

Plants under pressure

A land holder's guide



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Reading the landscape: What plant health reveals about grazing pressure

Sustained grazing pressure from feral goats, rabbits, macropods and other overabundant species can drive the decline – and eventual local extinction – of long-lived trees and shrubs.

Continuous, selective grazing prevents seedlings from reaching adulthood, leaving no new plants to replace natural mortality. As these species disappear, food and shelter for native fauna diminish, habitat structure degrades, and stock feed quality and diversity decline.

The loss of keystone plants triggers cascading impacts on smaller shrubs, fauna and invertebrates, reducing overall ecosystem function. Over time, this leads to declining organic matter and deteriorating soil condition.

Maintaining vegetation with mixed shrub layers and varied height classes is essential for landscape resilience. Structural diversity slows wind, protects topsoil, reduces erosion during heavy rain, and supports soil formation and organic matter accumulation.

These conditions promote diverse native grasses with varied nutrient profiles. Shade trees and shrubs across the landscape are also vital for livestock health.

An Eremophila species that has been heavily grazed.



*'You look after country
and it will look after you.'*
Arabana Rangers 2025

Travelling your country

Land managers are highly observant and will often notice change during routine activities such as water runs or fence checks.

Regular activities can easily become a survey on areas favoured by goats, euros, rabbits and dorpers, such as wooded hillsides, steep slopes and ridgelines, rocky outcrops, and damp gullies.

When surveying your property, we recommend avoiding areas within 500m of permanent water, which are the last to respond to management.

Surveys in ungrazed areas can follow track networks. The steep ridges and rocky outcrops in grazed areas must be accessed on foot.

Regular survey activities can help land managers build on existing knowledge of local plants and preferred areas, noting soils, geology, and terrain.

By looking across comparable landscape systems, you can assess browse form, plant height, and where the browse is most noticeable.

By moving away from tracks, you can avoid misleading signs of recovery caused by water runoff.

It is important that within each management area you identify and record known threatened species.



Know the tell-tale plants

Indicator species, often referred to as 'ice-cream species' are perennial plants that are highly palatable to most herbivores and are preferentially browsed. Narrow-leaf Emubush (*Eremophila alternifolia*) is the most palatable of these species.

Mulga (*Acacia aneura*) is a slow-growing, long-lived shrub or small tree with high cultural significance. It has infrequent recruitment events, very low seedling survivorship and drought often limits establishment. Mulga seedlings and young plants take a long time to reach maturity and are often lost to browsing before then, particularly by goats, leading to depletion of the soil seed bank over time.

Other highly palatable and culturally significant plant species, with their Adnyamathanha names are: Plumbush or Sandalwood (*Santalum lanceolatum*), Quandong (Urti *Santalum acuminatum*, Desert Mintbush (*Prostanthera striatiflora*), Native Orange (Iga/*Capparis mitchilli*), Leafless Cherry (*Exocarpos aphyllus*), Black Oak (Casuarina pauper), Long-leaf Emubush (Vativaka/*Eremophila longifolia*) and Bullock Bush (Minara/*Alectryon oleifolius*).

Suckering plants such as Black Oak and Bullock Bush send out suckering stems underground to reproduce, because viable seed are not always produced.

Narrow-leaf Emubush, flower.
Photo: Anne-Marie Taranto (FRFN).



Did you know that the Bullock Bush is not a tree? The literal name is a hint.



Less palatable species are important as 'Gate Keeper plants.' Species such as Hop Bushes (*Dodonaea* sp.), Dead Finish (*Acacia tetragonophylla*) and Elegant Wattle (*Acacia victoriae*) are gnarly, spiny and have dense branching. While they are not necessarily attractive or as palatable, they play a crucial role in protecting younger, more palatable species from grazing. These species often return first as part of a system's natural succession.

Reading individual plants – browse form and intensity

The **browse form** describes the shape and structure of a plant after it has been affected by grazing. It shows how far the plant's appearance has shifted from what its natural form would be.

Plumbush with a 'lollipop' form.



When animals repeatedly eat the softer, younger parts of a plant, its lower branches may disappear, leaving a thick, older-looking base with most growth higher up. This can create an “umbrella” or “lollipop” shape. The more the plant has been grazed, the more distorted its browse form becomes.

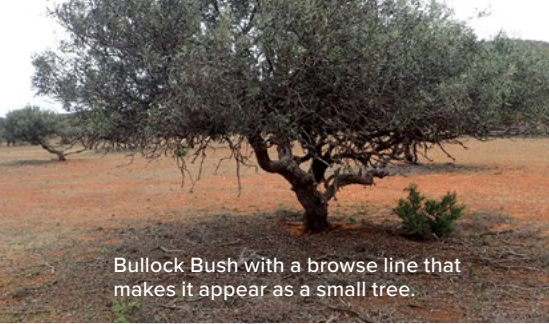
Historical browsing can create unnatural architecture, such as clear browse lines, or hemlines, causing large shrubs to appear as small trees. This can be the case with species such as Black Oak, Native Orange, Bullock Bush or the Umbrella Wattle).

Plant architecture may also remain largely unchanged and appear halted or damaged in arid environments for 5-10 years or longer due to past browsing and the effects of drought. This can be the case for species such as the Mulga.

Browse intensity describes how much of a plant's foliage has been removed by grazing animals during the most recent period of growth, based on the proportion of leaves, twigs, stems and branches eaten.

Twigs refer to branches less than 2mm thickness, stems are 2-6mm thick and most branches grazed to greater than 6mm, indicate heavy to severe browse.

For smaller plants this can be less applicable because they generally don't produce larger thick trunks. In that instance it becomes more about the proportion and the plants architecture. Drought can further increase browse intensity by limiting plant recovery.



Bullock Bush with a browse line that makes it appear as a small tree.



Smaller understorey shrubs recovered and canopy is beginning to drop.
Photo: Andrea Tschirner.



Acacia murrayana.



Smaller plants growing down to the ground.
Photo: Ellen Ryan-Coffin, Murraylands.

Intact

Browse form

Plant displays its expected functional form, with stems and branches tapering progressively to fine twigs at the canopy edge. With intact plants, less than 20 percent of the plant is browsed.

Browse intensity

Minor browsing only, typically limited to fine twigs that are less than 2-3mm in diameter.



Narrow-leaf Emubush.
Photo: Anne-Marie Taranto (FRFN).



Intact Iga. Photo: Ben McCallum.

Damaged/Overutilised

Browse form

Dead stems and branches extend beyond live foliage, larger plants browsed high (hemmed) or stunted with swollen stems. Structural form reduced by 50 per cent or more.

Browse intensity

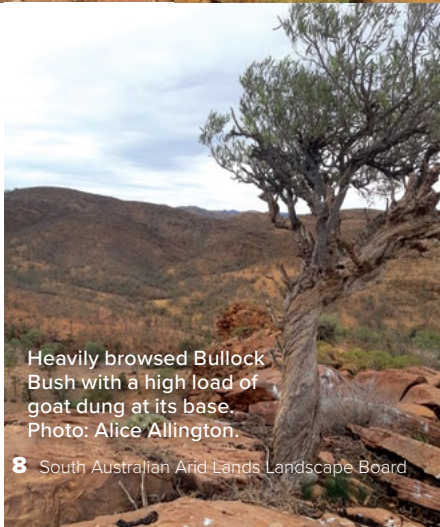
Browsing extends to larger stems greater than 6mm and in severe cases, plants may be too modified to provide any available green pick.



Damaged Bluebush.



Damaged Eremophila alternifolia.



Heavily browsed Bullock Bush with a high load of goat dung at its base.
Photo: Alice Allington.

Modified/Halted

Browse form

Plant is noticeably altered from its intent functional form, with a reduced size of 20-50 percent overall.

Browse intensity

Growth repeatedly suppressed by browsing, primarily on twigs and 2/3-6mm in diameter.



Modified Pimelea microphylla.



Modified exocarpos.



Modified Xerothamnella parvifolia.

Recovering

Browse form

Recent growth extends beyond dead or previously browsed stems, and the plant is increasing in overall size. The plant transitions to a modified state with new shoots forming branchlets. Reaching an intact state may take 3-5 years with smaller plants or more than 10 years for Mulga.

Recruitment of palatable plants

A key indicator is the reappearance of palatable decreaser species, seedlings and juveniles and surviving beyond early growth stages.

You will find a list of palatable decreaser species on Page 16 of this publication.



Pimelea in modified state beginning to recover.



Recovering Bluebush.
Photo Andrea Tschirner.

Who's doing the chewing?

In the rocky range country of the arid lands, a variety of grazing and browsing animals favour different terrain and food sources and heights.

Grazing and browsing characteristics

Goats are primarily browsers, with about 60 per cent of their diet made up of leaves, bark and twigs. Euros are likely to fall into this category, compared with 10-15 per cent for cattle and Merino sheep, and focus on grazing grasses, herbs and forbs. Rabbits and hares will target smaller shrubs and seedlings, grasses and forbs.

Dorpers have a dietary overlap with Merino sheep, and are highly adapted to arid environments. They have an efficient digestive system, particularly in their ability to use woody perennial species. This is a trait that is typically associated with goats.

Foliage stripping and branch-breaking damage is commonly caused by goats or Euros, not smaller grazers. It is probable, that goats and Kangaroos may do this when accessing upper foliage, which stimulates a response of new growth. An example is this Slender Bellfruit, which is damaged with broken branches, there was a presence of many fresh goat dung and goats were sighted in the area.

Rabbit browse is chiselled and at a 45-degree angle and the vegetation impacted to less than 60cm high. Hares are less common and the impact is less than 80cm high.

Some species are considered poisonous or toxic to most animals. These include Bullock Bush, Riceflower or Slender Bellfruit, which is often referred to as camel poison.



Damaged lower branches of Slender Bellfruit.



Rabbit browse. Photo: Alison Skinner.



Goats in focus

- Capable of processing thick woody material (greater than thumb width).
- Readily consume unpalatable or less palatable species, such as Harlequin Emubush.
- Possess strong digestive enzymes, allowing them to tolerate higher levels of plant toxicity.
- Goats prefer rocky ridges terrain and ridges – which is the same as Yellow-footed Rock Wallabies (YFRW). YFRW have specialised food plants such as the stellate trichome species; Sida bushes, Lantern Bushes, Hibiscus, Solanum (Soft leaf) Mulla Mulla.
- Known behaviours include:
 - Breaking branches to access new growth.
 - Browsing up to 2 metres high by leaning on shrubs and snapping stems.
 - Targeting seedlings and juveniles, often preventing plants from reaching maturity.



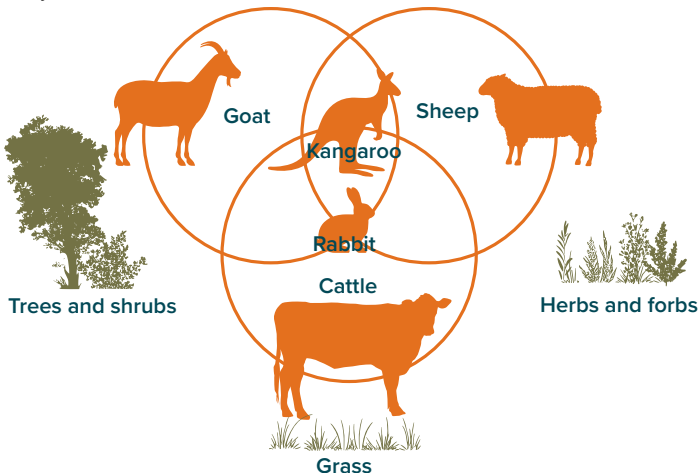
Kangaroos in focus

- Kangaroos primarily graze on grasses when they are available.
- Outside of grasses, they will browse on saltbush
- Able to digest fibrous material.
- Can cause foliage stripping and branch breaking when accessing higher foliage, which stimulates a response of new growth.



Rabbits in focus

- Rabbit browse is chiselled and at a 45 degree angle, and the vegetation impacted to less than 60cm high.
- Will eat the same plants as goats, but will target the material nearer the ground., removing new growth.
- Australian plants have not evolved to cope with intense rabbit browsing.
- Even in small numbers their effects can be profound. One rabbit in 2ha is enough to stop native plants from growing back.



Different animals exploit different food sources.

Dung measure as an indicator

Dung density is used as a measure of which species are in high numbers, regularly in the area and can be linked to the browse impacts.

Dung density attribute table

Dung attribute	Low density	Medium density	High density
Dung age	Fresh or dark, <30 days	Mix of fresh and older dung	Mostly fresh & frequent, continuous signs
Colour	Grey or greying, >30 days	Mixed colours (fresh + old)	Mostly fresh/dark pellets
Quantity	Small amounts, sparse	Moderate amounts	High amounts, dense
Distribution pattern	Scattered pellets, widely spaced	Patchy areas of dung accumulation	Dense, continuous covering of dung, often mounded
Description of coverage	Minimal / isolated	Moderate covering with occasional mounds	Heavy covering, obvious concentrated patches



Rabbit scat.



Kangaroo scat.



Fresh heavy load goat scat.

Not all damage is caused by grazing

Accurate assessment of browse impacts requires recognising that a range of environmental factors—beyond grazing—can influence plant condition and produce similar visual symptoms.

Climatic conditions—particularly extended drought—can leave the landscape looking sparse, stressed, or grey as many perennial shrubs die back, desiccate, or temporarily shut down. This often results in widespread twiggy, grey-toned vegetation that can closely resemble browse damage, even when grazing pressure is low.

During prolonged dry periods, especially in sensitive species such as Desert Mintbush and Leafless Cherry, it can be difficult to distinguish true browsing impacts from drought-related decline or wind damage, which can also break stems or strip foliage.

Rains bring short term relief for rangelands and sudden appearance of lush green annuals can mask the lack of structural diversity.

At the opposite extreme, extended wet periods can also affect plant health in arid environments. Prolonged root inundation can lead to plant die-off and increase susceptibility to fungal infections.

Insects can also act as significant grazers. Grubs and caterpillars can defoliate entire plants, commonly affecting species such as Desert Mintbush, Winged Daisy-bush and some Grevillea species. Insect impacts are often more noticeable and damaging in areas already heavily grazed.

When grazing reduces shrub diversity and density, the ecosystem becomes

unbalanced and no longer supports insect-gleaning bird species such as Weebills, Wrens and Thornbills. As a result, pest insects can increase unchecked. For example, borer damage in Slender Bellfruit can cause trunk weakening, breakage and loss of foliage.



Putting the pieces together: Judging the land's condition

Land that is well-vegetated can retain several times more rainwater than areas that are sparsely vegetated. It will also dry out more slowly and reduce flood runoff during intense rainfall events. The recovery of land and habitat condition can be monitored by the return, persistence, and maturity of ice-cream species that would be expected to grow in these areas.

Healthy soils will have a good cover of biological soil crust. This crust is made

up of many types of living organisms including lichens, bacteria and algae. Soil crusts play an important role in improving soil water retention, cycling important minerals like Nitrogen, providing ideal conditions for seed germination and preventing erosion. A healthy soil crust is a good indicator of total grazing impact. The more a landscape is grazed (especially with hard hooved animals) the less a soil crust is able to establish and thrive.

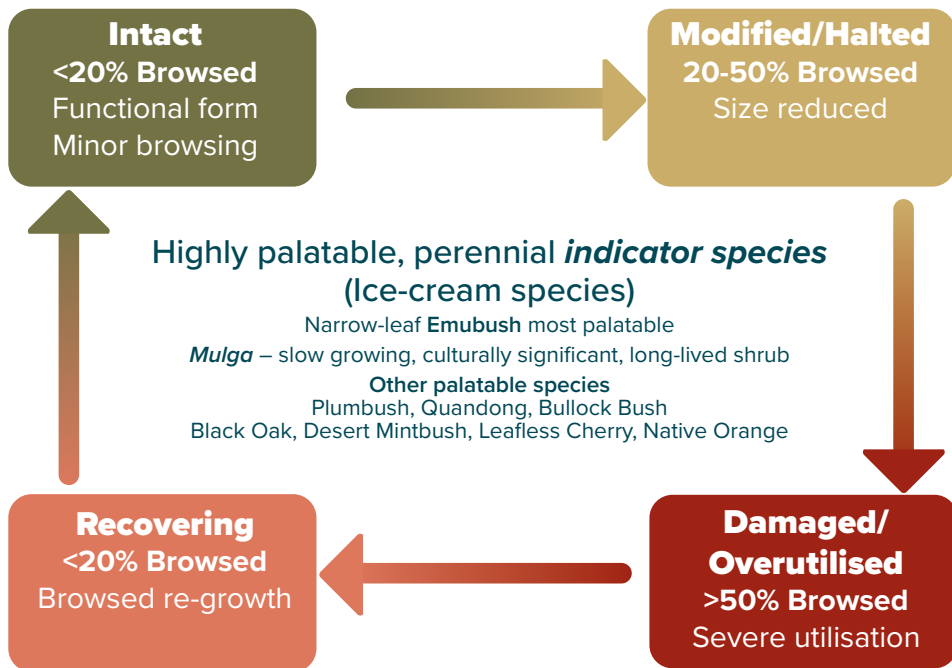
Act and watch for change

The way you manage your land directly shapes how well it copes with grazing, drought and other pressures. There are several proactive steps you can take to minimise impacts and support recovery, such as adjusting stocking rates, rotating grazing pressure, mustering or culling when required, fencing or establishing small exclosures, and implementing regenerative grazing practices. Under effective regenerative grazing, highly palatable decreaser species begin to regenerate and re-establish, gradually transitioning from over-utilised or damaged forms toward moderate, released or intact architectural forms.

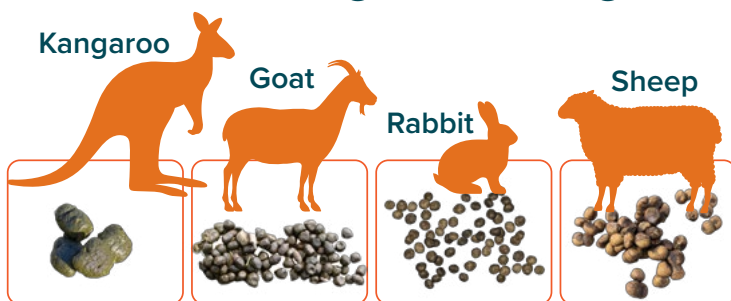


Desert mintbush.

Plants under pressure



Who's doing the chewing?



Indicators to observe

Are shrubs displaying hemline (clear browser line) or sucker growth?

- Stunted growth
- Branch damage
- Enlarged/dead stems
- Base thickening?

Indicators of system health

Some species will be grazed before others. Decreaser species are highly palatable plant species which indicate a healthy system. They are quick to decline under grazing pressure.

Increaser species are less preferred by grazing animals and will expand as the more favoured decreaser species reduce, indicating a damaged or overused system. They are species that are more tolerant to disturbance and grazing of these plants can indicate high numbers of pest animals



Flowering Iga.

Highly palatable decreaseers

Common name	Species
Bullock Bush	<i>Alectryon oleifolius</i>
Christmas Bush	<i>Bursaria spinosa</i>
Leafless Cherry	<i>Exocarpus aphyllus</i>
Long-leaf Emubush	<i>Eremophila longifolia</i>
Mulga	<i>Acacia aneura</i>
Narrow-leaf Emubush	<i>Eremophila alternifolia</i>
Native Apricot	<i>Pittosporum angustifolium</i>
Quandong	<i>Santalum acuminatum</i>
Plumbush	<i>Santalum lanceolatum</i>
Sandalwood	<i>Santalum spicatum</i>
Shrubby Riceflower	<i>Pimelea microcephala</i>
Striated Mintbush	<i>Prostanthera striatiflora</i>
Black Oak	<i>Casuarina pauper</i>
Slender Bellfruit	<i>Codonocarpus pyramidalis</i>
Drooping Sheoak	<i>Allocasuarinba verticillata</i>
Native Orange	<i>Capparis mitchellii</i>



Ptilotus obovatus

Unpalatable increasers

Common name	Scientific name
Dead Finish/Vada	<i>Acacia tetragonophylla</i>
Elegant Wattle	<i>Acacia victoriae</i>
Curry Bush	<i>Cassinia laevis</i> spp. <i>laevis</i>
Native Lemon-grass	<i>Cymbopogon ambiguous</i>
Narrow-leaf Hop-bush	<i>Dodonaea viscosa</i> spp. <i>angustissima</i>
Harlequin Emubush	<i>Eremophila duttonii</i>
Turpentine Bush	<i>Eremophila sturtii</i>
Thorny Fan-leaf	<i>Lawrenzia squamata</i>
Australian Boxthorn	<i>Lycium australe</i>
Pimelea Daisy-bush	<i>Olearia pimeleoides</i>
Silver Mulla Mulla	<i>Ptilotus obovatus</i>
Tangled Poverty Bush	<i>Sclerolaena</i> spp.
Cassia	<i>Senna</i> spp.

Find out More

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Rabbit warrens. Photo: Alice Allington.

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