11 Managing Native Pastures during Drought

KEY POINTS

- Drought is a natural part of the Tasmanian environment, and it should be taken into account in all property plans and management procedures.
- During drought, destock rather than overgraze native pastures.
- Allow adequate time for native pastures to recover following grazing during and after drought.
- Overgrazing native pastures during and after drought can have a deleterious effect on long-term productivity.

WHAT IS DROUGHT?

Drought is not just a period of low rainfall. Rather, it is a prolonged, abnormally dry period where not enough rain falls for normal pasture growth. Droughts often extend over several years, relieved only by brief, transitory rains. Over longer time periods, there may be periods of a decade or more that seem 'drought prone'. During these low rainfall periods, not every year is dry, but the rainfall in most years is below the long-term average and there are consecutive years of drought.

The lower rainfall areas of Tasmania, such as the Midlands, Derwent Valley, Fingal Valley, East Coast and Flinders Island, have experienced a sustained dry period with lower than average rainfall for most years since the mid 1970s (Figure 14). Although extended periods of lower than average rainfall are evident further back in Tasmania's rainfall records, evidence from climatic modelling suggests that the present dry period is related to global warming associated with the greenhouse effect.

Australian state and federal governments have recently acknowledged that drought is part of the natural variability of Australia's climate, and have restricted drought relief for farmers and agricultural communities to times of so-called 'exceptional circumstances'. In other words, farmers are expected to cope with normal rainfall variability and the occasional drought, so drought relief is available only for unusually long or severe droughts.

For pasture growth, the timing and quantity of rainfall can be just as important as the total annual rainfall. Regular rainfall events that maintain soil moisture without surface run-off are the most effective. Rainfall coming in very light falls at regular intervals or in a few large falls is far less effective.

EFFECTS OF DROUGHT ON NATIVE PASTURES

The most obvious effect of drought on native pastures is a lack of pasture growth. Most native grasses are highly tolerant of drought conditions. Healthy, vigorous plants use their root systems to access water deep in the soil, or they become dormant until soil moisture increases. However, when native grasses are grazed heavily just before a drought or after flushes of growth following light rains during a drought, their ability to regenerate and regrow after the drought may be severely reduced. Heavy grazing during dry periods, especially in summer, can expose the growing points of native grasses to high temperatures, which may kill the plants. For example, tussock grasses can provide a good fodder reserve during drought, but if the tussocks are grazed too heavily they may die completely. If they do survive, they may take several years to regain their former vigour.

Rainfall variability in the Midlands of Tasmania

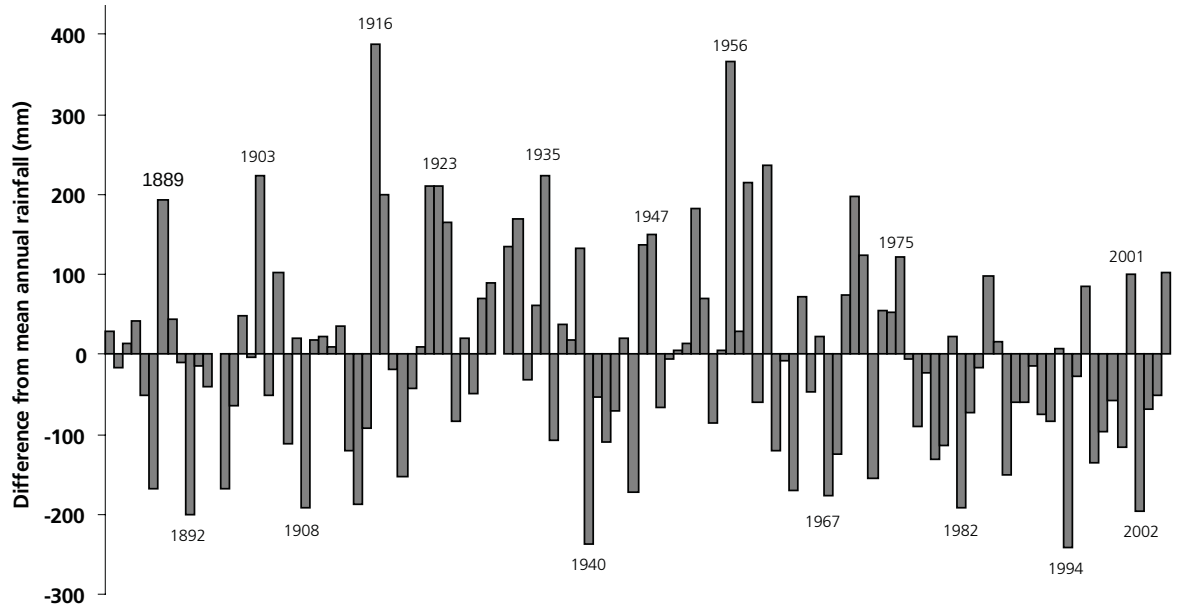


Figure 14. The Midlands of Tasmania has experienced an exceptionally dry period since 1976. The annual rainfall records for Oatlands for 1883–2005 are shown as the difference from the mean annual rainfall of 553 mm.

MANAGING NATIVE PASTURES DURING DROUGHT

The ways in which native pastures are managed during drought have major effects on the sustainability and long-term productivity of grazing enterprises.

Have a plan

Drought is one of the biggest uncertainties affecting farm enterprises, and graziers are increasingly being encouraged to be self-reliant in managing rainfall variability. Although it is tempting to avoid thinking about drought when times are good, having a drought plan—preferably written—is beneficial. A drought plan may involve reducing stock numbers if specified amounts of rain do not fall by specified dates, categorising paddocks according to erosion risk, and selecting one or two paddocks to be used as 'sacrifice paddocks' so that not all the pastures become degraded. It is better to use already degraded pastures on flatter areas as sacrifice paddocks, because they can be resown later, and they are not highly susceptible to soil erosion.

Native pastures can be seriously degraded if grazing is not controlled during drought.

The most basic preparation for drought is to have a plan for destocking and accumulating water, fodder and cash before the drought begins. Farmers are being encouraged to invest and save money in good years, so they can be more financially secure during drought years. However, the interests of short-term profitability may conflict with the long-term sustainability of native pastures during drought. During normal rainfall years, higher stocking rates are more profitable.

However, higher stocking rates make grazing enterprises more susceptible to drought, and result in more rapid degradation of the pasture resource. The key is to destock early in the drought by selling, lot feeding or agisting out livestock before fodder reserves are exhausted.

Use native pastures as feed but don't degrade them

Native pastures are commonly used as feed during drought. Under prolonged dry conditions, the damage to native pastures can be minimised by removing livestock as soon as planned minimum levels of pasture mass (e.g. 500 kg DM/ha) or maximum levels of bare ground (e.g. 30%) occur. These levels should not be exceeded. Overgrazing of native pastures should be avoided at all times, but overgrazing is particularly critical during drought. If grazed too heavily during drought conditions, native grasses may be depleted or eliminated from native pastures, leaving the soil susceptible to erosion and creating bare areas where weeds can invade. The invasion of weeds may be irreversible, and may cause a decline in pasture condition and productivity. Unlike sown pastures, most native pastures cannot be resown.

Monitor the feed available

The major problems faced when managing pastures during drought are not knowing if a dry period will turn into drought, and not knowing how long a drought will last. Careful monitoring of soil moisture, pastures and livestock is recommended to improve drought management practices. Continuous monitoring of the available feed and livestock requirements allows feed shortages to be identified early, and provides the opportunity to respond quickly by destocking or buying fodder.

Sheep waiting to be fed grain during drought. Watch out for weeds in areas where grain or hay has been used.

Determine the number of livestock early

Some graziers argue that properties are overstocked if it is necessary to feed grain during a drought. Developing a contingency plan for selling the least valuable livestock first allows the resource base, including stock bloodlines and pastures, to be kept relatively intact. The arrival or otherwise of the 'autumn break' is often regarded as a good time to reassess winter stocking rates.

In poor seasons or when the autumn break is late, it may be useful to reduce stock numbers so the demand for feed matches that available. Nominating a 'disposable' (can be sold when needed) portion of the flock allows graziers to respond rapidly to drying conditions and possible feed shortages. For this strategy to be successful, the priorities for disposing of stock must be clearly defined ahead of time, and may include stock already identified for culling, old wethers, old ewes and younger wethers. Young breeding ewes are often the highest priority for retention in order to maintain the genetics of replacement stock, though the fertility of these ewes is often compromised by poor seasons.

To make sure the demand for feed does not exceed that available, the critical periods in the year for feed availability should be identified. For instance, in most districts, if the autumn rainfall has been low and little feed is available by the end of April, it will be too cold for significant pasture growth before the end of September, even if good rain falls in winter. In such circumstances, stock numbers should be reduced in autumn or concentrates sourced for supplementary feeding.

Avoid overgrazing after drought

After a drought breaks, the pastures need time to replenish their energy reserves. Most drought damage occurs as a result of continuous grazing of new growth after the drought breaks. Allowing adequate time for the pastures to regenerate and recover after a drought results in more rapid growth rates. Ideally, wait until at least 1000 kg DM/ha is available before grazing. After a bad drought, wait until the native grasses have flowered.

Take care also to control any weeds that have germinated in areas where imported feed has been fed out.

These silver tussocks have been heavily grazed during drought, and will need resting to allow them to recover.

Lindsay Nicolson

'Bonneys Plains', Conara

'Drought is how you perceive it. We have periods of low rainfall, but we never have periods of no rainfall. So, you've just got to look at what rainfall you get and manage according to that.

'During periods of low rainfall, we move stock on to our native country. We're fortunate that 70% of the property is native, because it means we've got a fall back position to cope with dry periods.

'If a dry spell persists, our policy is to reduce stock numbers. We try not to leave it until the stage where stock are flogging the pasture out or exposing a lot of bare earth. We get rid of the oldest stock first. We might sell two years of cast-for-age stock, rather than one.

'In the past, we just ran everything in the native country during dry periods and didn't destock. Looking back on that policy, it wasn't so good for the native country.

'There's still a perception that you can use native pastures as a store of feed that will persist regardless of stocking rates during dry periods—but I don't think that's the case.

'When rainfall returns to normal, we try to rest our native pastures for 12 months. I think that having a break following a dry period is critical—allowing things to recover rather than grazing them immediately. If you rest native pastures for a full 12 months after a dry period, it's just incredible how much they recover. Resting native pastures following a dry spell is probably just as important as what you do during the period of low rainfall.

'You have an abnormal amount of bare ground after a dry period. If you can allow the grasses to set seed in the following season, the chances of regeneration are pretty good. I've kept a close eye on that, and you do get some good regeneration if you're lucky enough to get a half-decent season following the dry period.'

12

Monitoring Change in Native Pastures

KEY POINTS

» Monitoring native pastures provides useful information about changes in pasture condition, and gives early warning of potential problems, such as loss of native grasses and soil erosion.

» Fixed-point photographs provide a visual record of changes in the pasture.

» Monitoring pasture composition (species presence and abundance) provides the most useful information about changes in pasture condition.

» Monitoring the condition of pastures and livestock allows better management of native pastures.

Chapter 12 Monitoring Change in Native Pastures

WHAT IS MONITORING?

Pasture dry matter production, species composition and soil attributes change constantly. These and other features combine to determine the 'condition' of a pasture. Monitoring involves taking regular measurements to identify changes in pasture condition.

Most graziers monitor the condition of their livestock, and many graziers also monitor the condition of their pastures, most commonly by looking at the pasture and making judgements about its potential to support grazing. This information allows graziers to move livestock before they lose condition, and before the pasture becomes overgrazed. However, unless the information is recorded, changes in the condition of a pasture over time may not be detected.

This chapter shows how pasture monitoring can improve grazing management and maintain pasture productivity. It also describes some objective methods for monitoring native pastures.

WHY MONITOR NATIVE PASTURES?

» To determine the condition of a pasture – Monitoring allows you to determine the current condition of a pasture, and compare it with previous measurements and other pastures.

» To provide a permanent record – The human memory is unreliable, selective and short-lived, and cannot be relied upon to detect long-term changes in pasture condition. Monitoring provides a permanent record that can highlight gradual changes in a pasture over the years, and help determine whether the condition is stable, deteriorating or improving. Monitoring highlights potential hazards, such as weed invasion and soil erosion, and is essential to avoid the gradual loss of desirable species, such as productive perennial grasses.

» To evaluate the effectiveness of management – Monitoring enables you to measure the response of a pasture and underlying soil to different management actions. It can also be useful for recording the effect of a change in management on pasture composition, such as the effect of resting a pasture or changing from continuous to rotational grazing.

» To develop a better understanding of native pastures – Pastures and soils are the basis of grazing enterprises, and they directly affect the health, productivity and profitability of the business. It is important to understand how pastures function and how management decisions affect them. Monitoring pastures encourages graziers to look more closely at the plant and soil aspects of their grazing systems.

» Because livestock condition is different from pasture condition – Livestock condition is a poor indicator of pasture condition, because livestock can appear healthy despite degrading pastures and soils. Eventually, pasture and soil degradation will adversely affect livestock health and pasture carrying capacity. However, many graziers monitor only their livestock and neglect to monitor their pastures.

Wallaby grass pasture following drought and a corbie grub attack.

MONITORING WITH FIXED-POINT PHOTOGRAPHS

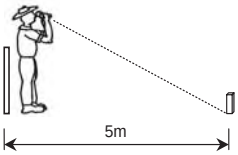
The simplest way to monitor the pasture in a paddock is to take fixed-point photographs at regular intervals, usually in spring and autumn. Fixed-point photographs are useful for showing changes in ground cover, pasture dry matter, soil erosion, and the cover of trees, shrubs and tussocks. It is recommended that two fixed-point photographs be taken at each site: a ground-cover photograph and a landscape photograph. Be sure to write the date and location of the site on the back of each photograph. It may also be useful to keep the photographs from each site in a separate album or folder.

To set up a fixed-point photograph site

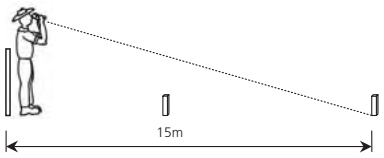
1. Choose a site that is typical of the pasture, or a site that you have a particular interest in monitoring. (You may want more than one site in a paddock.)
2. Drive a steel post into the ground at the site.
3. Drive two wooden pegs about 50 cm long into the ground, so that about 25 cm of each peg is above ground. Place the pegs in a line about 5 m and 15 m from the steel post. If possible, place the pegs in a line to the south of the post to avoid taking photographs looking into the sun.

Take the ground-cover photograph while standing with your back against the steel post, and with the 5 m peg in the centre of the viewfinder. If using a lens with a variable focal length, use a focal length of 50 mm. Record the date, paddock name and exposure number in a notebook.

Take the landscape photograph while standing with your back against the steel post, and with the 15 m peg in the centre of the viewfinder. Again, use a 50 mm focal length lens, record the date, paddock name and exposure number in a notebook as previously.



The ground-cover photograph



The landscape photograph

Litter is an important component of ground cover.

MONITORING PASTURE COMPOSITION

Monitoring the composition of a pasture gives more information than fixed-point photographs by recording the species present and their abundance.

Many methods can be used to monitor pasture composition. The species present may be recorded separately, e.g. key native grasses, such as kangaroo grass, or the species may be grouped into functional groups, e.g. native grasses, clovers, annual grasses, native broadleaf species and introduced broadleaf species.

The most common methods involve measuring cover. These include

» Place a number of quadrats (minimum size 50 cm x 50 cm) randomly or at fixed points (e.g. 30) in the pasture, and estimate the cover of the species or species groups, litter and bare ground in each quadrat. Then, calculate the average cover of each component.

» Throw a pointed stick a fixed number of times (e.g. 100) while walking through the pasture, and record the species or species group of the plant directly under the point where it lands. If no plant is present, record whether the point is over litter or bare ground. The cover of each component is the number of 'hits' expressed as a percentage (Prograze Victoria 2005).

Alternatively, if the purpose is to monitor changes in particular species or species groups, frequency (i.e. commonness of occurrence) is the best measure to use. This is best obtained using gridded quadrats (e.g. a 50 cm x 50 cm piece of weldmesh comprising 25 squares 10 cm x 10 cm). Place the quadrat randomly or at a number of fixed points (e.g. 30) in the pasture, and count the number of grid squares containing each of the species or species groups of interest. The frequency of each component is the average count expressed as a percentage.

The composition of a pasture should be monitored at least once a year, the best time being in early spring. Estimating the plant cover is easiest when the pasture has been grazed to 5–8 cm. Removing livestock from the paddock three weeks before monitoring allows the plants to flower, and makes plant identification easier. It is important to also keep records of rainfall, stock movements and other management actions, such as fertiliser application, to help make sense of any changes in pasture

Monitoring results

Table 7. Changes in percentage composition (% cover) over 4 years in a wallaby grass pasture monitoring site in Tasmania.

	Date				
Species or species group	Oct 2001	Nov 2002	Nov 2003	Oct 2004	Nov 2005
Kangaroo grass	5	2	1	1	1
Tussock grass	5	3	5	3	3
Wallaby grasses	35	25	30	25	20
Native lilies and broadleaf species	5	2	2	1	1
Clover	15	30	15	10	25
Annual grasses	10	20	25	30	20
Broadleaf weeds	5	10	15	15	20
Moss and lichen	5	3	2	0	0
Bare ground	15	5	5	15	10

composition. Most importantly, such records allow better and more informed decisions to be made about the pasture's management.

The decrease in native grass cover of the paddock documented in Table 7 may not have been noticeable without monitoring. If the trend continues, the pasture will become severely degraded. The figures indicate that the grazing management needs to be reviewed to prevent further degradation.

MONITORING SOIL ATTRIBUTES

While fixed-point photographs can show changes in the surface soil condition, e.g. erosion, they give no indication of the chemical, morphological and physical changes that relate to soil health.

The key chemical attributes to monitor are soil pH and electrical conductivity. These can be measured from soil samples using pocket-type meters or laboratory analyses. Major elements, such as phosphorus, potassium and sulphur, together with soil carbon can also be monitored through laboratory analyses to show changes in soil fertility. This is particularly important when fertilisers have been applied. Measuring every 5 years would be sufficient for most situations, though for fertilised pastures more frequent measuring (e.g. every 2–3 years) would be better to ensure that soil fertility levels are not raised too quickly (see Chapter 5, 'Managing fertiliser on native pastures').

Landscape photographs of a native pasture showing changes in the vegetation cover between January 2004 (top) and November 2004 (bottom).

Soil morphological and physical attributes, such as consistency and structure, affect water intake, water holding capacity and rooting depth.

Measuring these attributes mostly requires specialised procedures, which are offered by some agricultural consultants. Measuring every 10 years would be sufficient to monitor the important soil morphological and physical attributes.

Matthew Dunbabin

'Bangor', Dunalley

'In early summer 2001, we set up two pasture monitoring sites. Both sites are on predominantly native pasture. One site is a native pasture that's never been sown or fertilised. The second site is a far more productive area that's still predominantly native, but it's had some application of fertiliser and spreading of legume seeds in the past, so there's a fair mix of native and introduced species.

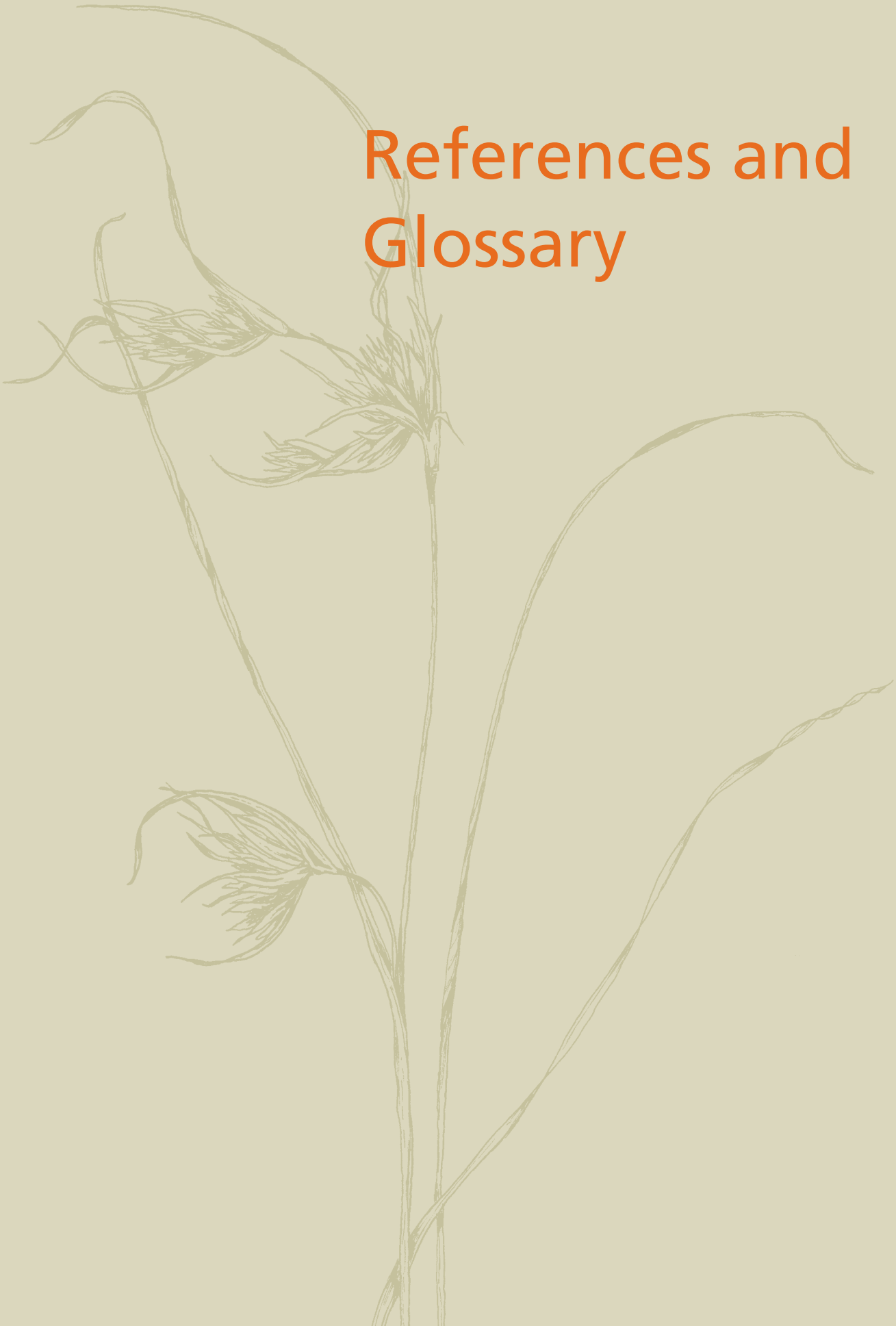
'We chose these sites because they're contrasting in their species composition, in the times of year they're growing, and in the way we use them.

'The initial monitoring has given us an overview of the composition of the two pastures. Now, we've got a good baseline of what's there, which we didn't have before, and we can go forward and monitor the changes over time.

'Both pastures need to be productive and produce useful feed. We want to retain the native species present, and possibly even improve the proportion of native species in both areas. On the more developed pasture, there's a lot of annual grasses, and the aim is to reduce the cover of those species. Whether they're replaced by native species or introduced perennials remains to be seen, but we'll try to get rid of the annual grasses.

'Monitoring these two pastures will allow us to really think about our grazing management. So, we'll try to graze and spell at times that promote the species we want, and retard the species we don't want.

'Without monitoring, we don't have an objective way of measuring whether we're heading in the right direction with our management. Once we start to get an idea of how our management is affecting these pastures, we can extrapolate the results to other areas of the property.'



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AGENCY CONTACTS

The Department of Primary Industries and Water (DPIW) is the government agency with the primary role of managing the Tasmania's natural resources - air, land, water, plants and animals – for the benefit of all Tasmanians.

www.dpiw.tas.gov.au

The Land Information System Tasmania (the LIST) is a whole of government integrated land information infrastructure with a web based delivery system. It includes spatial information such as natural resource data.

www.thelist.tas.gov.au

Land, Water & Wool is a national research program providing wool producers with practical tools for managing natural resources sustainably and profitably.

www.landwaterwool.gov.au

Tasmanian Institute of Agricultural Research (TIAR) is a joint venture between DPIW and the University of Tasmania focusing on research for Tasmanian agricultural industries.

www.tiar.tas.edu.au

GLOSSARY

Annual species – Species whose life cycle is completed in one year: typically germination in autumn, flowering in early spring, and seed set, senescence and death in mid–late spring. Examples include annual grasses, such as rat's tail fescue, annual clovers, such as subterranean clover, and broadleaf species, such as capeweed.

Awned seeds – Seeds that have a stiff, often spear-like projection. Examples of species with awned seeds include native speargrass and barley grass.

Biodiversity – The variety of life forms, including plants, animals and micro-organisms, and the genes they contain and the ecosystems they form. Biodiversity is an essential element of a healthy, functioning ecosystem.

Block grazing – see Rotational grazing and Cell grazing

Botanical composition – The plant species present in an area of vegetation (e.g. the desirable native and exotic grasses, legumes and other broadleaf species, and the exotic weed species present in a pasture). For pastures, often, referred to as 'pasture composition' or 'species composition'.

Broadleaf species – A highly variable group of plants: most have broad leaves with net-like veins as opposed to the narrow leaves and parallel veins of grasses. Also called Dicots.

Carrying capacity – The maximum stocking rate that can be supported by a pasture without causing a deterioration in the condition of the pasture: usually measured in dry sheep equivalents per hectare (DSE/ha). The carrying capacity of a pasture is not static, but varies from season to season and year to year.

Cell grazing – Grazing management in which livestock are moved around a cell consisting of a large number of small paddocks of a size that allow high stocking densities to be used in each paddock for a short time. Pasture growth rates must be monitored, and grazing periods should be calculated according to the growth and recovery rate of the desirable pasture species.

Conservation value – A value ascribed to an area of vegetation that defines its worthiness for conservation. Areas with high conservation value would include poorly conserved, rare and threatened ecosystems, and ecosystems containing rare or threatened species. Wildlife corridors linking core habitat areas may also have a high conservation value.

Continuous grazing – Grazing management in which livestock remain in a paddock for a long time. The paddock may be rested for part of the year, and the stocking rate may change over time. Also called set stocking.

Crash grazing – see Mob stocking

Crude protein – The estimated protein content of stock feed obtained from laboratory analysis, expressed as a percentage of the dry matter (% DM). As plants mature, their crude protein content decreases. Values range from 3% in mature, dry material to over 30% in young, green, heavily fertilised forage.

Cryptogams – Plants that have no true flowers or seeds (e.g. mosses, algae, lichens and fungi). In native pastures in good condition, cryptogams cover areas where there is no other plant cover, thus protecting the soil from erosion.

Dicots – The abbreviation for dicotyledons, which are flowering plants that have two leaves emerging from the seed. Also called Broadleaf species, (see also Monocots).

Digestibility – The proportion of consumed pasture used by the animal (expressed as a percentage of the dry matter consumed). For example, if the digestibility of a pasture is 65%, the animal uses 65% of the consumed dry matter for its nutritional requirements, and the remaining 35% passes through as faeces.

Dry matter (DM) – The plant material in a pasture with the water removed by drying.

Dry sheep equivalents (DSE) – The standard unit used for estimating the feed requirements of different types of livestock. The basic unit of 1 DSE is a merino wether (45 kg live weight) maintained in store condition by an intake of feed that provides 7 Megajoules (MJ) per day of metabolisable energy.

Ecosystem – A biological community of interacting organisms and their physical environment (e.g. a native pasture containing a range of native and exotic plants, and supporting a variety of soil micro-organisms, insects, reptiles, birds and mammals, including sheep, on a dolerite soil on a north-facing slope in the central Midlands).

Exotic species – see Introduced species

Forage value – The overall quality of a pasture as a source of nutrition for livestock (i.e. digestibility, protein content, metabolisable energy).

Forbs – Non-woody plants other than grasses.

Grassland – Vegetation in which grasses dominate the ground cover, and the tree cover is sparse or non-existent.

Grazing pressure – The relationship between the number of grazing animals and the amount of forage available at a particular time, expressed as DSE per kg of pasture dry matter (DSE/kg DM).

Ground cover – The proportion (%) of ground surface covered by plant material, including litter. A minimum ground cover of 70% is necessary to protect the soil from wind and water erosion.

Growing points – Tissues within the plant that produce new cells and new plant tissue.

Habitat – The natural home of an organism, i.e. the place where a particular plant or animal naturally grows or lives.

Herbage mass – The amount of pasture expressed as kg of pasture dry matter (kg DM).

Herbs – Non-woody plants, including grasses, broadleaf species, sedges, rushes and lilies.

Introduced species – Species that were not present in Tasmania before European settlement. It includes species that have been introduced intentionally and unintentionally. Also called non-native or exotic species.

Land capability – The ability of land to support a particular type and intensity of use without permanent damage (e.g. crop production requiring regular tillage). Land capability is determined principally by the physical properties of the soil, slope and climate.

Land types – Defined by features such as topography, aspect, soil type, geology, and vegetation.

Litter – Dead plant material lying on the ground, unattached to plants.

Metabolisable energy – The energy content of stock feed that is available to the animal following digestion for maintenance (to maintain basic metabolic processes and body temperature) and for production (wool growth, weight gain, foetal growth and milk production). Metabolisable energy is expressed as megajoules per kilogram of dry matter (MJ/kg DM). Values for pasture vary from about 5 MJ/kg DM for dry material to over 12 MJ/kg DM for young, green forage.

Mob stocking – Grazing management in which a pasture is grazed by a large number of livestock (high animal density) for usually a short period of time followed by a long rest. Also called crash grazing.

Monocots – The abbreviation for monocotyledons, which are flowering plants that have one leaf emerging from the seed (e.g. grasses and lilies. (See also Dicots)

Native species – Species that were present in Tasmania before European settlement.

Non-native species – see Introduced species

Overgrazing – Grazing where the stocking rate exceeds the carrying capacity of the pasture. Overgrazing degrades the condition of a pasture through loss of desirable pasture species, weed invasion and/or soil erosion.

Palatability – The acceptability of forage to livestock.

Pasture – An area devoted to the production of forage for livestock in which the ground cover is dominated by herbaceous species, such as grasses and broadleaf species.

Pasture condition – A descriptive term that combines information on botanical composition, pasture cover, soil erosion, etc., that relate to its ability to support grazing. A native pasture in good condition would have a high native grass content (greater than 70% pasture DM) and a small amount of bare ground (less than 10%).

Perennial species – Species that persist for more than two growing seasons. Examples include most native grasses, such as wallaby grasses and kangaroo grass, many native broadleaf species, such as common everlasting, and many sown grasses, such as perennial ryegrass and cocksfoot.

Recruitment – The process of regeneration from seedlings.

Resting – Removing livestock from a paddock for a period of time. Also referred to as spelling.

Riparian – vegetation that occurs along the margins of wetlands and rivers.

Rotational grazing – Grazing management that involves regular periods of grazing and resting.

Rotational resting – see Rotational grazing

Sagg – The plant *Lomandra longifolia,* also called cutting rush.

Sedges – Grass-like plants that belong to the family Cyperaceae. They often have hard leaves and stems and their flowering parts are usually dark, rather than straw-coloured.

Selective grazing – The propensity of livestock to graze particular favoured plants or parts of a plant.

Set stocking – see Continuous grazing

Soil seed bank – The amount of seed stored in the soil.

Sown pasture – Pasture established by sowing introduced species (e.g. grasses and clovers), normally following the removal of existing vegetation by cultivation or herbicide use or both. Also referred to as introduced pasture or improved pasture.

Sp. – An abbreviation of species (plural spp.), which is used when the specific name (the second term in the binomial system of botanical nomenclature) is uncertain (e.g. *Austrodanthonia* sp. refers to a species belonging to the genus *Austrodanthonia* whose specific name is uncertain; *Austrodanthonia* spp. refers to several species of the same genus).

Spelling – see Resting

Stocking rate – The number of livestock on a particular area: usually expressed as dry sheep equivalents per hectare (DSE/ha).

Time-controlled grazing – see Rotational grazing

Utilisation – The proportion of pasture forage eaten by stock.

Volunteer species – Usually an introduced plant species that has not been deliberately sown or introduced, but has dispersed and spread by itself to different areas. Examples include annual grass weeds, broadleaf weeds and small leaf annual clovers.

Wildflowers – Native broadleaf plant species.

Woodland – An area of vegetation with trees, where the tree canopies are clearly separated. A grassy woodland has an understorey dominated by grasses.