Managing mulga grasslands

a graziers guide

Ian Partridge

QI96072

QUEENSLAND GOVERNMENT

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Information Series QI96072

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Department of Primary Industries
Queensland

Information series QI96072

ISBN 0 7242 6658 5
ISSN 0727–6273

First published 1996

This book has been published with funding
from the

Department of Primary Industries
GPO Box 46
Brisbane Q 4001

Contents

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The information in this book comes from a wide range of sources—from local graziers through the Local Consensus Data and Best Practice, from many officers of the Department of Primary Industries and Department of Natural Resources and from the CSIRO Rangelands Progam.

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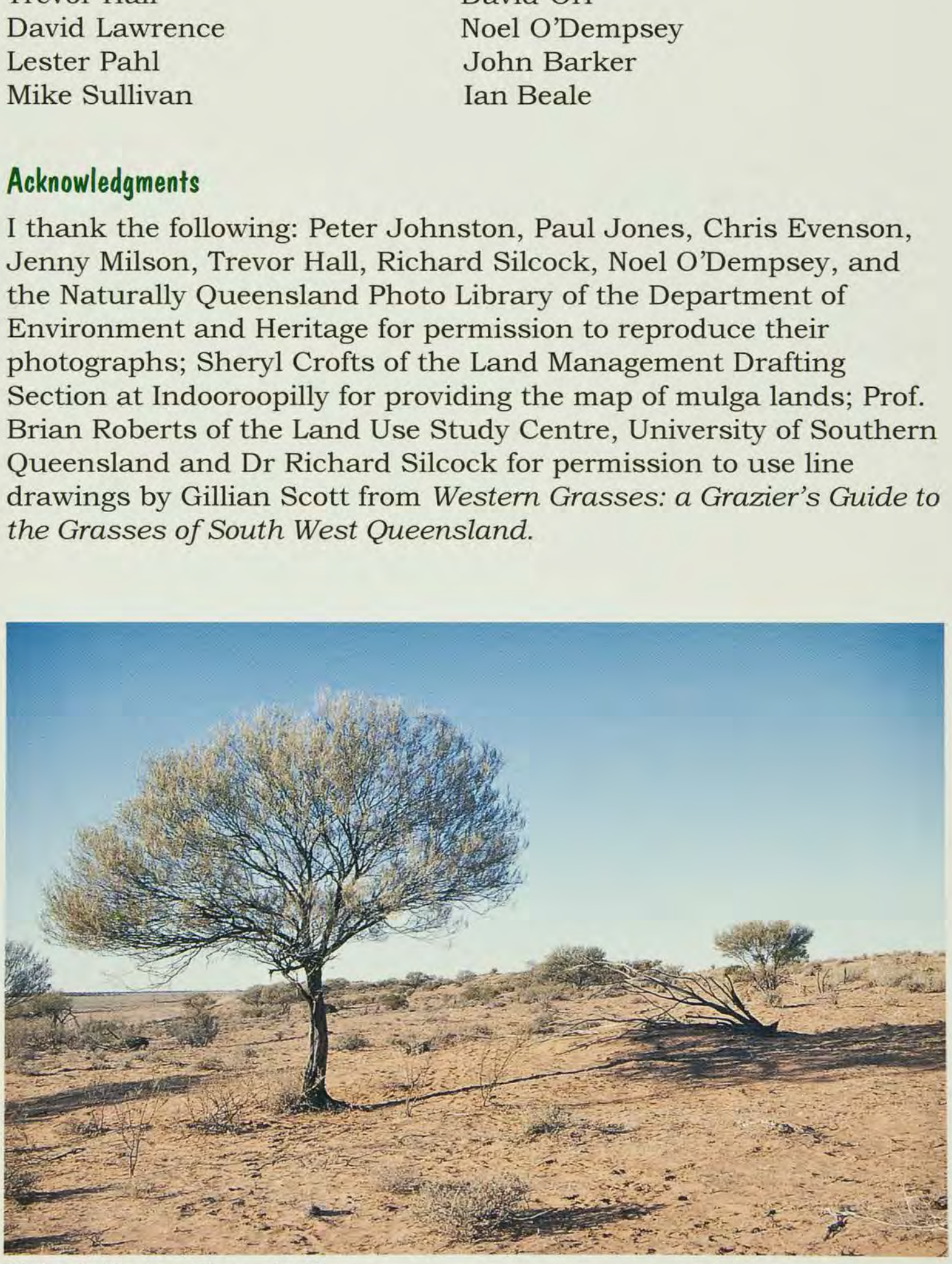
Acknowledgments

I thank the following: Peter Johnston, Paul Jones, Chris Evenson, Jenny Milson, Trevor Hall, Richard Silcock, Noel O'Dempsey, and the Naturally Queensland Photo Library of the Department of Environment and Heritage for permission to reproduce their photographs; Sheryl Crofts of the Land Management Drafting Section at Indooroopilly for providing the map of mulga lands; Prof. Brian Roberts of the Land Use Study Centre, University of Southern Queensland and Dr Richard Silcock for permission to use line drawings by Gillian Scott from *Western Grasses: a Grazier's Guide to the Grasses of South West Queensland.*



Mulga in far west Queensland

Preface

Successful graziers are successful because of their expertise in managing their livestock enterprise. Income from these livestock provides for the needs of the family and for future development of the property.

Most of these livestock will eat native pastures for all of their lives. However, even if stock are in good condition, it does not necessarily follow that the pasture is. A recent survey suggests that only a third of the total area of native pasture in Queensland is in top condition, the rest is under some sort of stress—some has been degraded too far to be recovered economically. The mulga areas are especially fragile and only about 20% of the area of the mulga lands of Queensland is in good condition.

The condition of this native pasture resource is of vital importance to the long-term profitability of each property, and hence to the viability of the pastoral industry in the mulga lands.

The Federal and State governments regard maintenance of our natural resources as one of their important functions. Commonwealth programs through the National Landcare Program and state programs through the Department of Primary Industries and Department of Natural Resources seek to help graziers to protect their asset for the present and future.

Property Management Planning plays a major part in the efficient use of the land. Whole property management involves planning for all aspects of the entire property—land, vegetation, livestock and finances; it must be followed up with suitable information and guidelines on the management of each aspect.

This book concentrates on the plant side of the livestock industry; I hope it will help you by:

- bringing together the knowledge that you already have
- telling you about management practices being developed through research
- stimulating more interest in what is happening in your pastures.

Mulga with cypress pine in the Maranoa

In a nut shell

Managing mulga grasslands is difficult and complex because of the poor soils, the low and unreliable rainfall, and because of the interactions between the grasses and the trees and shrubs and between the grasses and the domestic, feral and native herbivores.

There are no fixed recipes; instead you need:

- to understand how the different plants and grazing animals interact with each other
- to have some practical local guidelines
- to monitor—look closely at—the plants on the ground.

The key to sustainable use is managing total grazing pressure—matching the numbers of domestic stock and other grazers to the forage available.

Your safe long-term carrying capacity depends on the make-up of land types on your property, your average rainfall, the density of your timber and the present condition of your pasture; it can be checked against local experience or determined more specifically using the DPI's computer-based Safe Carrying Capacity Calculator.

Assessing pastures at the end of the growing season (March–April) allows you to adjust stock numbers for the next year according to the feed present.

Sustainable management incorporates:

- having adequate living areas
- matching total grazing pressure to available feed
- reducing grazing pressure during and just after droughts
- controlling grazing pressure from kangaroos and wild goats
- achieving and keeping some tree cover
- burning in good seasons to control woody weeds.

Much mulga grazing country is now in a condition that would need a machinery input to start to recover it.

Mulga near Charleville

Introduction

The aim—production with care

Good grazing management aims to achieve a level of production that can be maintained over decades—without the condition of the pasture deteriorating because woody shrubs increase, the grasses disappear or because the soil washes away.

Recent surveys suggest that only about 20% of the mulga lands in Queensland are in good condition. Some of the deteriorated pasture can be restored with reasonable rainfall—and with suitable management practices.

No fixed recipes

Mulga grasslands are the most complex and difficult to manage of all our native pastures—it needs special skills. Rainfall is low and erratic, flocks and herds take years to build up, returns are low, and costs have to be kept down.

There can be no fixed recipes for managing mulga pastures. Rather you need:

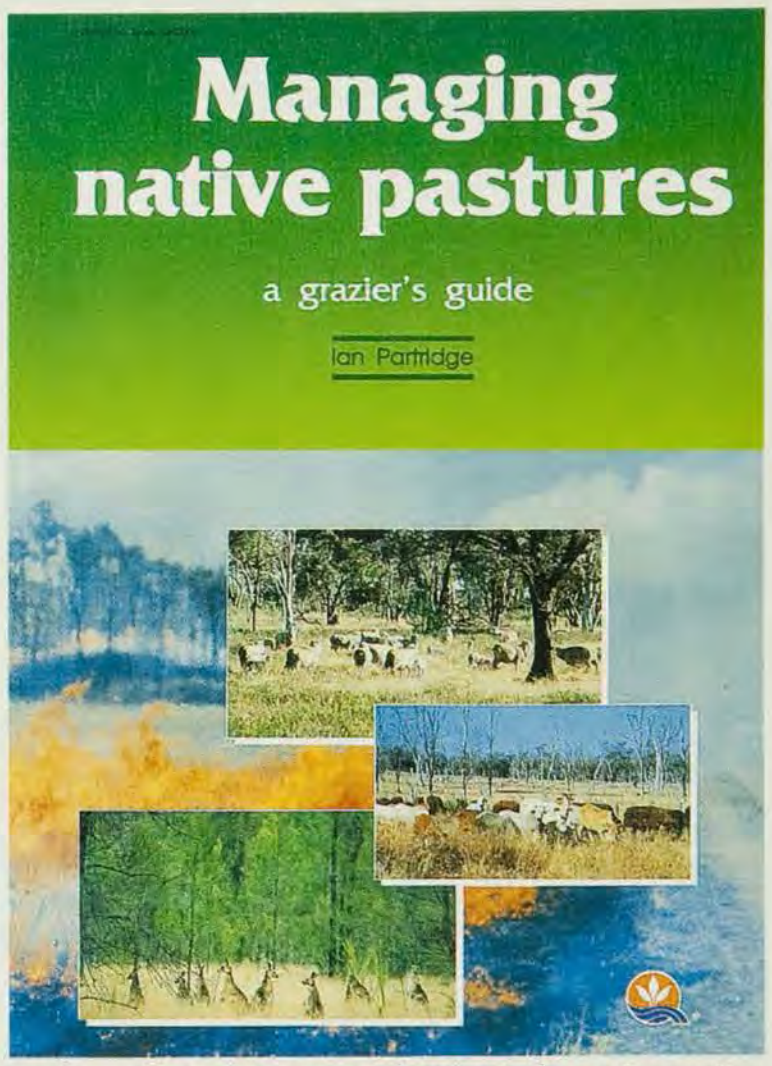
- to understand how grasses, trees, soils, grazing animals and climate interact with each other—their ecology
- to follow some practical guidelines which are based on local experience and research
- to check—monitor—for gradual changes or fluctuations that may occur in your pastures.

The basic principles of native pasture ecology have been described in ***Managing native pastures: a graziers guide.***

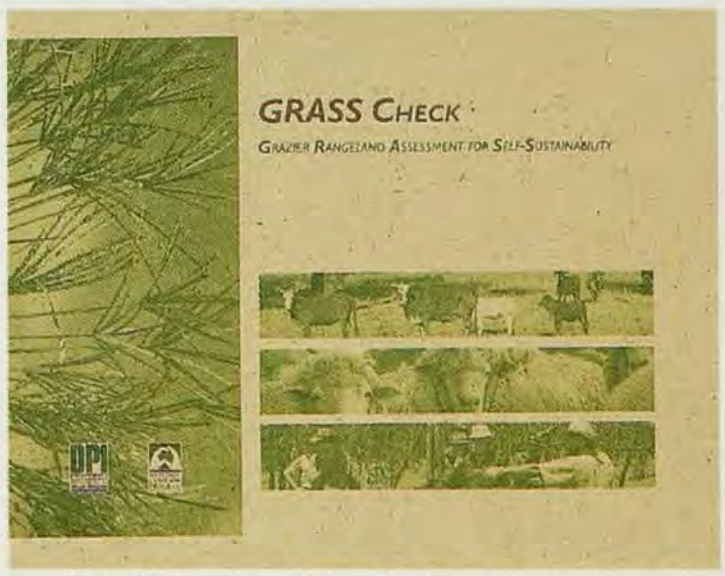
Methods of monitoring are described in a separate DPI publication **GRASS Check.**

This book provides general guidelines for managing your mulga country; it also helps you to identify some important grasses. Many other local plants are illustrated in ***Plant Identification in the Arid Zone, Pasture Plants of Southern Inland Queensland*** and ***Western Grasses.***

You probably already know most of the individual guidelines, but this booklet tries to bring them together to help you devise good management strategies. It may further stimulate your interest so that you will give management of your pastures equal consideration to the management of your livestock.



... describes the general principles of grazing management and ecology



... describes how to monitor pastures.

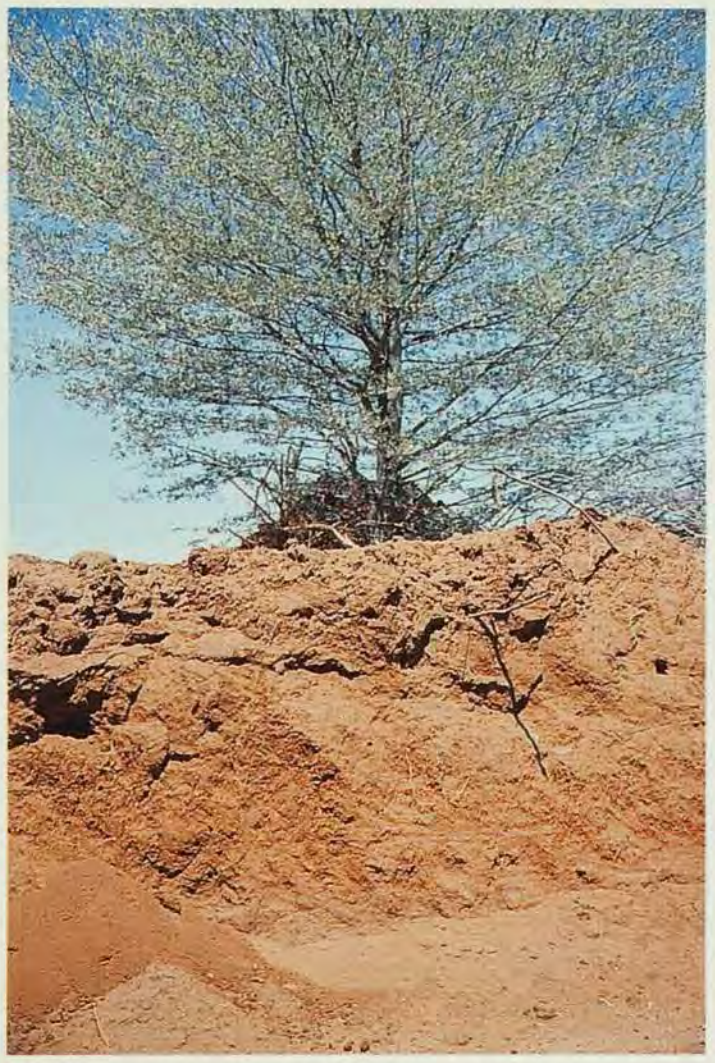
Charleville mulga – silvery leaves and an inverted umbrella shape.

Mulga

Mulga communities occur over about 1.5 million square kilometres of arid and semi-arid Australia—some 20% of the continent. Mulga (*Acacia aneura*) grows on infertile, acid soils where rainfall is aseasonal and unreliable.

Of the nearly 18 million hectares of mulga in Queensland, 'soft' and 'hard' mulga cover just over 10 million hectares of undulating red-earth plains and sand plains—the rest is on stony rough country.

Mulga plants across Australia are highly variable in form (ranging from shrubs to trees over 15 metres high) and in leaf shape and colour. Mulga 'leaves' are actually phyllodes—flattened petioles for true leaves that exist only in young seedlings.



Mulga grows on infertile, acid red earths and sands.

The 'Charleville' mulga is characterised by the inverted umbrella form of its branches, rising to about 12 metres, and by its silvery-blue, slightly curved leaves 3–8 cm long and 3–10 mm broad. This inverted umbrella collects and funnels rainwater down the main stem and into the more porous soil around the base of the tree.

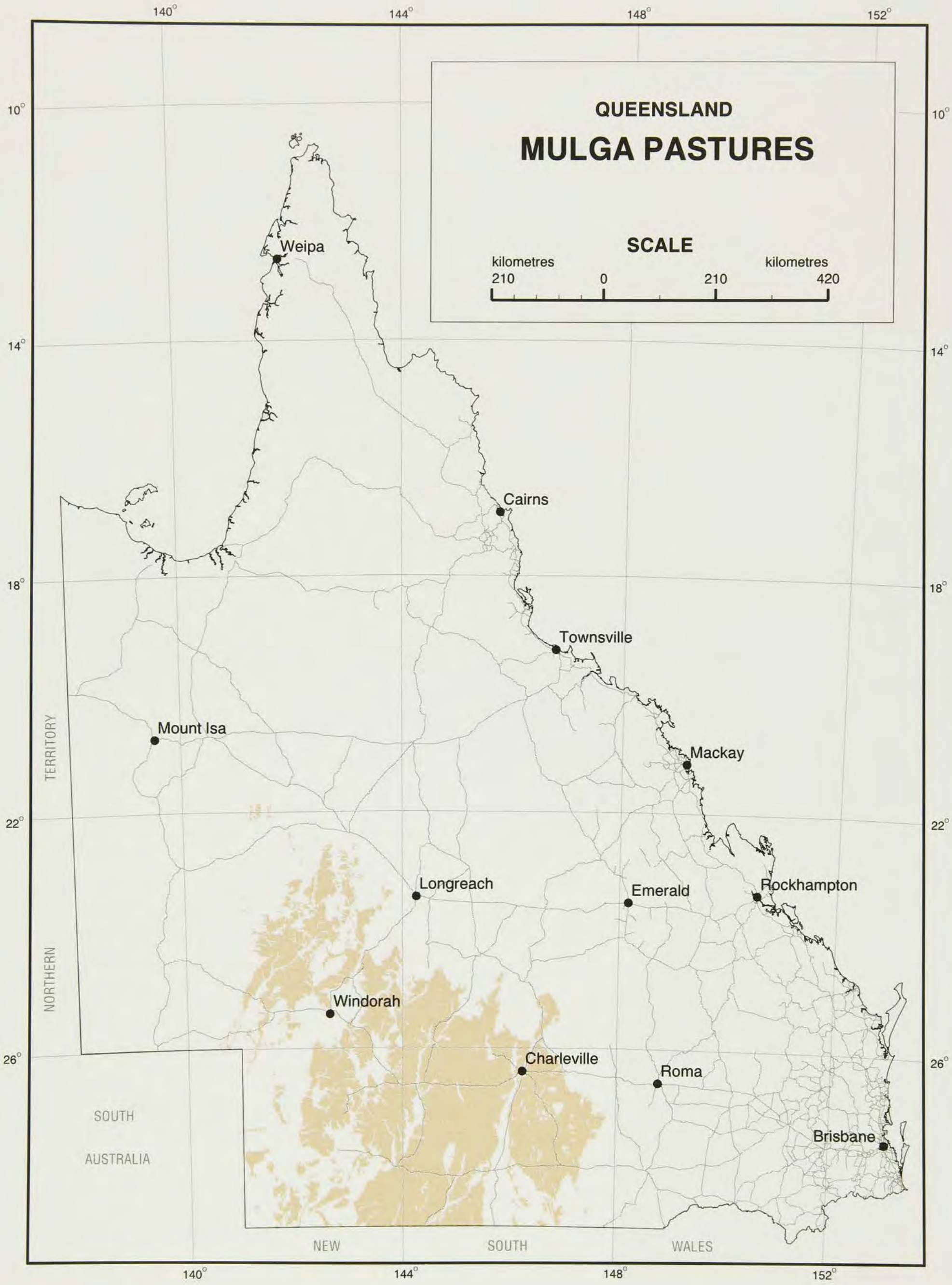
Stands of mulga often show 'layering', with two different heights and ages of trees, but few in between; this is sometimes attributed to massive regeneration from seed following those few years (10–15 years apart) with heavy summer rainfall. However, in south-west Queensland, mulga seed germinates every year, so 'layering' is more likely due to these seedlings growing very poorly in dry years while stock browse and kill them.

Within the mulga communities, four main land types are recognised: soft mulga, hard mulga, mulga sandplains and 'dissected residuals' or the rough stony hills. The vegetation ranges from tall mulga trees in association with poplar box on deep loamy red earths to an open short shrubby vegetation on shallow stony jump-ups; in the grasslands, mulga trees grow over a pasture of perennial and annual grasses, forbs and other shrubs. Mulga can surround large areas of mitchell grass found on cracking clay soils along the drainage lines of major streams such as the Warrego.

Mulga 'leaves' are actually flattened stems, and are more correctly called phyllodes.

Within a property, mulga may be only one of some 5–10 land types or land zones. These will be described later because the mix of different land types is the key to assessing an overall safe carrying capacity for your property.

(Also see the booklet *Property Development and Green Timber Treatment Guidelines for South-West Queensland*)

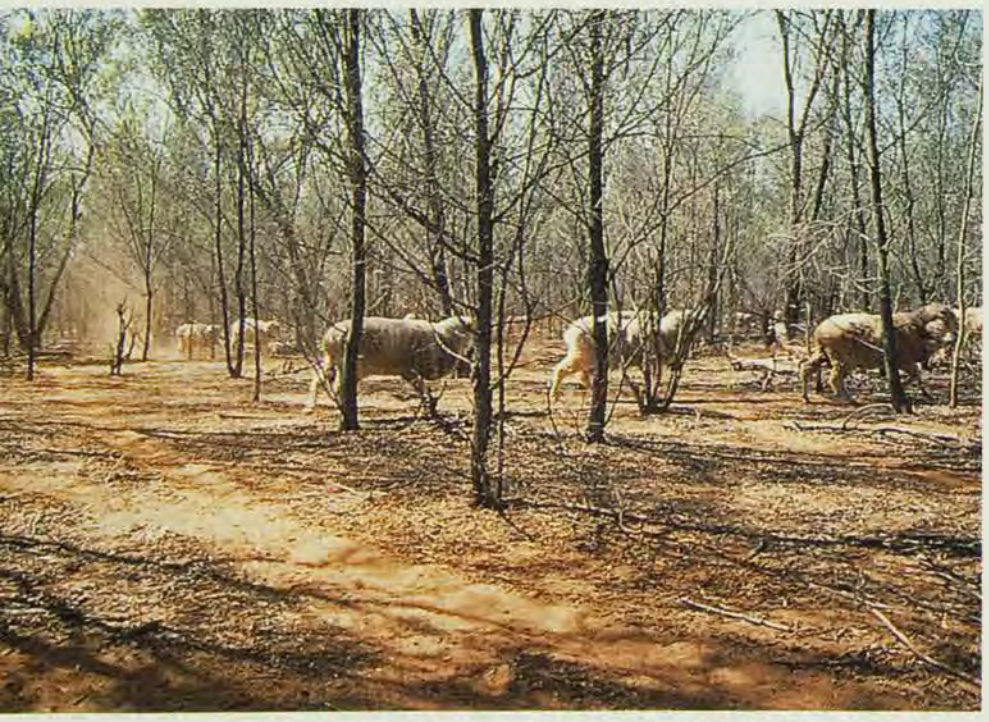


Map showing the area of mulga grasslands in Queensland

Mulga pastures under light grazing.

Mulga pastures under moderate grazing.

In the mulga lands, any grass is better than no grass.



Mulga pastures after years of heavy grazing.

Mulga pastures

When first settled, the mulga lands were probably a mosaic of relatively productive undulating grasslands and open woodlands. But they would never been vigorous, being constrained by the soil and climate.

In open woodlands with spaced large mulga trees and under low grazing pressure, the main species are the perennial grasses—kangaroo grass, silky umbrella grass, mulga oats, mulga mitchell, Queensland bluegrass and wiregrasses.

As grazing and other pressures increase, kangaroo grass disappears. Sheep prefer mulga oats and mulga mitchell, eating little of the wiregrasses. Thus, under heavier grazing pressure, these unpalatable wire-grasses become more dominant, while annual grasses, such as five-minute grass, and forbs, such as sida, also become more abundant.

Annual grasses provide useful grazing for a short time, but offer less stability and protection to the soil. Although the stemmy grasses have little grazing value, any perennial grass provides ground cover, while pores in the soil of their root zones act as 'wicks' for water infiltration, reducing water run-off.

With long-term over-use, all vegetation disappears, leaving only sand-blasted scalds.

Poor ground cover increases rainfall run-off on the slopes, especially during intense summer storms when 75% of the rainfall can be lost. This water may increase grass growth in run-on areas, but the slopes become even more degraded.

For and against mulga browse

For. The mulga tree or shrub is a legume the leaves of which have fairly high (10–12%) levels of crude protein. However, stock can digest only about 40% of this protein because it is protected by tannins.

Despite the tannins, mulga browse provides good feed throughout the year and is a valuable reserve feed during droughts. It will maintain the condition of animals, although it is not a production ration.

Against. The fragile nature of these pastures has been exacerbated by the use of mulga as browse. It has allowed property managers to keep too many animals during droughts, resulting in excessive grazing pressure on the pasture. As only vigorous pasture and fire can control shrub growth, there follows massive regrowth of mulga and woody weeds.

Open grassland under old man mulga has changed to mulga thickets with sparse wiregrass. Grass growth

declines as the tree stands become more dense. In the competition for water between trees, shrubs and grasses, the deep-rooted woody species win.

The problem of mulga regrowth has been recognised for a long time. In 1901, a Royal Commission was set up to look into the problem in New South Wales, probably after mulga feeding became a common practice during the severe and long drought at the turn of the century.

More damage to the mulga lands occurred during the 1930s resulting from closer settlement, the Depression and recurring droughts. Even larger areas were affected in the 1950s, made easier with chain-saws and mechanised pushing.

Grass growth declines as mulga becomes more dense.

Mulga thickets or bare ground

The lack of fire has allowed mulga regrowth and unpalatable shrubs so thick that some land now has little grazing value. Mulga populations are now often as high as 12,000 stems/ha, while woody shrubs, such as turkey bush, hopbush, turpentine, cassias and false sandalwood, occupy open spaces where tree cover is less dense. As the density of trees and shrubs increases, grass production declines.

Mulga's only natural enemy seems to be grass-hoppers, which can cause localised damage. There are no effective enemies of many of the other shrubs.

Where managers have tried to maintain their flock size, excessive grazing pressure on the remaining grasses has led to loss of ground cover and increased soil erosion from wind or water. Some highly erodible soils in mixed mulga–box country have developed deep gullies; other hard-setting soils suffer sheet erosion to form extensive scalds.

Bare soil deteriorates quickly in the mulga lands as the top few centimetres of soil contain most of the available nutrients and organic matter. When this is lost, the soil surface seals, reducing rainfall infiltration. Increased run-off results in a near-constant drought for existing herbage, while few seedlings can establish on the scalded, often sand-blasted, surfaces. About half of the grass seedlings that do emerge die within 14 days, and less than 10% will ever flower and drop seed.

These mulga trees were killed by grasshoppers.

Scalds—the end.

Droughts are part of the normal cycle...

... often broken by flooding rains.

Rainfall produces grass.

Rainfall and droughts

Average annual rainfall in Queensland's mulga region ranges from 500 mm in the east to 200 mm to the west. In the south-west of the state, about 65% of annual total is summer rain, falling between October and March, with the rest over the cooler months.

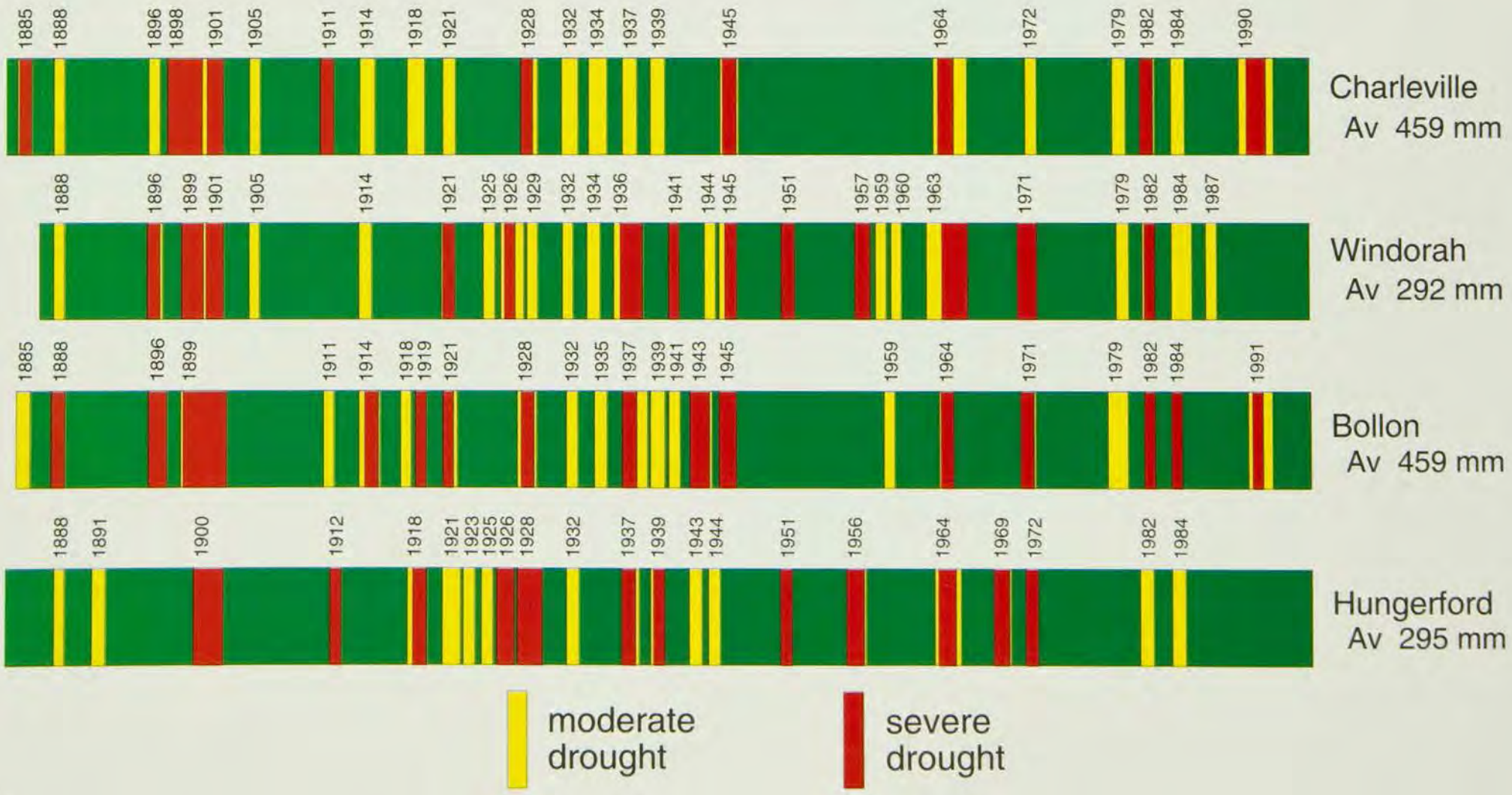
Rainfall varies greatly from year to year, with a severe drought every 5–7 years, and enough rain for good pasture production in about four years in ten. Good summer rainfall is needed for grasses to recover from heavy grazing and to set abundant seed, but the best years for sheep production are usually those with well distributed winter rainfall which produces plenty of good-quality annual forbs, and gives green feed throughout the year

Droughts are defined here as severe rainfall deficiences over a mininum period of 12 months. A moderate drought has rainfall less than that received in the driest 10% of years, a severe drought less than that received in the driest 5% of years—at any particular district.

Most droughts occur as a failure of the rains during one summer, but longer-term droughts over after a sequence of dry years have major consequences for stock and pastures.

The occurrence of moderate and severe droughts for Charleville, Windorah, Bollon and Hungerford over the last century is shown below.

Droughts are a normal part of the climate. They do not come round at regular intervals, but will keep occurring in the future, and must be planned for as a normal part of property management.



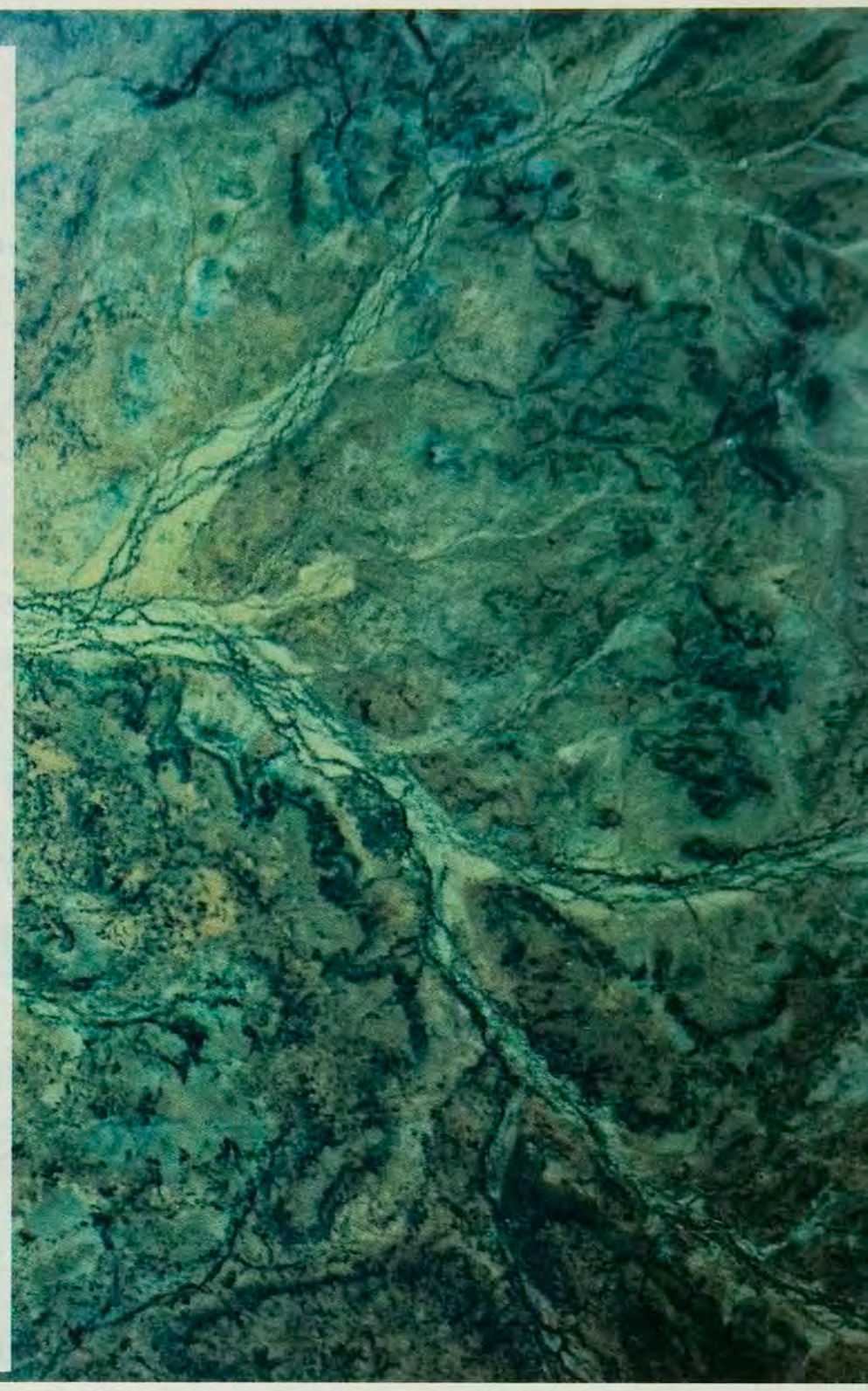
Properties

Individual leases in the mulga region average around 10,000 hectares, but many graziers run amalgamations of three or four leases as one unit; thus total enterprises average 20,000 hectares east of the Warrego River and 50,000 hectares to the west. Properties are smaller in the Maranoa where mulga is mixed with other, more productive, land types.

Original property sizes were extensive, but many large pastoral leases were sub-divided between World War 1 and the 1960s. While small properties have given a good living in times of high wool prices, most are marginal to uneconomic with present price trends, and they provide little opportunity to stock lightly or to spell paddocks. It is often considered that about 10,000 dry sheep equivalents are now necessary for a viable property, but this depends on debt levels.

Property management planning

Graziers have long been planning their properties. The DPI's *Property Management Planning* (PMP) program aims to strengthen their skills for all aspects of the enterprise (land, personal, financial and production), building on their existing local knowledge and expertise.



Satellite images are useful for planning large properties.

PMP involves:

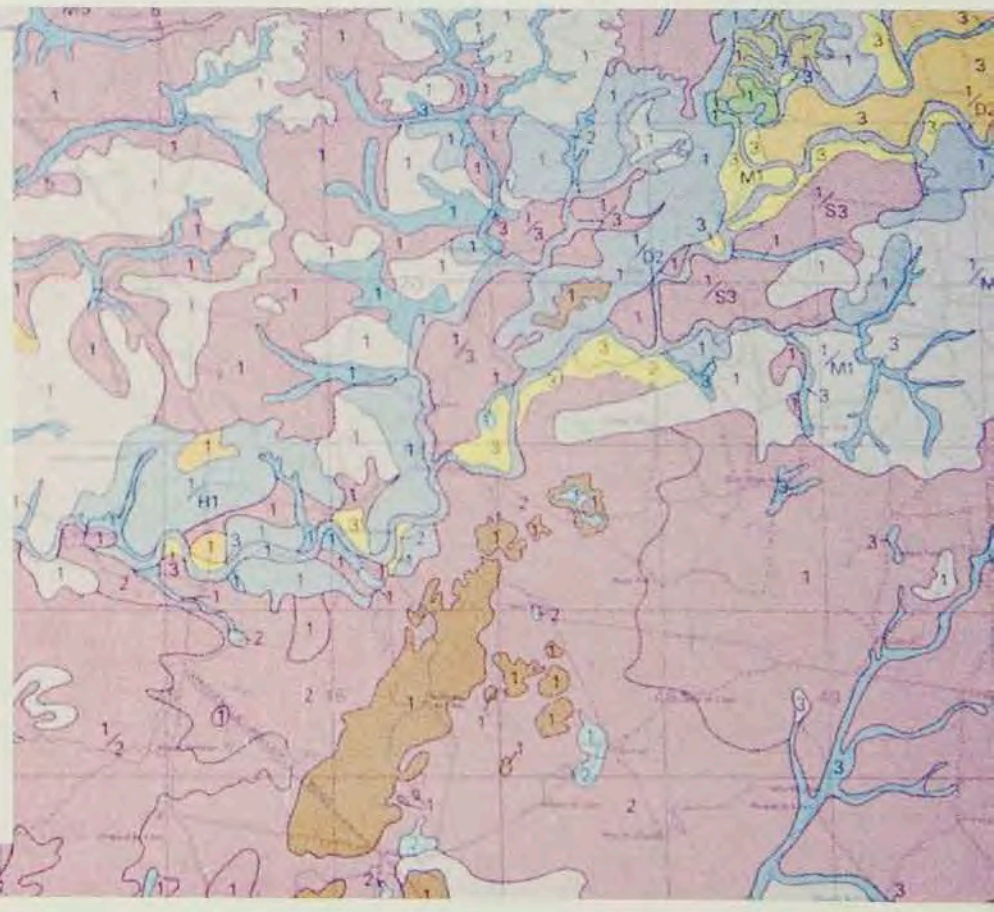
- mapping the resources of land, water and infrastructure
- planning future management and improvements
- managing and monitoring areas of weeds, land degradation and conservation
- considering the financial costs and benefits of management options
- risk management
- assessing whether the resources can achieve the plans.

Land management types

Graziers recognise that their properties and paddocks are made up of different types of land with differing soils, vegetation and differing potential production. These are classified locally as 'land systems'; local land systems are grouped into broader 'land zones', such as soft mulga, hard mulga or alluvial plains.

Land types needing greatly different management, for example alluvial frontage country, should be fenced separately where practical.

Land systems are the basis for calculating sustainable carrying capacity for paddocks, and thus the whole property, in the mulga region.



All mulga properties have a mix of land types.

Land zones

Local land systems are grouped into land zones.

The following zones are recognised in DPI Land Use studies, and are used in the Safe Carrying Capacity Calculator. (See the section on stocking rates and assessing safe carrying capacity).

Soft mulga (M)

Soft mulga (Zone M) is the best of the mulga country with flat or gently undulating slopes and moderately deep sandy or loamy red soils; it carries the best pastures as grassy woodlands with tall mulga and with eucalypts such as poplar box on the more fertile and moister soils of run-on areas.

Hard mulga (Zone H) is, as its name suggests, harder country. The soils are more shallow and more gravelly or stony, and the slopes more undulating. The woody species are less tall and more shrubby.

Hard mulga (H)

Mulga sandplains (Zone S) are flat or gently undulating, and carry open mulga as tall shrubs, sometimes as woodland. The sandier soils are often deep but are highly susceptible to wind erosion.

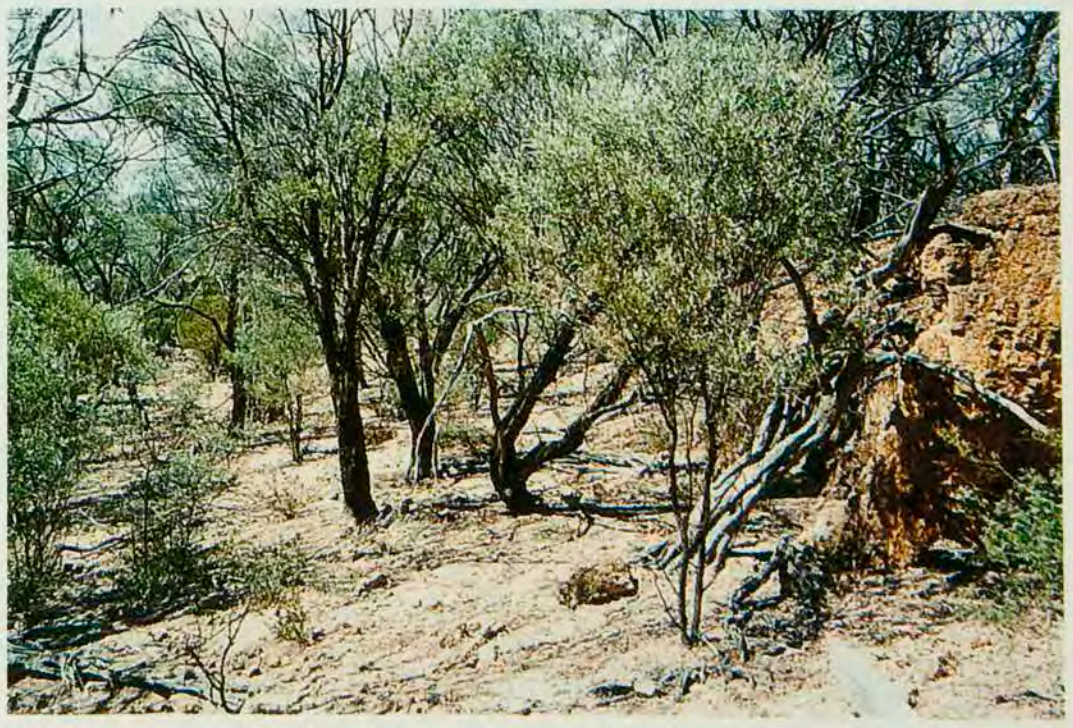
Dissected residuals (Zone R) are the steeper slopes or tops of hills—jump-ups; the soils are very shallow and often stony. The mulga is low open shrubland, often with bendee, mountain sandalwood and lancewoods.

Other land zones associated with mulga are:

(A) Alluvial plains open, (B) Brigalow, (C) Channel country, (D) Dunefields, (E) Poplar box, (F) Mitchell grass downs, (G) Gidyea, (L) Claypans, (N) Spinifex, (T) Wooded downs, (W) Alluvial plains woodlands.

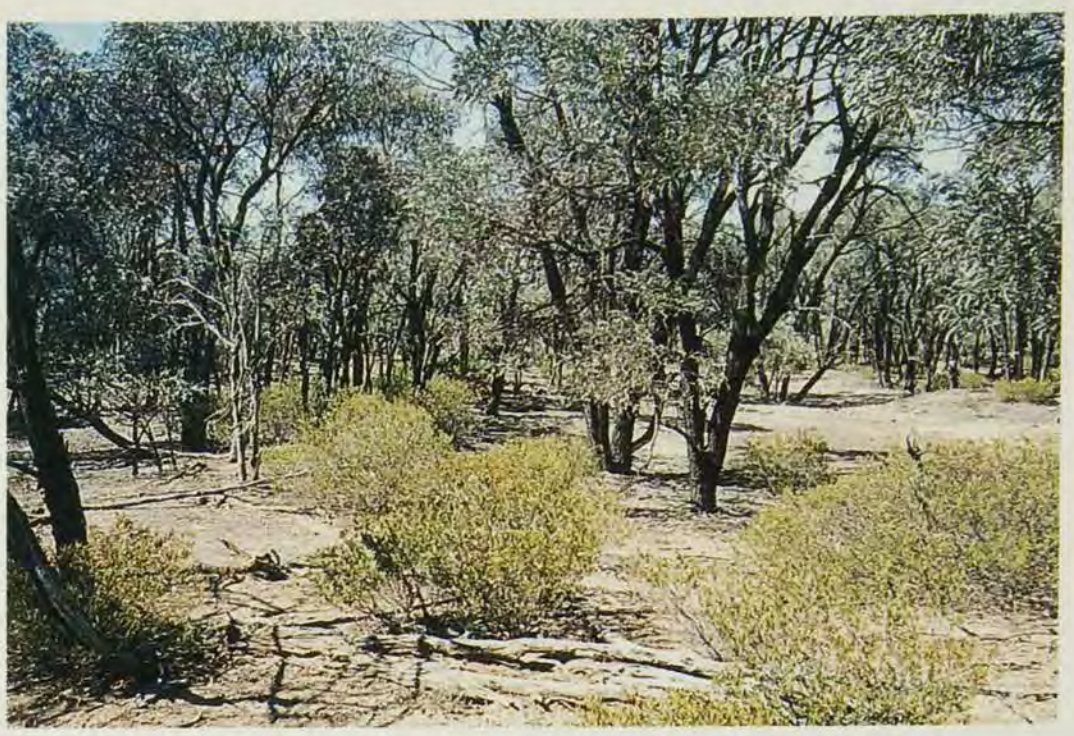
Note: Unfortunately the Land Clearing Guidelines use different definitions of 'Soft' and 'Hard' mulga. Their 'Hard' mulga is 'open, stunted mulga on shallow and stony soils', often on jump-up country (our Zone R), and is generally west of the Bulloo River. Check the definition before planning any clearing and see page 25.

Mulga sandplains (S)



Dissected residuals (R)

Alluvial plains open (A) with some W



Brigalow (B)

Dunefields (D)

Poplar box (E)

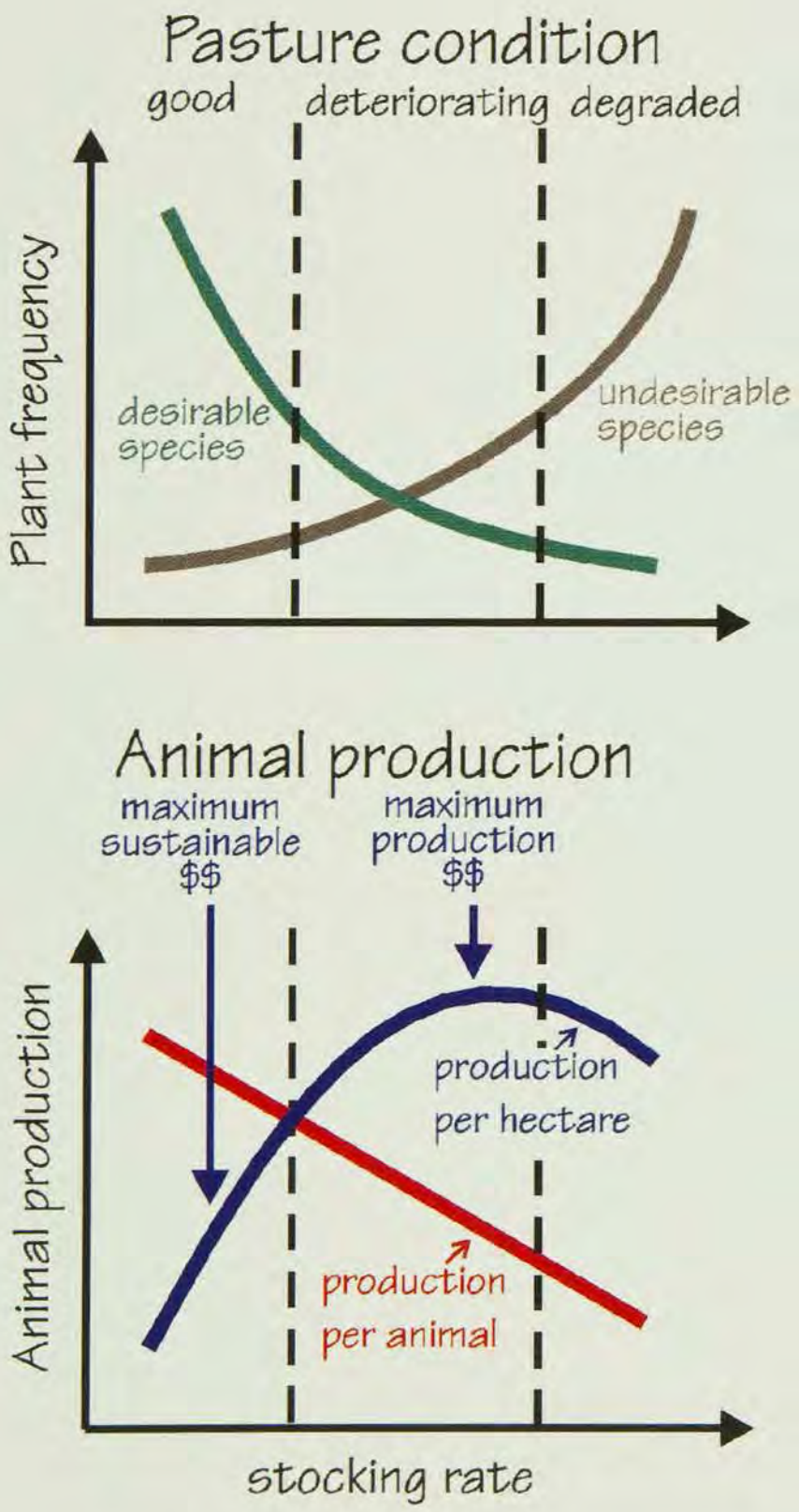
Mitchell grass downs (F)

Gidyea (G)

Wooded downs (T)

Alluvial plains woodlands (W)

Ideal mulga grassland. Stocking rate is the most important factor in grazing management.



Sustainable economic returns come from stocking rates below those giving the maximum animal production per hectare.

Management guidelines

The mulga lands are characterised by soils of naturally low fertility and poor structure, and a marginal and unreliable rainfall. This means there are few simple options for managing the pastures and, once pastures have been degraded, little money can be spent on rehabilitation.

Most property management has focused on infrastructure, such as buildings, fencing and water supplies, and pushing mulga for dry season feed.

The pasture management options are:

- setting stocking rates
- managing kangaroo and feral goat grazing pressure
- moving stock and spelling
- burning
- controlling woody weeds.

Setting stocking rates

Stocking rate is the most important factor in managing your grasslands; it has an over-riding effect on both pasture stability and animal production.

Light to moderate stocking is sustainable, and will keep land and pasture in good condition while allowing each animal to be more productive.

Stocking too heavily weakens the valuable perennial grasses, encourages short-lived grasses and woody weeds, exposes the soil to erosion, limits animal production and increases the need for dry season feeding.

Stocking rate describes how many domestic stock are being carried on a unit area (e.g. 0.3 sheep/ha). A more valuable term may be ***grazing pressure*** which describes the feed demand of your stock on the feed supply, or amount of herbage available Thus the grazing pressure of 100 sheep would be much higher in a paddock of poor mulga pasture than in a similarly sized paddock of good mitchell grass.

Carrying capacity

The safe carrying capacity of your property describes the stocking rate that your land can carry without the pasture losing condition or productivity in the long term.

It indicates the *average* number of stock your land can carry *in its present state*. Most deterioration in the mulga lands can be attributed to carrying too many stock at critical times such as when the grass is trying to recover after a drought.

When you set the size of your flock and herd, you must take into consideration all the other herbivores that you may be carrying.

If it is practical, you can vary your stock numbers each year according to the rainfall received, but the long-term average should not exceed the safe carrying capacity.

Carrying too many stock, especially under dry conditions, degrades pastures

Is carrying capacity the same as stocking rate?

Safe carrying capacity differs from historical stocking rates in many ways.

Safe carrying capacity	Historical stocking rates
long-term	short-term
based on –	
land type	
land condition	often on stock condition
determined primarily by –	
land productivity	management decisions
directly lowered by –	
degradation of pasture	degradation often not considered
calculated from –	
safe levels of feed use	indirect links with feed use
all available information	often restricted information

How can I calculate my safe carrying capacity?

To calculate your safe carrying capacity, you need considerable information about the mix and condition of your vegetation. For further information, you should contact the Department of Primary Industries or the Department of Natural Resources at Charleville.

Safe Carrying Capacity Calculator

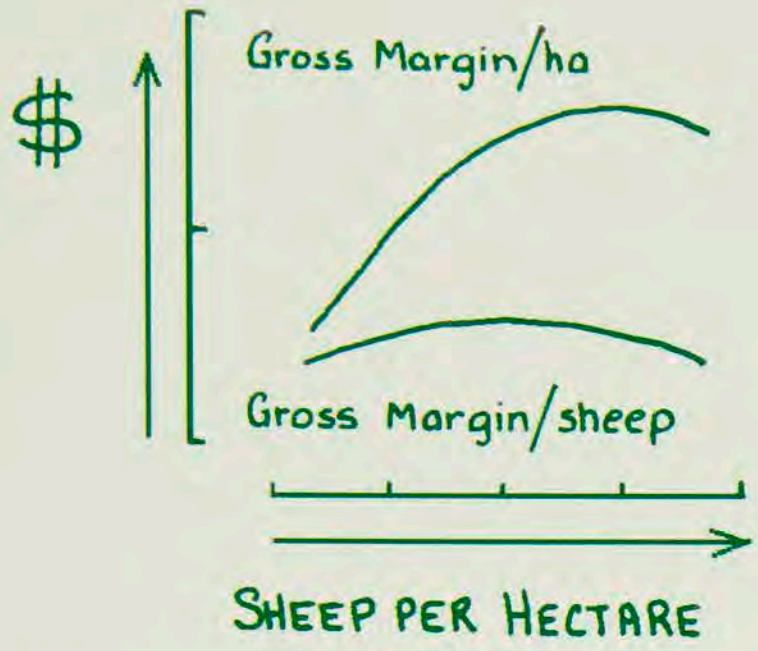
The Safe Carrying Capacity Calculator (SCCC) is a computer-based program to help graziers manage their land. It is part of the 'South-west Strategy'.

The areas of the different land systems (see photos in previous chapter) are calculated from aerial photographs of your paddock or property, while the present condition of the pasture in each land system is assessed on the ground. Pasture condition includes ground cover from grasses, the level of infestation with woody shrubs and the canopy cover from tall trees or shrubs. Allowances can also be included for the browse value of mulga, or frequency of flooding of frontage country.

Results from the GRASP program in the SCC estimate herbage production in the paddock in an average year from our knowledge of the soil type and local climate, and as modified by the present condition of the pasture. The number of stock (dry sheep equivalents) able to be carried on the property or paddock is calculated by allowing a safe level of utilisation (15–20%) of this herbage production.

This level of utilisation already takes into account the loss of feed to other herbivores (roos, goats, rabbits, grasshoppers.)

You can compare the 'safe carrying capacity' with your present or past stocking rates.



Lightening off stocking rate does not penalise the gross margin per sheep.

Short-term profits may sometimes be higher with heavy stocking, but they cannot be maintained without damaging the resource.

Can you remember when your turkey bush became so dominant?

How else can I check my stocking rate?

Until the Safe Carrying Capacity team have assessed your paddocks in greater detail, you can check against the stocking rates which have been recommended by groups of local graziers for different types of country.

These recommendations are naturally fairly broad; you can refine them with more localised experience or by monitoring your pastures to see if they are improving or deteriorating with time.

Recommended broad stocking rates

Land zone	SR (dse/ha)
Soft mulga	0.2–0.3
Hard mulga	0.1–0.3
Dissected residuals	<0.1
Mitchell grass	0.5–0.8
Alluvial plains	0.7

A grazier who runs a low stocking rate may make slightly less money than one who buys stock in good years and sells in bad years, but he will have a steadier income and fewer risks or ulcers.

Why monitor pastures?

Monitoring is a fundamental part of setting appropriate stocking rates to manage native pastures for sustainable use. Although you may be stocking near your safe carrying capacity, it may take several years before the condition of your pastures improves.

Memories are short and selective. Can you recall exactly what each of your paddocks was like five or ten years ago?

Your variable rainfall will cause year-to-year fluctuations in species and yield but, if the condition of your pasture is poor in three out of five years, you had better take notice when calculating stocking rates.

Can I alter my stock numbers from year to year?

The Safe Carrying Capacity project calculates the average safe carrying capacity of the paddock or property, but it is up to you if you want to alter your flock size each year according to the past seasons. Sometimes this is practical, sometimes not.

How do I calculate a stocking rate for next year?

One way to set a conservative stocking rate for the next year is to estimate how much feed is available at the end of summer (see the section on monitoring), and then assume that you will get next-to-no rain over the next 12 months. Thus the feed present at the end of this summer has to be enough to carry stock safely

through this winter and the next summer. If it does rain, that's a bonus that can be 'cashed in' next year.

Stock numbers should be adjusted so as to eat (utilise), over the next year, only 20% of the feed standing in March or April.

One dry sheep equivalent (DSE) will eat 400 kg of dry matter a year. If the standing feed in the paddock in March is 800 kg/ha of dry matter, and you allow only 20% to be used, there will be 160 kg of feed available—enough for one sheep (DSE) per 2.5 hectares. One adult equivalent (AE) of cattle is usually equal to 8 DSE in southern Queensland; one goat is also 1 dse.

While sheep,cattle and domestic goats for meat are somewhat interchangeable, they can complement each other by eating different plants and different parts of the plant—if there is enough feed to allow this.

Stock graze along open bore drains but may not use the back of the paddock.

How important is distribution of water points?

Your effective stocking rate has to take into account the distribution of water points in large paddocks (as well as the kangaroos and goats you are carrying).

In summer, sheep will range only about 3 km from water—cattle 5 km—and they may have to return twice a day. Long bore drains have allowed stock to spread well along the drain, but back areas of the paddocks are often under-used and may actually be in a better condition.

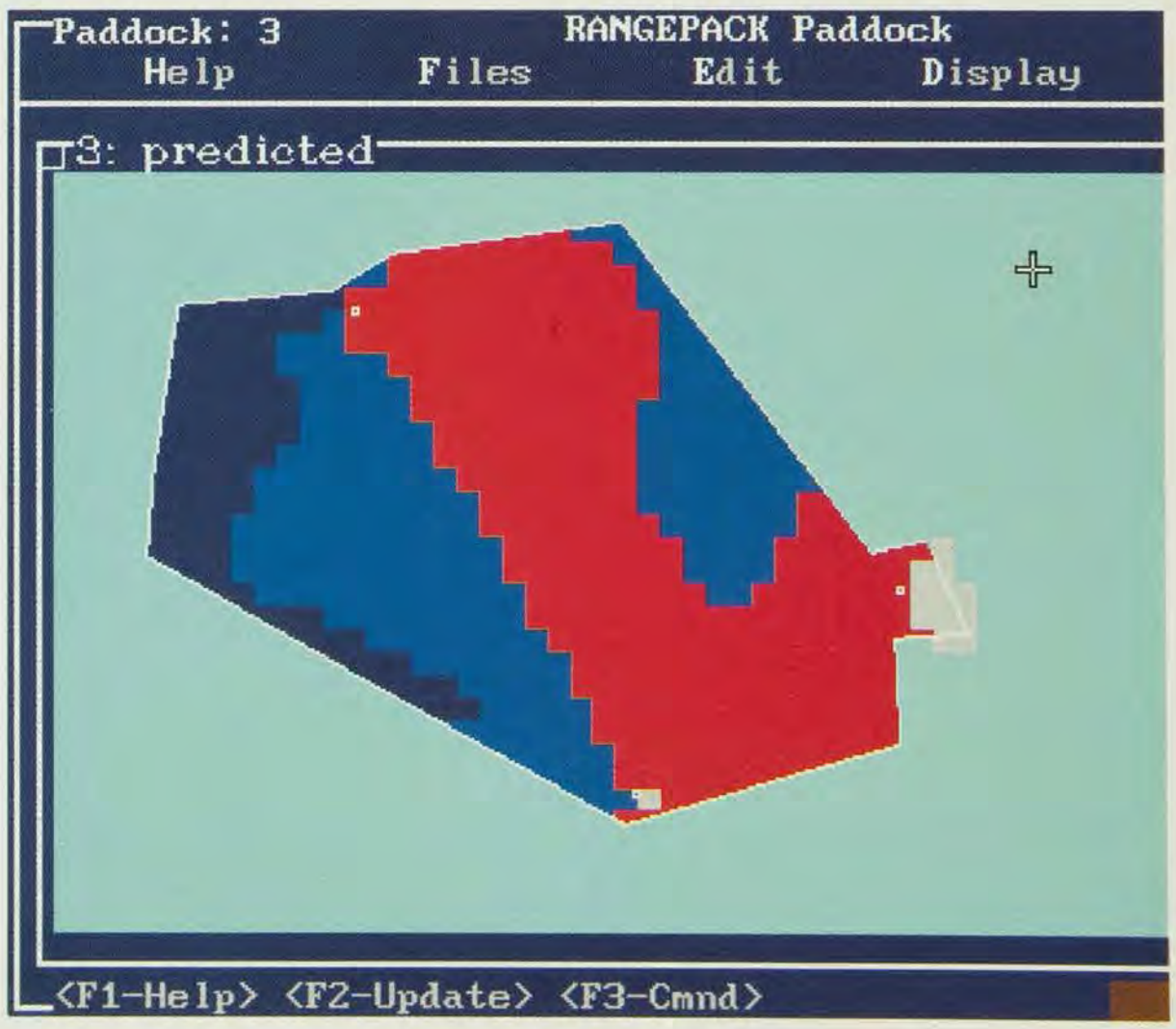
When artesian bores are capped, the new water points should be sited to allow even grazing over all of the paddock.

Capped bores conserve water. Piping and troughs allow better distribution of water points.

Where should my water points be placed?

Water points should be sited in relation to fencing, prevailing winds and the types of country that stock prefer to graze.

The PADDOCK module of CSIRO's computer decision support program HERDECON can allow you to enter these factors on a paddock plan, and to test re-arranging water points to achieve the most even grazing over the whole paddock.



Total grazing pressure includes your cattle and sheep...

... and feral goats (and rabbits)...

and native kangaroos.

Total grazing pressure is the key to sustainable land use; populations of sheep, kangaroos and goats have to be reduced if they get too high.

Managing total grazing pressure

'Total grazing pressure' reflects the total demand for feed from all herbivores—domestic, feral and native—relative to the herbage and browse available in your paddock. It is much higher than the grazing pressure from your stock, and all these animals have a significant effect on pasture composition and cover.

There are now about 3.5 million sheep, 0.3 million cattle, 2.6 million roos and 0.25 million goats in the mulga lands. This is equivalent to about 25 sheep, 12 kangaroos and 5 goats per square kilometre; there may be twice as many next to mitchell grass downs. Goat numbers have halved over the last few years as better prices are being paid, and the new goat abattoir in Charleville should provide a more reliable market. Some graziers are starting to rear—rather than harvest—goats, and have introduced Boer goat bucks to increase carcase size. Rabbits can be a local problem in the western mulga districts and along major rivers.

While you can control the numbers of your sheep and cattle, kangaroos know all the bounds and none of the boundaries; they graze where ever water and grass are available. Graziers often say kangaroos and goats are the main reason why they do not introduce systems of better grazing management; when they try to spell a paddock, large numbers of roos and goats invade.

Conservationists may claim that soft-footed macropods are more suitable for fragile country than hard-hoofed ungulates, but no-one can consider changing from running sheep to farming kangaroos until the latter is more profitable.

How much feed do roos and goats eat?

Three kangaroos eat about as much as two sheep, one goat eats as much as one sheep; grass is the main diet, and all will overgraze pasture when it is in short supply.

Roos are almost exclusively ground-herbage eaters, tending to browse less shrub than either sheep or cattle; goats on the other hand eat more browse. But all eat grass.

How can I manage the roo and goat problem?

Shooting. Shooting can turn a problem into a profit. Professional shooters are in business to make money from meat and hides, but have to operate on a roo quota set by the Federal government. Shooters prefer the large males, whose demise has negligible effect on

the population. Once the local population does drop, shooters move to more bountiful hunting grounds. Shooting for effective control of numbers may mean employing shooters specifically for that task.

Shooting may have most impact on the local roo population when their numbers are low during a drought; but by then the pasture has been damaged while the hides and carcasses are in poor condition and worth little. A better method is to concentrate harvesting at the end of summer and when going into dry times—standing pasture is conserved, and the animals are in good condition.

Shooting roos can be effective on open downs, but is less so in dense mulga country where vehicle access and visibility are poor.

Shooting is still the most effective way to control roos.

Shooting is not an effective method of control of goats; it works against small mobs of less than five goats, but larger mobs or herds are better mustered by plane or trapped.

Trapping. Goat populations are best controlled by mustering with a plane, or by trapping, before selling the animals live for meat. It is illegal to trap roos.

Turn off the water. Capped bores or troughs can be turned off to spell a paddock if there is no other source of water. But roos and goats may travel up to 10 km to water.

Fence off reticulated waters. A roo-proof fence with swing or trap gates for cattle and sheep around your water point may persuade roos to drink elsewhere.

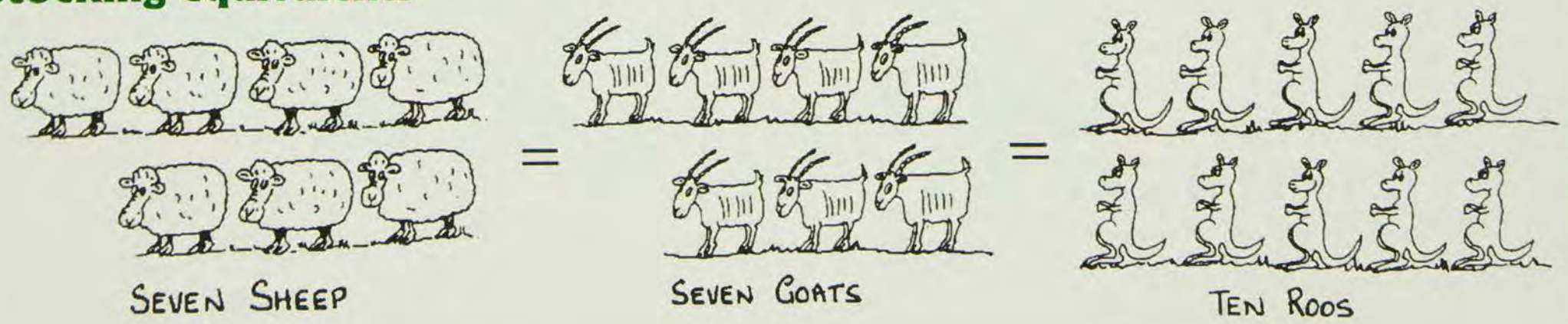
Finlayson trough. The Finlayson trough uses a strategically placed electric fencing wire to deter kangaroos from the water trough while allowing sheep access. It has not been found effective.

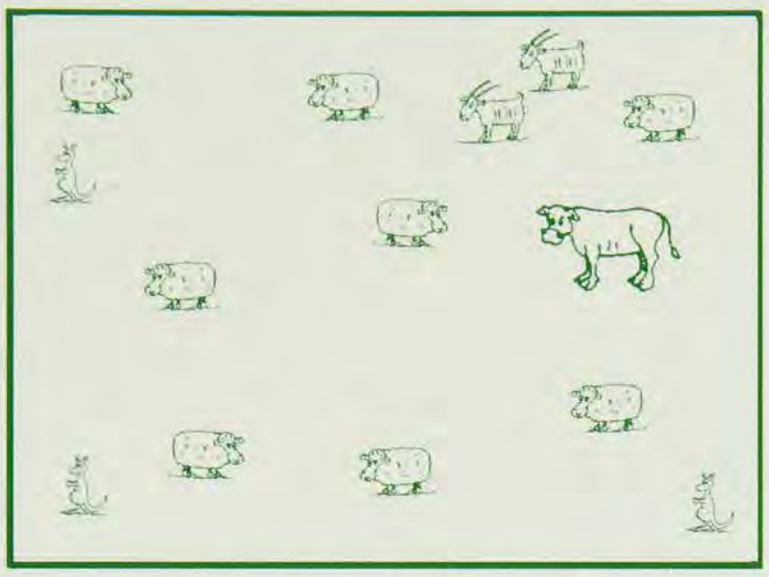
There is no easy method of effective management of roos. Some methods, such as restricting access to water supply, merely push the problem towards a neighbour unless a harvesting programme is initiated by a group of properties at the same time.

Spear-traps may persuade roos to drink elsewhere.

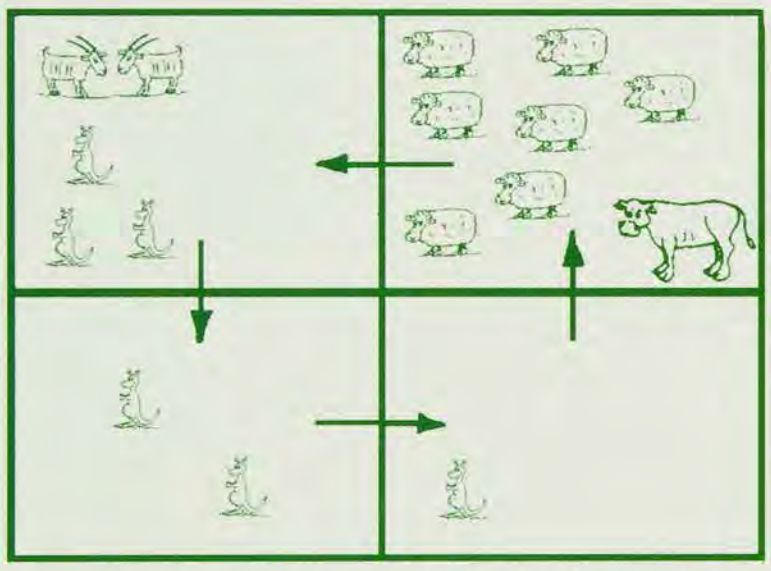
Reducing the number of kangaroos should never mean their annihilation.

Stocking equivalents

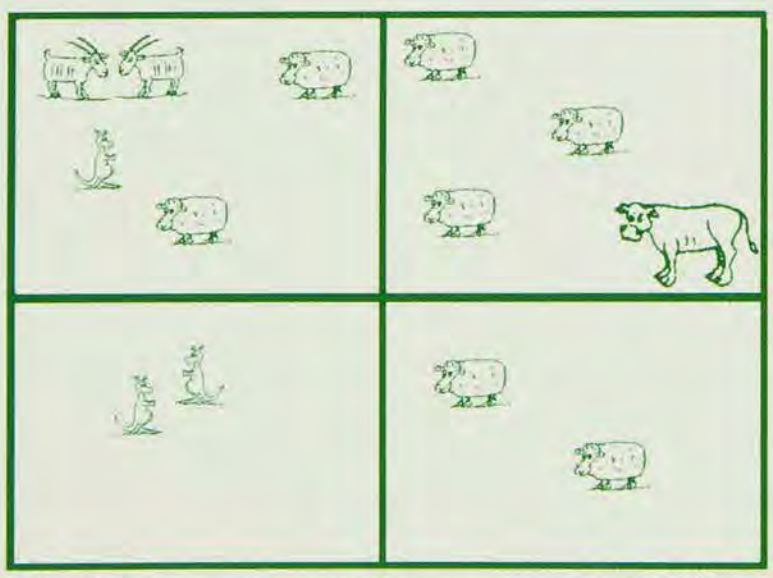




Continuous grazing—stock spread out.



Rotational grazing—periodic high grazing pressure.



The best system—continuous grazing with fewer stock, opportunistic spelling and roo control.

Moving stock and spelling

Stock can be moved between paddocks under various grazing systems, or moved off the property for agistment or sale.

The total number of animals on the pasture is generally much more important than how they are moved around.

What grazing sytems might be useful?

Stock can be grazed continuously or rotated between paddocks; a paddock can be rested or spelled.

Stock are often moved between paddocks, but this has generally been to manage the animals rather than the pasture.

While any form of strict rotational grazing (including cell grazing) has little relevance on extensive properties in the mulga lands, spelling can definitely be beneficial on heavily grazed paddocks—provided kangaroos and goats are controlled at the same time.

What is the best system for mulga pastures?

The best system is the one with the right number of stock!

Is continuous grazing the same as set stocking?

Not necessarily. In continuous grazing, animals are not moved between paddocks, but the number of stock can still be adjusted to the feed available.

In set stocking with the same number of animals every year, they may eat 80% of the feed in dry years and only 10% in the wettest years.

If set stocking is the only practical system on your property, you should not exceed the safe carrying capacity. This will allow the pasture to recover in between droughts.

What's opportunistic spelling?

This means that, in a good year, you do not increase stock numbers greatly to eat all the feed available. Instead you allow the grasses to recover from the bad years, to build up their reserves and the size of the tussocks, and to drop plenty of seed. Spelling during dry times does little for the plant.

Generally spelling is possible only during a good year when there is plenty of grass everywhere, and hence when kangaroos are well spread out and less likely to concentrate on the spelled paddock.

When do I adjust stocking numbers?

Stock numbers should be adjusted at the end of the growing season in March–April after checking the amount of feed in the paddock. Stock should be in good saleable condition at this time.

In a good season, the decision to spell some paddocks can be made partway through summer.

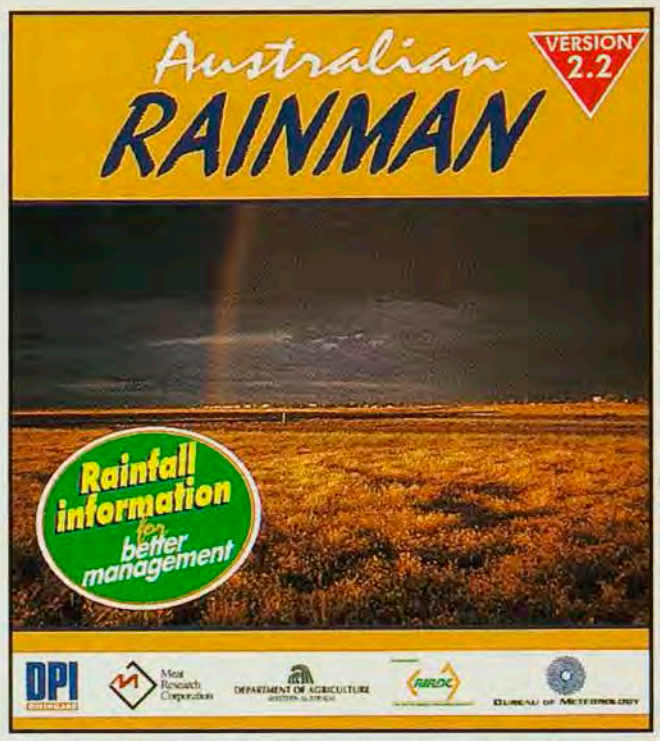
Stock numbers may have to be adjusted at normal mustering times. For sheep, this could be at marking, weaning, crutching or shearing depending on the timing of these operations. Cattle numbers can be adjusted at weaning in April or May.

Maintain flexibility in stock numbers for good pasture management.

'God's will' or can we forecast droughts?

Until recently, the causes of droughts were not understood and we accepted them as random events. Now with better understanding of our weather systems, we can sometimes get a forecast of the seasons ahead using the Southern Oscillation Index (SOI).

The DPI computer package – AUSTRALIAN RAINMAN – can look at the present value of the SOI to calculate the probabilities of rainfall in your locality months ahead. The SOI usually changes in autumn so forecasts cannot usually be made until the end of May.



Local rainfall information for better management

What's the SOI this month?

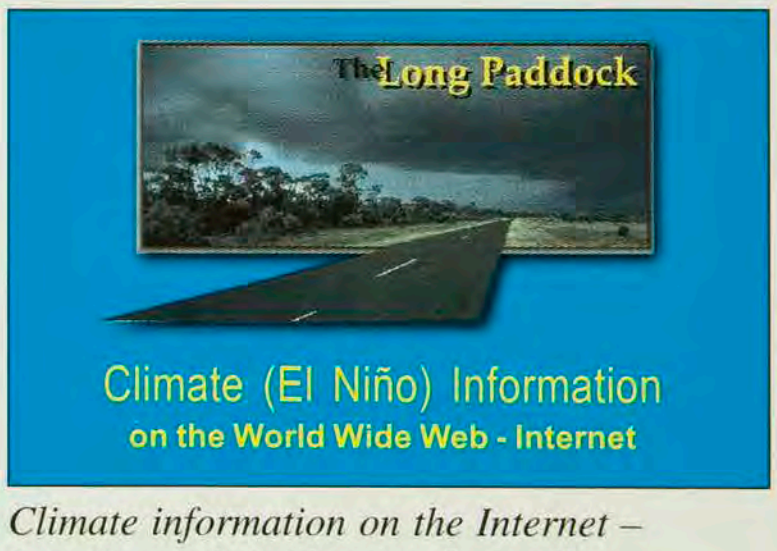
Monthly SOI values are given on the weather page of the Queensland Country Life and on the ABC TV Weather Forecast on Wednesday nights.

You can check the latest values for the SOI by phoning the DPI Hotline on (07) 3877 9602 or Fax Hotline on (019) 725 301, or through *Long Paddock* in the QDPI Climatic Information Highway on the Internet.
Address: http://www.dpi.qld.gov.au/longpdk

Chances of getting average rainfall in spring and summer at Charleville based on the SOI. (from AUSTRALIAN RAINMAN)

Season	av rain(mm)	Probability of getting av rain when SOI in Mar–May is	
		negative	positive[1]
Spring (Oct–Dec)	133	20%	60%
Summer (Dec–Feb)	192	20%	60%

[1] as defined by SOI phases



Climate information on the Internet – http://www.dpi.qld.gov.au/longpdk

It's looking dry, how many should I sell?

If you assess your pastures in autumn to calculate a stocking rate for the coming year, check the effect of the SOI in your locality with AUSTRALIAN RAINMAN.

If a positive SOI indicates chances of better rainfall, you can be more confident of the number of animals that you can hold. A negative SOI suggests that you should sell excess stock as quickly as possible before

Accurate short-term seasonal forecasting holds the key to more efficient and safe use of our grazing lands.

good

Open mulga woodland

overstocking

light stock, fire

going

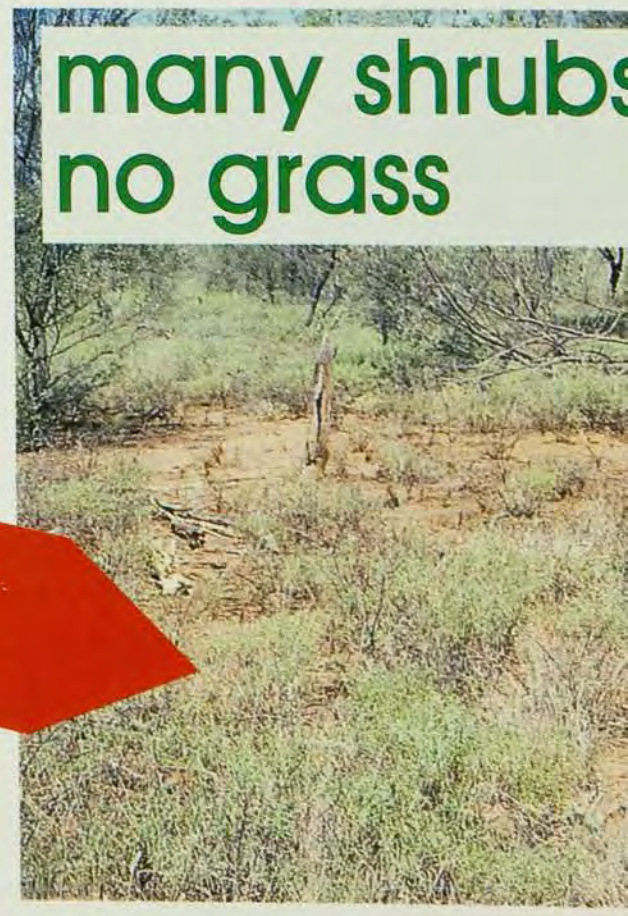
more shrubs,
less grass

The state
depends
past sea
and on y
manage

overstocking, no fires

gone

many shrubs
no grass



Open grassland, strips of mulga

good

light stocking, fire

no shrub control

of your pasture on ons our ment

grass and shrubs

graze, no fires

pull, burn, stop run-off

recovery

Rain in winter improves the growth of good-quality herbage.

Summer rain for quantity, winter rain for quality.

Road trains—great for sending stock, too fast for returning stock.

Road-train recruitment allows you to bring back too many stock too soon.

everyone else jumps on the band-wagon and floods the market.

AUSTRALIAN RAINMAN has been combined with GRASP: *grass production from native pastures in northern Australia,* a program which simulates the growth of grass. It shows that the effect of the SOI on herbage production is much greater than its effect on rainfall alone.

The SOI can help you make better decisions than just hoping, but there are obviously have many other factors to consider before changing stock numbers.

What if I get winter rain?

Regard winter rain as a bonus for existing stock, rather than a reason to increase your stocking rate. Winter rain does not produce bulk for feeding stock, but it does produce high quality winter 'herbage' that will increase the quality and yield of wool and improve lambing rates.

Should I sell, or agist or feed in a drought?

Droughts start gradually but often end suddenly. What we never know is how long the drought will last, and feeding or agisting can get very expensive in a prolonged drought.

'Sell! Sell and regret maybe, but sell!' has been good advice for pasture stability. No-one has gone broke by selling early in a drought; plenty have by holding onto too many animals.

The DPI's DROUGHTPLAN project has been developed to help you manage the risks (and opportunities) of our variable climate. The parts of DROUGHTPLAN that are useful here are *Decision trees* and BBSafe: *Breed/Buy – Sell/Agist/Feed Evaluator*

Decision trees sets out a logical system of handling complex and stressful decisions, such as what to do as a drought gradually deepens, while BBSAFE is a spreadsheet program that allows you to calculate the costs and returns of the options of selling, agisting or feeding your stock.

When can I restock after a drought?

Do not rush out to buy up stock or to get your own back from agistment.

A drought may end suddenly with flooding rain, but it does not rain paddocks of grass. Pastures that have been knocked around by over-grazing during a long drought will take time to recover; those in better condition will respond more quickly.

Managing mulga browse

Stock browse fresh mulga leaves throughout the year; during winter, sheep may get up to 70% of their diet from browse.

Fresh leaves have reasonable feed quality and can keep stock alive—or in reasonable condition with extra mineral supplements—but mulga is never a production ration. Fallen leaves also provide some low-quality bulk.

Is feeding mulga good or bad?

Mulga browse during the growing season increases the productivity of what is fairly ordinary country.

Mulga browse during the dry season has allowed many more sheep to be carried than would be expected from the low and erratic rainfall and infertile soils.

However, carrying these extra sheep during dry times puts extra stress on the grasses when they try to recover after rain, and prevents the build-up of a fuel load for controlled burning. Lopping and pushing mulga have changed open mulga woodland to closed mulga shrubland.

As a result, much of the mulga country has been degraded—much of the better perennial grass has been lost and replaced by sparse annual grasses, shrubs or bare ground.

How much mulga leaf will a sheep eat?

A mature sheep will eat 700–800 grams of mulga leaf each day under dry paddock conditions, but this provides barely enough energy to maintain it. Neither can the animal digest much (35–40%) of the protein because of the high level of tannin in the leaf.

Sheep on mulga still have low wool growth rates, lose weight, and may die if fed mulga for an extended period (9–12 months).

How can I improve the feed value of mulga?

Feeding a supplement made up of 2 parts stock salt, 1 part sulphate of ammonia and 1 part Kynofos, or other phosphorus supplement, improves the digestion of mulga; supplemented sheep can eat more mulga leaf and produce 10–20% more wool.

Some bore water may provide sufficient sulphur and sodium.

Feeding supplements can concentrate stock in small areas, and increase treading damage to the soil.

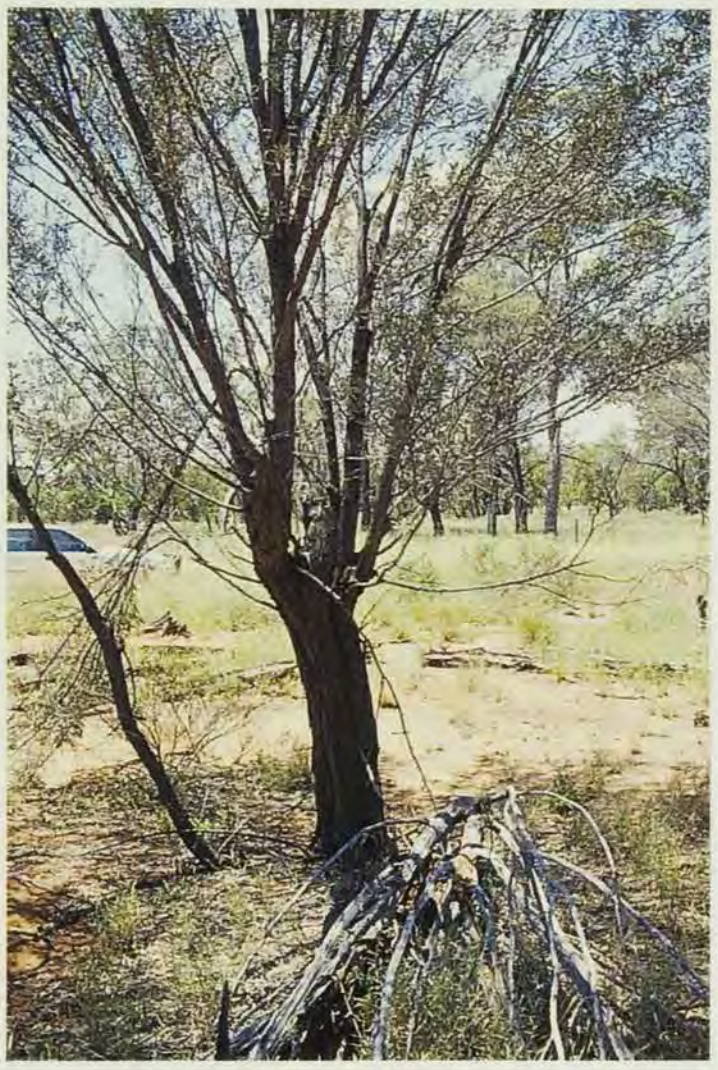
Fresh mulga leaves have reasonable feed value.

Feeding mulga browse during the dry may be good for the present stock, not so good for the future pasture.

Stock browse fresh mulga leaf throughout the year.

Stock can reach mulga leaf up to about 2 metres high.

Most mulga for browse is pushed these days.



Lopping leader branches allows the tree to recover.

Chopping the main stem kills the tree.

Which is the best mulga for browse?

Umbrella mulga is most commonly used because it has a good leaf yield and a low density of 40–1200 stems/ha. To prevent total destruction of the trees, only the leader branches should be broken off or lopped with a chain saw.

Whipstick mulga are younger trees in dense stands of 2000–6000 stems per hectare; the leaves are out of reach to sheep until the trees are pulled.

If whipstick mulga is pulled in summer when the soil is wet, many trees will keep growing, but with a horizontal trunk. New branches will grow vertically off the trunk, and these will be available for browse as low mulga. Stems lying on the ground protect existing grasses and new seedlings from stock.

Tall mulga cannot be lopped as the trees have long bare trunks which will not coppice, while cutting or pushing destroys the tree. These older trees were suppressing the mass of mulga seedlings, and their removal can result in thickets of whipstick shrubs. As tall mulga trees with 170 stems/ha scattered through open grassland is the best vegetation state, they are best left alone.

Low mulga can be browsed by sheep or cattle until it reachs about 2 metres high; cattle will break branches, making them more accessible to sheep. Well-spaced bushes provide good leaf yields, but very dense stands with 7000–12000 stems per ha provide little fodder during droughts after the first browse. Heavy grazing by sheep can prevent thick whipstick regeneration, but cattle may foster it.

Where should I start pushing?

Start pushing mulga at the far end of the paddock away from the water point. Early in the season, the sheep should be in good condition and able to walk the distance between there and water. Later, when the animals are weaker, they can have the browse close to water point.

Pushing mulga at right angles to the slope helps to build up obstructions to water flow, providing sites for grass seedling establishment.

Should I spell the paddock when the drought is finished?

During the drought, sheep in the pushed areas will graze into the ground all the grass that they can reach.

Start by pushing the browse growing well away from the water points.

When the season breaks, the paddock *must* be spelled if these grass plants are to recover and set seed.

An opposing view is to feed all animals in one paddock and to turn this into a sacrifice area, keeping the sheep in it for several weeks after the drought to spell the other paddocks. The sacrifice area has then to be left destocked for a long time.

Both practices have merit, so the choice will probably depend on factors other than pasture management.

The most important practice is to reduce animal numbers early in the drought so that you are not carrying too many stock.

Allow grasses to recover and to seed in the drought-feeding paddock.

Reduce animal numbers early in the drought so that you are not carrying too many stock.

What other benefits come from pushed mulga?

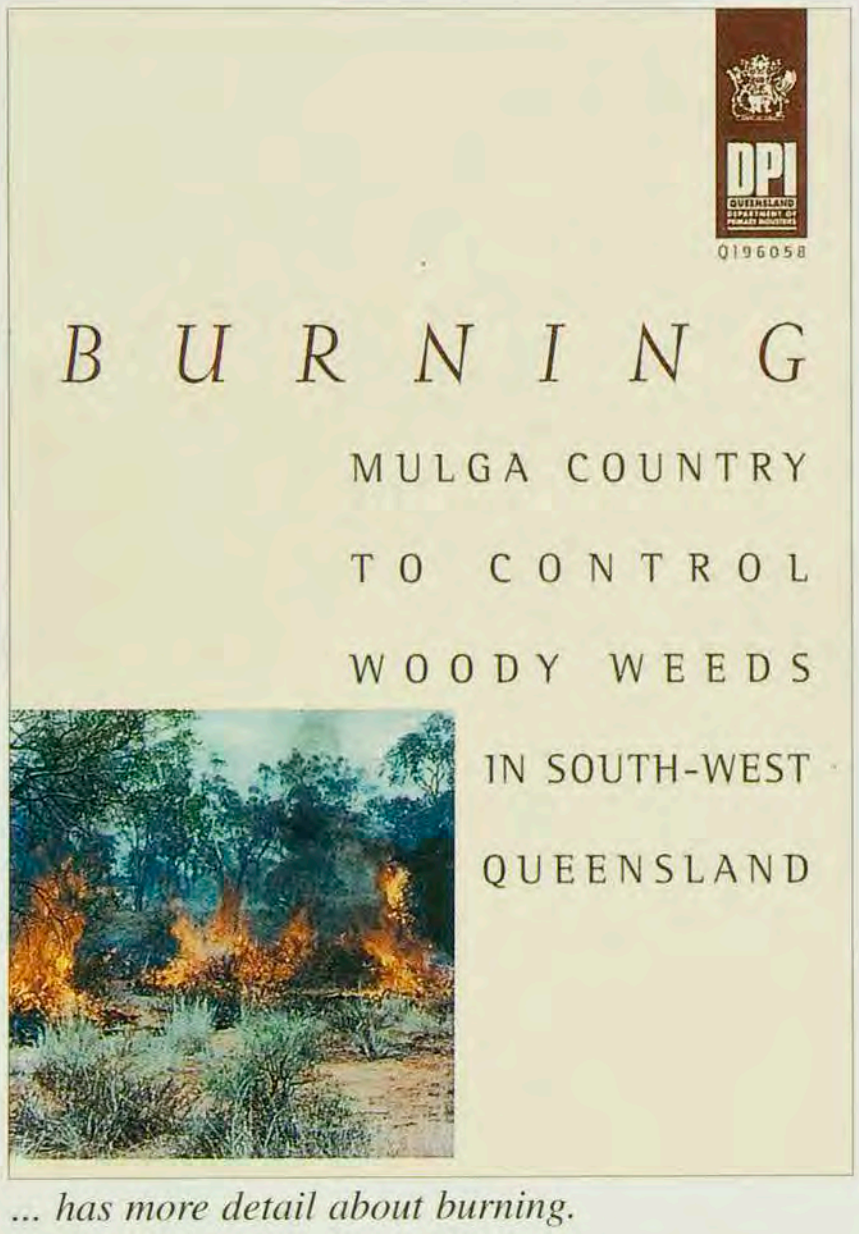
Fallen or pushed branches of mulga covering the ground help the pasture to regenerate. The branches touching the soil interrupt run-off causing silt and grass seeds to be deposited. Branches in the air prevent stock reaching establishing and growing grass plants. These grasses can flower and seed in an otherwise heavily-grazed paddock.

Fallen branches allow some grasses to recover in a grazed paddock.

Fallen branches trap surface run-off and protect young grass plants.

Cattle and sheep feeding on pushed browse.

Only fire and vigorous pasture will keep out woody weeds.



... has more detail about burning.

Lose your ground cover and lose your soil.

Burning

Only two things keep unpalatable woody weeds in check—competition from vigorous grasses and fire.

Fire can be used to rehabilitate poor mulga grassland, but is rarely feasible until the numbers of stock on the property are reduced to match the safe carrying capacity.

It takes rain to start a fire; water must get into the soil to support enough grass.

Rainfall is too unreliable for burning at regular intervals, but when you get the chance after a good season, burning will suppress or kill many woody weeds.

Which woody weeds are controlled?

Many species can be controlled while they are small shrubs; fire will kill green turkey bush, narrowleaf hop bush and fernleaf hop bush. Although these will come back from seed after good winter rainfall, it may take 5 years before they grow back to the original height.

Seedlings under 15 cm high of grey turkey bush, turpentine and false sandalwood will be killed, but more mature plants usually sprout again unless the fire was raging hot. But burning will still set shrubs back for about 5 years.

Fire will also kill mulga seedlings and even tall trees, but mulga comes back more quickly than most other shrubs.

More detailed information on burning is given in the booklet ***Burning mulga country to control woody weeds in south-west Queensland***.

What happens when there are no fires?

Most mulga country has not been burnt for 20–40 years, and this lack of fire is a major reason why so much mulga land is in poor condition. Of course, lack of fire is only part of the downward spiral into degradation.

What's this downward spiral?

Too many grazing animals eat too much of the grass, low fuel loads prevent effective fires, infrequent fires fail to control regrowth, too many mulga shrubs and fire-resistant bushes compete with the grasses for soil moisture, there is less grass so it comes under increasing grazing pressure, lack of ground cover leads to soil erosion and surface sealing, more water runs-off than soaks into the soil, the shrubs steal that water, the grasses get weaker, and so on until we end with bare soil, mulga thickets or total turkey bush! Have you seen any country like that?

How can we break the downward spiral?

At the present stage of the spiral on many properties, some major mechanical intervention is going to be needed. The problem is that it is difficult to justify any major expenditure because of the low potential productivity of the land.

Mulga land in poor condition can be rehabilitated by stages—provided the landholder has sufficient living area and enough money.

Rehabilitation starts by using machinery, but then follows a more ecological approach.

The steps are to:

- reduce stock numbers on the property to match the carrying capacity of the land as it is now
- reduce the grazing pressure from kangaroos and feral goats
- pull the mulga in one paddock—for drought feed in winter–spring
- destock this paddock for one good season
- allow grasses to grow and seed
- burn the paddock if shrubs or mulga regrowth are a problem
- allow grasses to grow again and seed again
- restock the paddock to carrying capacity of the land as it is at that time with cattle and sheep
- browse the mulga seedlings and bushes before they reach 1 metre high
- aim to keep the mulga stand below an average 170 stems per ha
- burn the paddock when possible after a good season or use a herbicide against shrubs
- keep within the adjusted carrying capacity as pasture condition improves.

This mulga and sandalwood was chained, rested and then burned...

... a year later, it looked like this.

Where can I clear?

The mulga region comes under Zone 2 Southern Inland Queensland for Tree Clearing Guidelines. One aim of the current guidelines is to restore degraded dense mulga to its original state of semi-open woodland with a density of 30–100 trees per hectare on soft mulga or just 30 trees/ha on hard mulga (check those definitions on page 8).

The other approach is to alternate areas of open grassland with groves of mulga. In soft mulga (Zones M and H) east of the Bulloo River, up to 80% of the area can be cleared where the mulga is dense with more than 700 stems/ha; in rougher country (Zone R) and west of the Bulloo, up to 30% of the lower slopes can be cleared if the mulga density is above 250 stems/ha.

The maximum slope for chaining is 5%, but land of up to 8% slope can be treated with herbicides.

Clearing mulga to rehabilitate the land is approved in the current Tree Clearing Guidelines for Queensland.

Strips of mulga woodland were chained, spelled and burned, to become this grassy paddock.

Turkey bush seeds waiting to go. Any seedlings may need a follow-up treatment.

You need at least 1000 kg of fuel load per hectare for an effective fire.

Is one fire enough?

One good fire will kill the whole plants of some woody species and the top growth of others.

Follow-up fires or other measures are needed to control resprouting species—one fire may kill 15% of sandalwood shrubs, two fires will kill 85% of them. As successive good seasons are rare indeed, the second fire can be replaced with a herbicide. This is described later.

When is the best time for a fire?

Burning in late winter to early spring is the best time to kill both seedlings and mature shrubs without damaging the regenerating grasses. However, grass fuel loads are at a peak in autumn, and the opportunities for useful fires are rare.

If your woody weed problem is serious and all other conditions are right, go for a fire in autumn.

How much fuel is needed?

The more fuel, the better the control of woody weeds. You need 1000 kg/ha of fuel for a hot fire to travel through the paddock.

The most effective fire comes in the middle of a hot (33+°C) day with a light *steady* breeze. This will give better control than a strong wind that races the fire front across the paddock.

What about burning part of the paddock?

Since most extensive grazing properties have only about 6 main paddocks with a few more holding paddocks, it can be difficult to follow the ideal and take one whole paddock out of operation for a couple of years or more. An alternative is to burn one third to a half of the paddock, and then to graze with a small number of stock.

Very patchy fires over a large area can be counter-productive as seed from unburnt weeds will colonise the adjacent burnt areas, and stock and roos will overgraze the limited green pick.

How wide should firebreaks be?

Fierce fires have been known to jump more than 100 metres. You will generally need a break of 50 metres if you are burning an effective amount of fuel in the hotter months. The best conditions for burning firebreaks are the reverse of those for weed control—so burn late in the evening, against the breeze and downhill.

Always consult with your neighbours and get your fire permit from the fire warden. Better still, work as a neighbourhood team in the battle against regrowth.

What should I do after a fire?

Try to control the numbers of roos, goats and rabbits that come for the green pick on burnt areas.

What should I not do after a fire?

Do not put the normal number of stock into a recently burned paddock. Grazing fresh green pick will weaken the grasses, preventing them from competing with woody seedlings and preventing the build up of a body of grass.

When can I start using the paddock again?

Paddocks should be kept destocked to allow the grass to bulk up to at least 600 kg/ha of dry matter, and for perennial grasses to set seed—a minimum of one good growing season.

Complete destocking during winter is unwarranted as shrub seedlings are relatively palatable when the grasses have been frosted.

You can stock lightly after the grass has hayed off in autumn.

How frequent are good burning years?

You may get enough fuel for a good fire on average once every 5 years—a spelled pasture in reasonable condition under medium density mulga should produce 1200 kg/ha of dry matter in a good year.

Once the stand of shrubs is reduced after two burns, you will not need to burn so frequently.

How can I reclaim bare or scalded areas?

Push or pull mulga across the slope, or push it into low mounds on bare areas. These mounds will trap soil sediment from run-off, increase water infiltration and attract soil insects. Grass seed caught under the mound will germinate, with seedlings being protected from grazing animals by the matrix of mulga branches.

After a fire, wait until the grass is at least this high, or has set seed, before grazing.

If your woody weed problem is serious and all other conditions are right, go for a fire in autumn.

Push mulga across the slope to stop run-off and to protect establishing grasses.

The sandalwood and turkey bush in the foreground were sprayed from the air.

Small areas of turkey bush can be ploughed,

... the resulting grass strips can provide feed or fuel to burn the rest of the turkey bush.

Shrub control

How effective are herbicides?

Pulling, spelling, then a good fire, followed later by another spelling and a second fire will give good control of shrubs and regrowth.

However, because the opportunities for burning are irregular, herbicides can replace the second fire for weed control. Spraying with a low rate of glyphosate will kill cassia and sandalwood. Ultra-low-volume spraying from the air or ground has been quite promising in trials, so check with the DPI in Charleville for the latest recommendations. Alternatively individual plants can be spot-treated.

Graslan has been very effective against turkey bush with an excellent residual effect at 10 kg/ha, but is too expensive except for special purpose areas such as fence lines.

How effective are mechanical treatments?

Chaining is the cheapest way to pull timber, but is not effective against shrubs under about 2 metres tall. It must be followed by spelling or lenient grazing to allow grasses to establish, and burning for shrub control.

Blade ploughing is too expensive for mulga country, but has been used on gidyea and brigalow country suitable for buffel grass. Development is usually profitable if the country can be sown with buffel—where there is plenty of poplar box, yellow jacket, kurrajong or cypress pine.

Stickraking will clean up country, but has only a temporary effect of shrubs. It gives access for follow-up spraying.

Ploughing with offset discs has been effective in controlling small areas of turkey bush provided there is not too much standing or fallen timber. Once turkey bush gets a canopy cover of over 10%, it is difficult to control with fire because there is insufficient grass. Turkey bush should be ploughed in late winter–early spring, and followed by seeding with suitable grasses. Burning later will help to increase the area under grass.

Grubbing can be effective against shrubs that resprout from the base, such as sandalwood or hopbush, and where their density is low. It does not work against shrubs that sucker from the roots, such as beanbush or firebush (*Senna pleurocarpa*).

A guide to the costs and life of these treatments is given below:

Treatment	Cost $	lasts for (years)
Pulling	14–30/ha	5–15
Stick rake	30–50/ha	5–8
Blade plough	100/ha	10–15
Disc plough	30/ha	5–10
Grubber	0.20/bush	10–20
Graslan	135/ha	10+

Stick raking can clean up country for later spraying of regrowth.

Quilpie mesquite

Mesquite is an introduced woody weed that deserves special mention. From two plants introduced as shade trees near Quilpie in the 1930s, Quilpie mesquite has infested nearly half a million hectares on the Bulloo floodplain. This Quilpie mesquite is smaller than the mesquite or algaroba found further north, but is more difficult to kill with herbicide.

Individual bushes can be killed by basal bark treatment with trichopyr (Garlon) at 1:60 in distillate, although the low branches make this operation difficult. Thick stands on the floodplains can be blade-ploughed, but mesquite will regenerate from seed and follow-up treatment is needed.

Quilpie mesquite is spreading into mulga country, and will grow on any soil type in south-west Queensland.

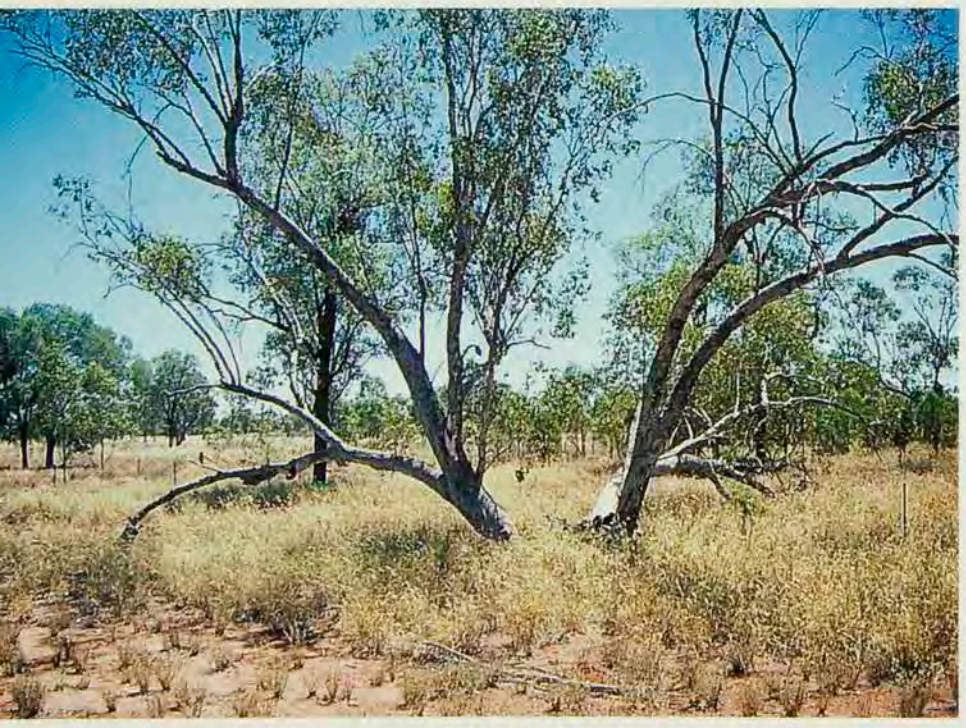
Blade ploughing is too expensive for typical mulga country, but can be used on the better clay soils when developing with buffel grass.

Thick stands of Quilpie mesquite on the Bulloo floodplain; it can spread into mulga country.

This block of Quilpie mesquite on the Bulloo floodplain has been blade-ploughed.

Ants will harvest seed on the ground.

Seed of good mulga grasses can be harvested.



Buffel grass will establish in run-on areas and under box trees.

Improving mulga pasture

Mulga country is never going to be highly productive; rainfall is too low and unreliable and the soil is too infertile.

At present, any grass is better than none, both as feed and for soil protection.

However, most mulga pastures can be improved greatly from their existing low level by the combination of practices recommended so far in this booklet. These include lighter stocking, pulling, burning and follow-up treatments.

You will still be grazing native species, but there should be more total herbage and maybe more of the desirable species, with less tree and shrub cover. Sheep will be able to select a more nutritious diet if the pasture is in good condition.

Various attempts have been made to introduce more resilient 'improved' species, but none can be considered successful for most mulga areas. It has been too difficult to establish them because of the harsh conditions. Seed-harvesting ants also remove seed lying on the ground while grasshoppers damage establishing seedlings.

Are improved grasses better than native species?

Native species may be better adapted to the hard conditions but, where buffel will grow, it is more productive. Of the native grasses, the most productive for the mulga country are mulga oats and mulga mitchell. Seed of these are not commercially available yet, but this may improve with the new brush harvesters that collect ripe seed without cutting off the seed heads.

Where will improved grasses grow?

Buffel grass has naturalised on some of the better soil types, especially on the heavier soils growing poplar box. Patches of buffel often grow under box trees, aided by leaf fall and nutrients recycled through the deep root system.

Buffel grass seedlings need much higher soil phosphorus to establish than the native grasses, and it also prefers less acid soils. It may establish anywhere in a good year, but will not survive on the unsuitable soils.

Monitoring pastures

Monitoring is a basic part of managing a native pasture. It encourages you to look more closely at the pasture, and it provides a record so that you can detect gradual changes over the years.

This booklet does not tell you how to monitor because the various methods are described in another DPI publication – GRASS CHECK. An earlier system of monitoring under the Mulga Assessment Program has been superseded by Grass Check.

Taking photos is the simplest form of monitoring pastures.

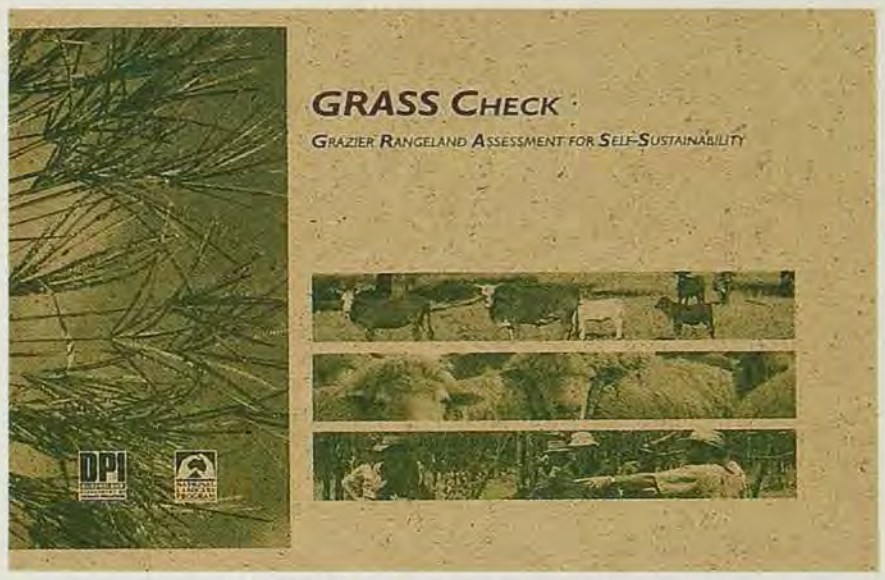
What is the best way to monitor pastures?

Monitoring pastures may seem a little daunting at first, but once tried, it is relatively simple—and very interesting. Most graziers are very keen to learn the names of more of the plants in their paddocks; recording is a good way to do it.

Monitoring becomes your own small research project in your paddock, not someone else's results from miles away. It is not time-consuming, taking only a couple of hours for each site each year.

GRASS CHECK offers you a number of techniques, with varying levels of detail, for estimating the amount of herbage in the paddock, the ground cover, presence of desirable and undesirable species, and the density of woody weeds. The simplest recordings are regular photographs of a number of sites; they show the real changes that are obvious in time.

The DPI runs GRASS CHECK training workshops to explain and demonstrate the various methods.



... describes the different systems of monitoring.

When is the best time to monitor pastures?

Assessing the bulk of standing feed at the end of the summer growing season—around March–April—allows you to make decisions on adjusting stock numbers while animals and pastures are still in good condition. Also the grasses are easier to identify because they still have seed-heads.

How can I identify the different species?

Many graziers have always been interested in plants, but have found it difficult to identify them.

Some of the more common grasses are shown in the next few pages of this booklet, but many more species are identified in other DPI publications—*Plant Identification in the Arid Zone* and *Pasture Plants of Southern Inland Queensland*. There are also excellent line drawings of grasses in *Western Grasses: a grazier's guide to the grasses of south-west Queensland.*

Mulga mitchell

Mulga oats

Estimating feed in the paddock

You can estimate the amount of feed standing in the paddock either by direct measurement or by comparing with the photo-standards in this booklet.

200 kg/ha

Very sparse cover of perennial grasses; extensive bare patches between tussocks.

600 kg/ha

Patchy cover of grass tussocks which occupy up to 40% of the area; bare ground still predominates.

These photographs of mulga pastures show the amount of standing pasture (total dry matter—not green leaf) in kg/ha.

800 kg/ha

Large grass tussocks occupy about 60% of the area; patches of bare ground are still conspicuous.

1000 kg/ha

Dense cover of large grass tussocks; very few patches of bare ground.

Estimating tree canopy cover

Rain makes grass, but trees and shrubs compete with grasses for moisture in the soil. The thicker the stand of trees, the smaller the amount of grass that grows.

Tree canopy cover is assessed when your safe carrying capacity is calculated.

Foliage projected cover 10%
Timber basal area 1.0 sq.m/ha

Foliage projected cover 20%
Timber basal area 6 sq.m/ha

Foliage projected cover 50%
Timber basal area 13 sq.m/ha

Recognise the important grasses

In the mulga lands, any grass, however stemmy, provides cover while all annual grasses are good feed even if they do indicate overgrazing.

Desirable

Bottle washers	*Enneapogon polyphyllus*
Box grass	*Paspalidium constrictum*
Buffel	*Cenchrus ciliaris* (naturalised)
Cotton panic	*Digitaria brownii*
Hairy panic	*Panicum effusum*
Kangaroo grass	*Themeda triandra*
Katoora	*Sporobolus actinocladus*
Mulga mitchell	*Thyridolepis mitchelliana*
Mulga oats	*Monachather paradoxus*
Pitted bluegrass	*Bothriochloa decipiens*
Ridge grass	*Enneapogon avenaceus*
Silky umbrella grass	*Digitaria ammophila*
Woollybutt	*Eragrostis eriopoda*

Intermediate value

Button grass	*Dactyloctenium radulans*
Clustered lovegrass	*Eragrostis elongata*
Comb chloris	*Chloris pectinata*
Curly windmill	*Enteropogon acicularis*
Golden beard grass	*Chrysopogon fallax*
Greybeard grass	*Amphipogon caricinus*
Mountain wanderrie	*Eriachne mucronata*
Purple lovegrass	*Eragrostis lacunaria*
Purple plume grass	*Triraphis mollis*
Silky heads	*Cymbopogon obtectus*
Weeping lovegrass	*Eragrostis parviflora*
Woollybutt wanderrie	*Eriachne helmsii*

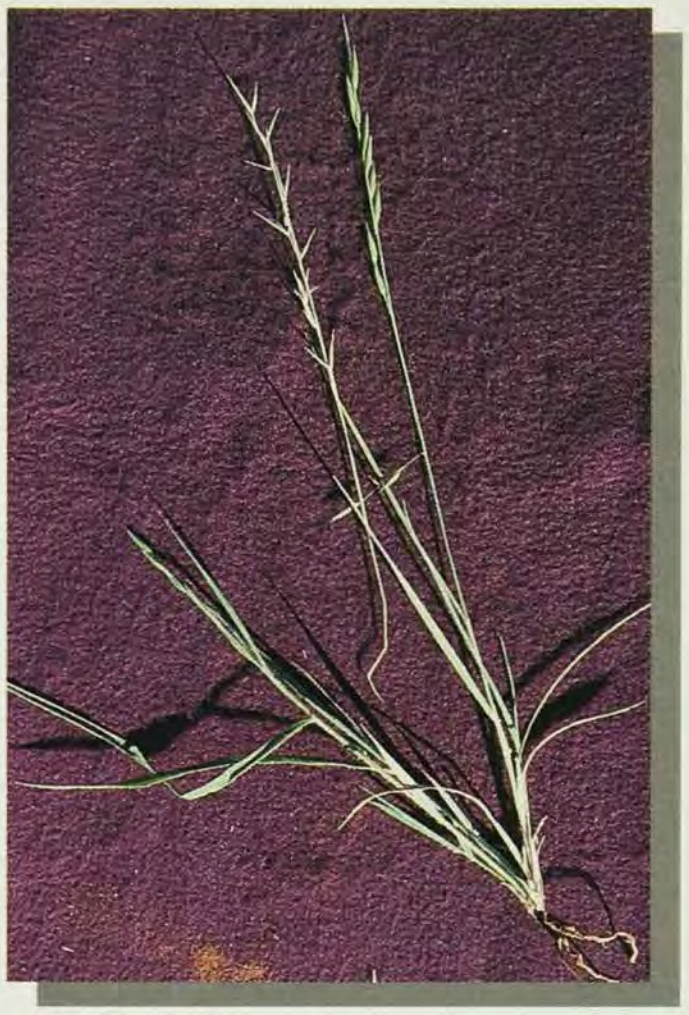
Undesirable

Branched wiregrass	*Aristida calycina* var. *praealta*
Bunched kerosene grass	*Aristida contorta*
Erect kerosene grass	*Aristida holathera*
Jericho wire grass	*Aristida jerichoensis*

Common forbs

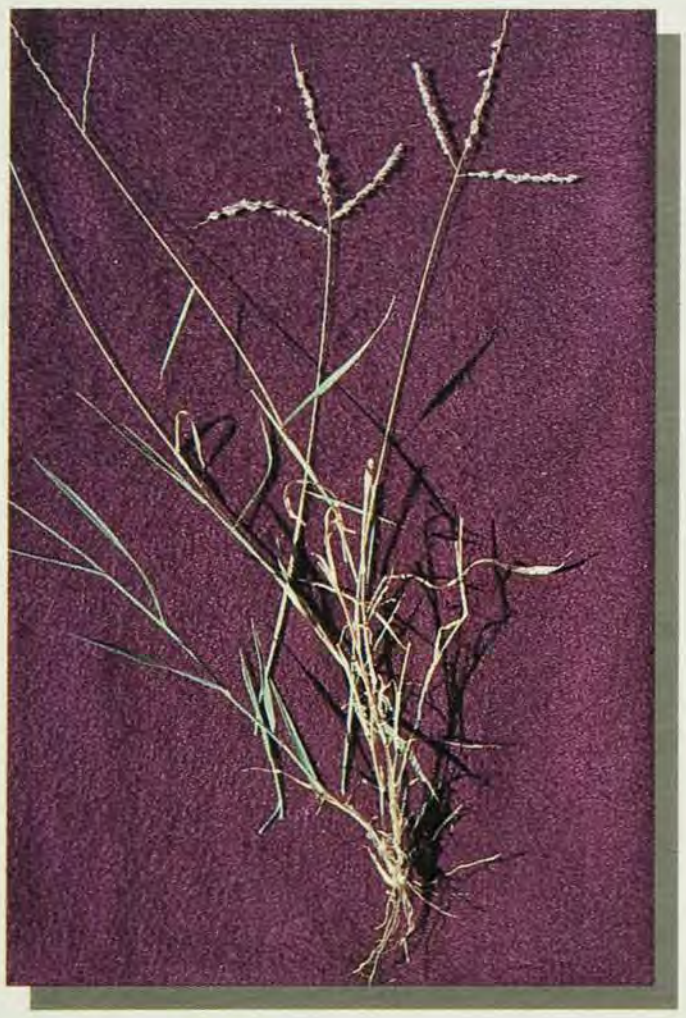
Desert chinese lantern	*Abutilon* sp.
Joyweed	*Alternanthera nodiflora*
Tarvine	*Boerhavia dominii*
Daisy burr	*Calotis* sp.
Mulga fern	*Cheilanthes sieberi*
Caustic weed	*Euphorbia drummondii*
Speedwell	*Evolvus alsinoides*
Smooth goodenia	*Goodenia glabra*
Silky bluebush	*Maireana villosa*
Pussytail, longtail	*Ptilotus* spp.
Copperburrs	*Scleroleana* spp.
Sida	*Sida* spp.
Smooth velleia	*Velleia glabrata*
Weir vine	*Ipomea calobra* (poisonous)

Mulga mitchell grass



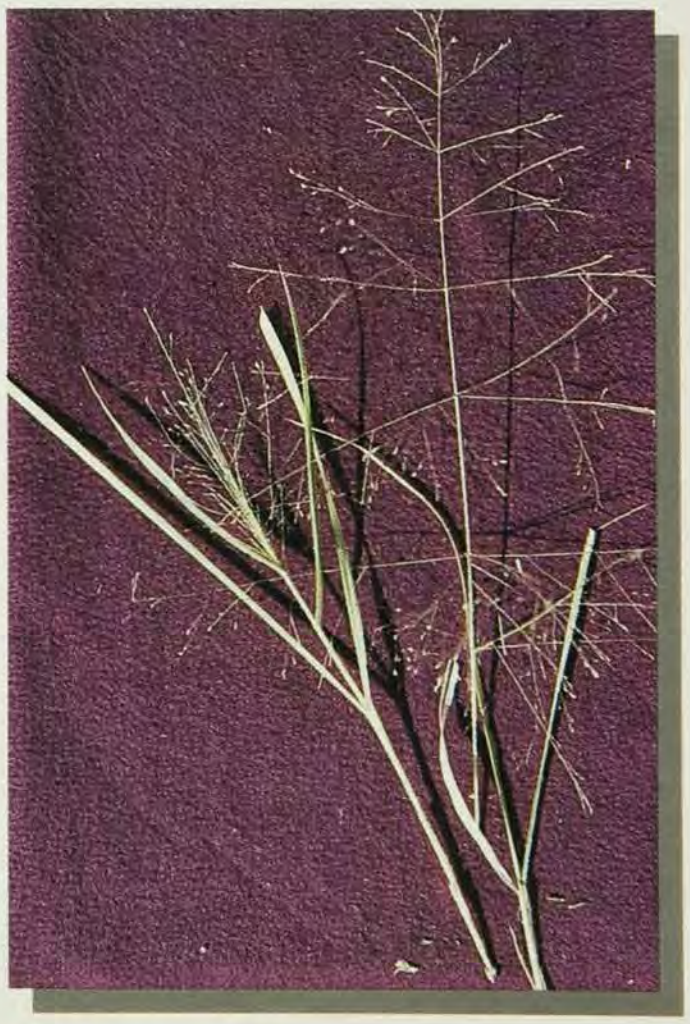
Mulga oats

Kangaroo grass



Cotton panic

Silky umbrella grass



Hairy panic

Buffel grass

Bottlewashers

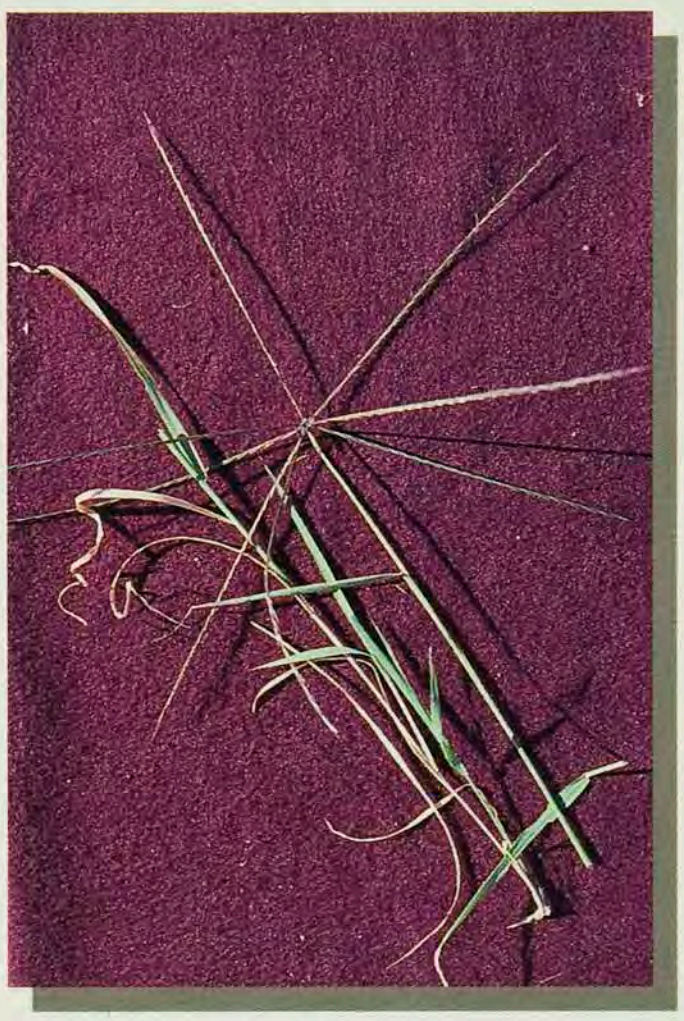
Ridge grass

Woollybutt

Katoora

Threeawn wanderrie

Purple plume grass



Curly windmill

Comb chloris

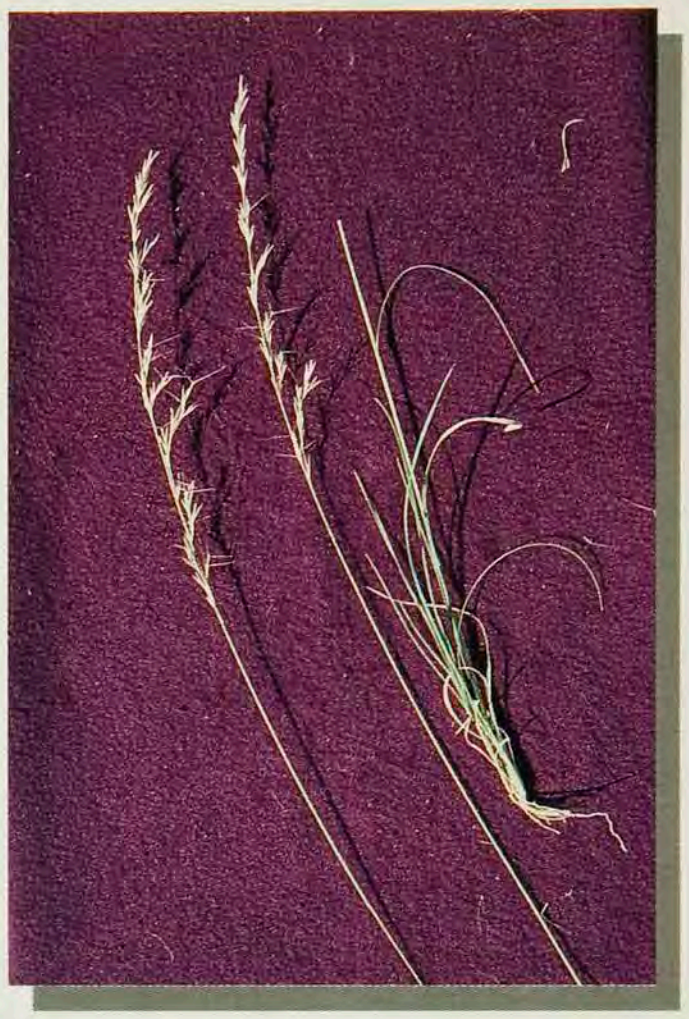
Button grass

Silky heads

Clustered lovegrass

Weeping lovegrass

Purple lovegrass



Jericho wiregrass

Erect kerosene grass

Bunched kerosene grass

Another common wiregrass

How are your pastures?

You can rate the condition of your pastures after monitoring. Condition can be categorised (on the ground cover, proportion of different species present and on the soil condition) into three states—good, deteriorating or degraded.

A 'deteriorating' pasture can be reversed to one in 'good' condition by changing the management or by a return to more normal rainfall patterns.

'Degraded' land can be returned to its inherent productivity only by practices or expenditure outside the normal for this type of country, for example with machinery.

What 'state'?

These states – 'good', deteriorating' and 'degraded' are simple descriptions. Pasture ecologists have developed the terms 'state' and 'transition' to describe the more detailed changes in native pastures under various pressures. Pastures may be in a certain 'state' or moving between states 'in transition'.

If we can identify what management practices cause the transition, then we are better able to make recommendations or to give warnings.

The states for mulga grasslands are described here as:

'States' illustrated for mulga grasslands

State 1A. Open mulga woodland (Good condition)
Good condition pasture with many desirable perennial and annual grasses; less than 170 scattered mulga trees/ha, with less than 30 shrubs/ha giving under 1% shrub canopy cover. Less than 2 cm soil loss.

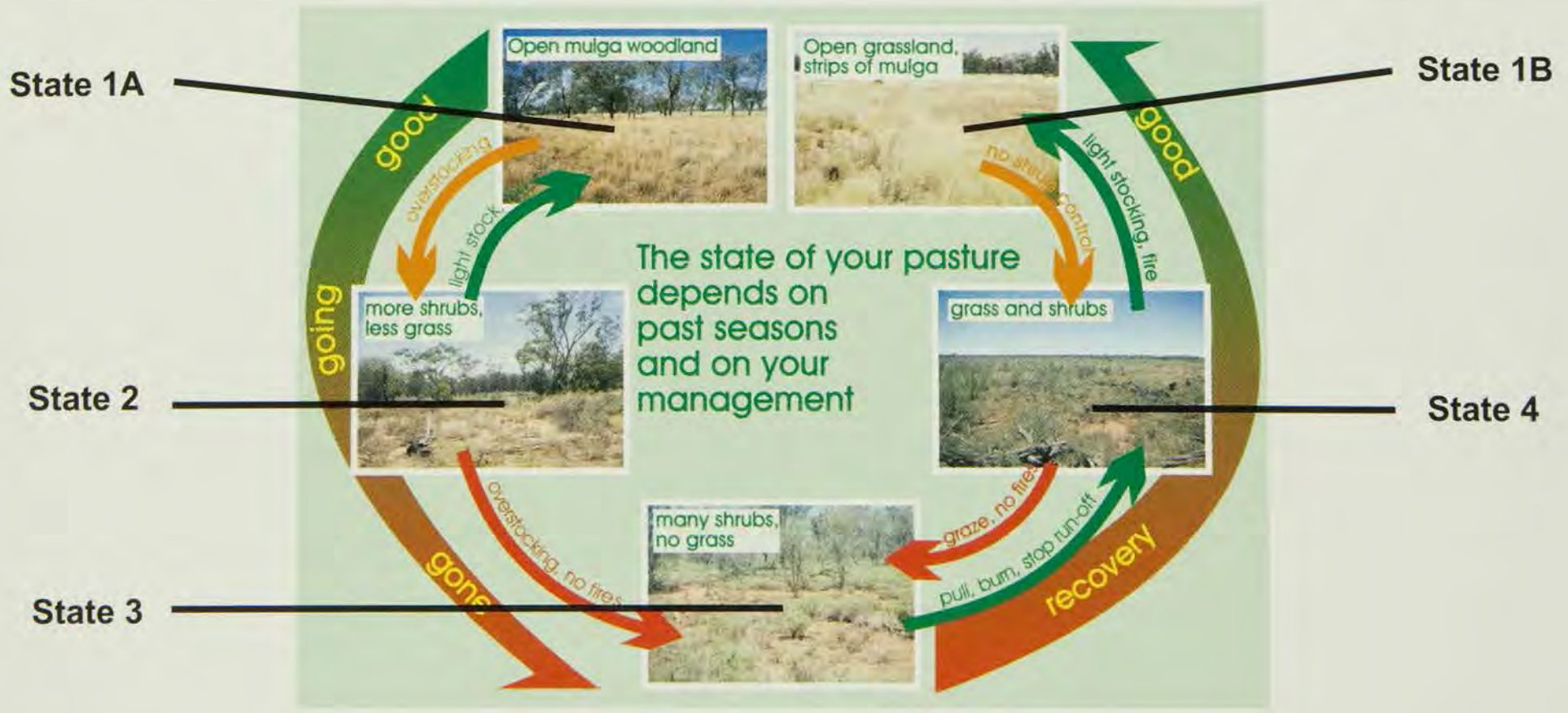
State 1B. Open grassland with retained mulga strips (Good condition)
Good condition pasture with many desirable perennial and annual grasses, but with less than 50 mulga trees/ha in open. Mulga in retained woodland strips (20% of area in soft mulga to 80% of area in rough country).

State 2. Mulga, shrubs and grass (Deteriorating condition)
Loss of perennial desirable grasses, increasing wiregrasses and annual grasses and forbs. Increasing bare soil with 2–4 cm soil loss. More than 200 mulga trees and shrubs/ha, with 5–20% canopy cover of inedible shrubs, especially turkey bush, hopbush and false sandalwood.

State 3. Thick mulga and shrubs (Degraded condition)
More than 200 mulga trees/ha with numerous mulga shrubs, 20–30% canopy cover of inedible shrubs, especially turkey bush, hopbush and false sandalwood. Little or no grass. Much bare soil with 2–4 cm soil loss.

State 4. Grass and shrubs (Deteriorated, but improving)
Mature trees and shrubs have been pulled and burned, but small shrubs of mulga, turkey bush and firebush re-establishing to give 10–20% shrub canopy cover. Increased rainfall infiltration from disturbed soil encourages perennial and annual grasses and forbs to re-establish, giving better ground cover.

These 'states', and the conditions and management that cause the pastures to move from one state to another, are illustrated in the centre-fold on pages 18 and 19.



Further reading

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Managing mulga grasslands **provides guidelines for the mulga grazing country that covers large areas of south-west Queensland. It is a local supplement to the basic principles described in *Managing native pastures: a graziers guide.***

Written in a readable question-and-answer style, and illustrated with many colour photographs, *Managing mulga grasslands* describes the country and the management options for sustainable production.
These options include:

- **setting stocking rates**
- **moving stock and spelling**
- **feeding mulga**
- **burning**
- **woody and shrub weed control**
- **improving the grazing.**

The booklet describes how the present carrying capacity of a property can be estimated and how monitoring can assess the condition of the pasture.

ISBN 0-7242-6658-5

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