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A REVIEW OF THE EFFECTS OF GRAZING NATURAL ECOSYSTEMS IN VICTORIA

(Technical Review Paper)

Department of Crown Lands and Survey

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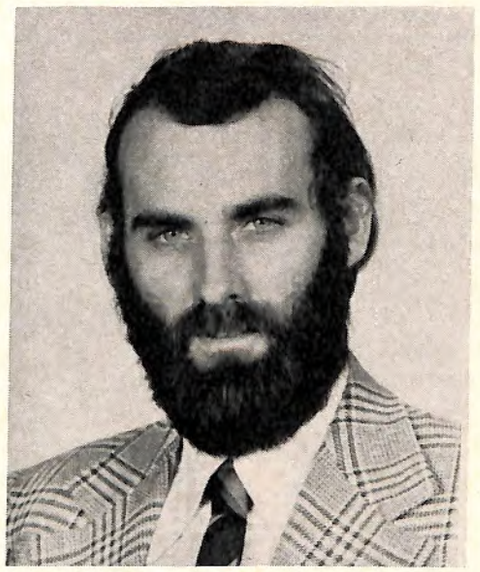

The following review is a little more technical than the Department's " Bulletin 5—Grazing on Crown Land ".

Readers who wish to become more familiar with the subject are invited to study the following pages and then refer to the bibliography at the end.

Assistance from Dr. R. G. Groves, Division of Plant Industry, C.S.I.R.O., Canberra, who helped in refereeing this material is gratefully acknowledged.

October 1977

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A REVIEW OF THE EFFECTS OF GRAZING NATURAL ECOSYSTEMS IN VICTORIA

1. The Effects of Grazing on the Composition of Natural Grasslands* in Temperate Australia

(*including natural grasslands which volunteered following the early clearing of woodland and forest.)

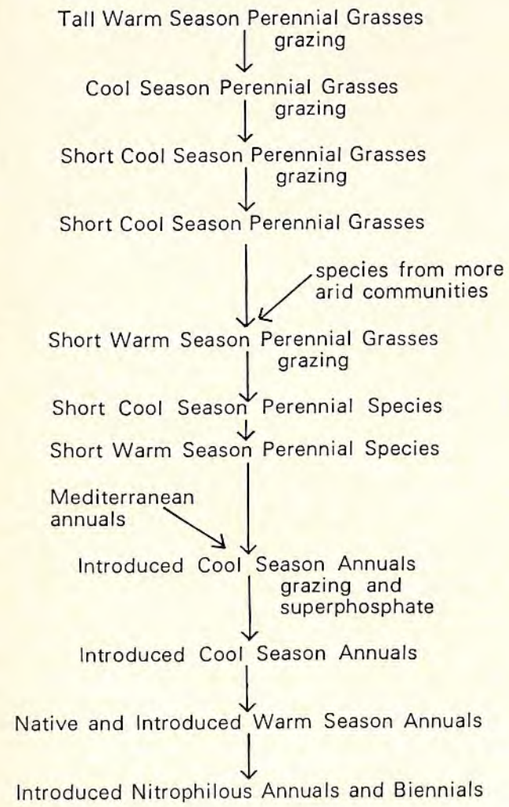
In Victoria, there are two major types of natural grassland; the temperate tallgrass which is dominated by *Themeda* and *Poa* and the temperate shortgrass which is dominated by *Danthonia* and *Stipa*.[30] *Themeda australis* was a feature of the herbaceous layers of natural climax communities whether forest, woodland or grassland in tropical and temperate humid and sub-humid areas except on the heaviest textured soils. *Themeda australis* has an extremely wide range of distribution which is believed to be associated with the mineralisation of soil organic matter in summer.

The species, which grows in summer, utilises nitrogen and other nutrient elements as soon as they become mineralised. This rapid uptake of nutrients prevents the invasion of other species and gives stability to the community. In this way the species apparently " controls " the environment, halting succession and the community thus attains a climax state.[30]

Kangaroo Grass (Themeda australis)

Wallaby-grass (Danthonia)

Because *Themeda* is mainly a summer growing species, in temperate woodlands it is out of phase with the rainfall regime which follows a Mediterranean pattern (dry summer, wet autumn, winter and spring). Thus the equilibrium of this system is finely balanced and its stability can be destroyed by the intrusion of factors such as grazing domestic animals when sedentary grazing is practised in temperate woodlands.[30] *Themeda* is rapidly replaced by cool season perennials such as *Danthonia* spp. and *Dichelachne* spp. This type of community may then be invaded by introduced species particularly Mediterranean annuals. These changes can be expressed diagrammatically:[30]



Spear Thistles have become well established in this grazed improved pasture.

Themeda australis although initially an important component in natural tussock grassland, disappears rapidly when subjected to grazing because of its erect growth habit and high palatability to domestic stock.

Other probable reasons which have been advanced to explain the disappearance of *Themeda* with intensified animal grazing include mechanical damage to adventitious roots at the soil surface, gradual exhaustion of root reserves by continual removal of vegetative material, poor seeding ability and poor subsequent seedling establishment and inability to survive " competition " for light and nutrients from associated species.[20]

Under similar conditions, *Danthonia* spp. and other species of native grasses persist. As a result the more mesophytic, temperate, natural grasslands are now composed mainly of the short cool season perennials, *Danthonia carphoides, Danthonia auriculata* and *Stipa falcata*. Only small patches of *Themeda*-based grasslands remain in the southern tablelands of N.S.W. and the Western District of Victoria.[41]

However, changes in natural grasslands have resulted not only from increased grazing pressures. Widespread changes in agricultural practices, notably top-dressing pastures with superphosphate and the introduction of species particularly subterranean clover, have almost eliminated these already modified communities.[41]

Native grass species are sensitive to increased soil fertility induced by agricultural practices and to competition from introduced grasses and legumes.

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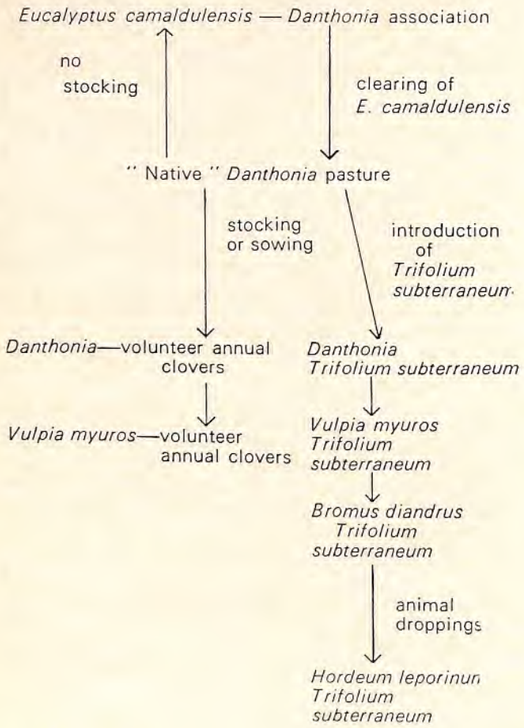
Changes in Red Gum Woodland with Grazing, Sowing and Top-dressing (from Specht 1972).[41]

Typical changes in a River Red Gum woodland are illustrated diagrammatically thus:—



With a heavy grazing regime which promotes reduced competition from native palatable species and increased areas of bare ground there is an invasion of weed species which may have very little grazing value e.g. *Arctotheca calendula* (Cape Weed), *Asphodelus fistulosus* (Onion Weed), *Echium lycopsis* (Paterson's Curse), *Homeria* spp. (Cape Tulip), *Oxalis pes-capræ* (Soursob), and *Romulea rosea* (Onion Grass). When grassland gets to this condition there is little that can be done except to cultivate it and establish improved pasture species.[41]

This red gum woodland along the Wimmera River has undergone the changes described above.

Fire

Another important outcome of the invasion of these species is that the period of maximum growth and flowering of the understorey is displaced from late spring–summer to early spring, a rhythm which is characteristic of other Mediterranean regions. Less summer growth now occurs and the lush growth of spring dries off in summer to become a potential fire hazard. Summer growth is an important aspect of both *Themeda* and *Danthonia* grasslands.[41] *Danthonia* has comparatively low producton in spring and is able to produce green shoots during summer with very little rain.[11] If *Themeda* grassland is burned early in the summer, summer rains produce a lush green carpet of shoots from the burnt tussocks. This phenomenon is often readily observed along road reserves which are burnt off in summer to produce firebreaks.

When *Themeda* grassland is burnt in September in ungrazed refugia (such as cemeteries and along railway lines) the subsequent density of *Themeda* is always greater than that occurring in adjoining grazed areas. This and other experience illustrates not only the fact that plants of *Themeda* cannot withstand heavy and prolonged grazing by stock but also that it is likely that the growth of *Themeda* is promoted by regular burning or the growth of associated species is considerably reduced.[21]

It is sometimes claimed that grazing reduces the fire risk in grassland. Fire hazard reduction is a valid reason only when grazing physically removes biomass which would otherwise dry off and form fuel. In the long term, grazing alters the botanical composition of the grassland making it more fire susceptible due to an increase in the number of annual species and an increase in spring production which is carried over into the summer as dry standing fuel.

In an exceptional year when it is impossible to remove excessive growth due to inadequate stock numbers, the previously heavily grazed grassland presents a much more serious fire risk than the lightly grazed or ungrazed grassland. This establishes the use of infrequent controlled burning as a more desirable management tool than grazing in natural grasslands where fire control is considered essential.

Themeda grassland has been shown to have a growth relationship similar to that for sclerophyll shrub (heath) vegetation in southern Australia.[21,24] On this basis it would appear that the most favourable interval between successive burns is about 2–3 years. More frequent burns may lead to decreased production of natural grassland dominated by *Themeda australis* and possibly to a deterioration in biological diversity. In disclimax communities less frequent burning may lead to an increased dominance on indigenous sclerophyll shrubs.[21] As with burning, mowing *Themeda* grassland also increases the proportion by weight of green shoots in the biomass of grassland.[21] This effect is not as pronounced as with burning but it does have management implications for controlling excessive growth of roadside grassland.

Grazing Near Watering Points

A study of pastures near sheep watering points concluded that grazing intensity ranged from severe near watering points to light 200 m away. This finding has relevance to the grazing of water frontages, which often provide stock with access to water.[7]

Wimmera Natural Grasslands

To complete this discussion of temperate grasslands it is necessary to mention the drier grasslands which occur on heavier textured soils from southern Queensland (Darling Downs) to the Wimmera region of Victoria. Native grasslands in these areas are extremely rare because they have been extensively cultivated for cereal growing. The principal species in dry temperate grasslands are now *Stipa aristiglumis* (syn. *S. bigeniculata*) (Plains Grass) and *Danthonia* spp. Originally *Themeda avenacea* (Native Oat Grass) was apparently co-dominant with *Stipa* but is now found only in spots protected from grazing.[30]

The last remnants of this dry temperate grassland–woodland ecosystem are probably restricted to small areas of Crown land and special care should be taken to ensure that grazing is not permitted on these last vestiges.

2. The Consequences of Grazing on Soil Erosion in Sub-humid Temperate Australia

Overgrazing can have serious effects on soil conditions and partly accounts for the process of decline of solodic soils in central and north-eastern Victoria.

After clear felling of the dry sclerophyll woodland and forest *Stipa–Danthonia* pastures volunteered as a consequence. Constant grazing of the south-eastern " native " pastures at rates of one sheep per 0·4 ha (or greater) coupled with the spread of rabbits in pest proportions brought about a decline in the vigour and persistence of the ground cover causing the poorly structured surface soils to become hard, compacted and impermeable. This increased runoff and produced more arid conditions on the hillsides further damaging the vegetative cover. Water washing into old stump holes and rabbit burrows led to tunnel erosion and the tunnels subsequently collapsed causing gullies to develop.[17]

Salting

Another problem induced by heavy grazing is that of salting. The changes in botanical composition under heavy grazing from perennial native species to introduced Mediterranean-type annuals are reflected in the rate at which water is utilised. The perennials which have deep spreading root systems maintain a hydrological balance between infiltration and transpiration. With a change to annual species less water is utilized causing more seepage and excessive wetness at lower levels.[17] In some parts of Victoria's Western District average rainfall deposits 25–40 kg of salt (sodium chloride) annually into each hectare of soil. Under normal conditions this would have little effect but the concentration of salt spot grazing reinforces the problem. Salt spot grazing is caused by increased salt content making these sections of pasture more palatable to stock. Salt accumulates until concentrations toxic to most native pasture species are reached and the survival of vegetation is impossible. The bare saline areas then become focal points for soil erosion.[22] A major cause of this problem can be traced to settlement practices of the squatters who felled or ring-barked many of the red gums on their runs.

This seems an incongruous practice because good pasture will grow right up to these trees with their open, light permeable canopies. Pasture under red gums is often better than in the open and this can be attributed to rain washing large amounts of nutrients from the leaf canopies of the surface soil which is naturally deficient in phosphorus, potassium and nitrogen. This is part of the natural nutrient cycle in the undisturbed ecosystem.[22] It is clear that with continued heavy grazing there can be no chance of regeneration of *E. camaldulensis* woodlands and only an intensification of the salting problem.

River Red Gum woodland along Hopkins River. Understorey originally Danthonia and Stipa, now highly modified by grazing and topdressing.

3. The Effects of Grazing in Forests

Grazing in forests does appear to have some benefits as a management tool. Controlled grazing has been successfully used for reducing weed problems in *Pinus radiata* plantations in South Australia and New Zealand.[4] There is evidence that cattle grazing aids seedling establishment in *Eucalyptus camaldulensis* forests at Barmah on the Murray, probably due to a significant reduction in weeds and grasses that would otherwise compete with the red gum seedlings for soil moisture at that site.[16] However while this seems to be relevant to pure stands of red gum which are found on the lower ground of riverine forests which receive regular flooding, the *E. camaldulensis–Danthonia* woodlands as previously described represent quite a different situation. And this research should be repeated with a range of intensities of grazing and seasonal conditions. Grazing in forests must be controlled to be successful. Even at the lowest grazing intensities, livestock will always do some damage to young trees; sheep mainly by browsing and cattle mainly by trampling.[4]

Data from Woohlpooer

There has been little information published on the effects of grazing on the ground cover and shrub layer vegetation of woodlands, as distinct from the tree species.

The following data which have been kindly provided by Dr. P. R. Bird were collected in Crown land along Ferguson's Road, three miles from Woohlpooer, north of Cavendish, western Victoria on 22nd September 1975. The site was a very open, sparse old woodland of *Eucalyptus melliodora* (Yellow Box), *E. camaldulensis* (River Red Gum) and *E. leucoxylon* (Yellow Gum). Transects were run 10 m from and parallel to the dividing fence on the grazed and ungrazed sides. Metre-square quadrats were dropped at each 10 m along the line.

Ground Species (excluding *Cyperaceæ* and *Graminæ).*

Numbers of Individuals per m².

	Grazed	Ungrazed
Hypoxis sp. . .	1·0	3·4
Xanthorrhœa minor . .	0·5	0·4
Chamæscilla corymbosa . .	0·8	3·3
Goodenia geniculata . .	0·7	22·8
Astroloma humifusum . .	0·5	0·3
Bossiaea prostrata	0·6	1·3
Anguillaria dioica	0·2	0·1
Cæsia vittata	0·3	0·1
Acacia aculeatissima . .	–	0·2
Diuris pedunculata	–	0·1
Leptorhynchos spp. . .	–	0·1
Kennedia prostrata	–(√)	0·2
Leucopogon virgatus . .	–(√)	0·1
	4·6	32·4
Other species found (√) but not in quadrats		
Drosera spp.	√	√
Eriochilus cucullatus . .	–	√
Pelargonium rodneyanum . .	√	√
Tetratheca ciliata	√	√
Dianella revoluta	√	√
Oxalis corniculata	√	√
Lissanthe strigosa	√	√
Hibbertia australis	√	√
Pterostylis sp.	–	√
Caladenia dilatata	–	√
Tricoryne elatior	–	√
Helichrysum spp.	–	√
Diuris longifolia	–	√
	7	13

The data illustrate the point that grazing reduces both the numbers of species and the number of individuals of each species of ground plants.

Grazing also has a marked effect on the composition of the open forest ground cover, both in terms of the number of species present and the biomass. (P. R. Bird 1976 personal communication).

This plot near Edenhope was fenced just two years before the photograph was taken. Note the River Red Gum seedlings inside the fence.

4. The Effects of Grazing in Mallee, Mallee Heaths and Arid Shrublands

In Victoria these formations are confined to the north-west of the State where mallee and mallee heaths predominate. " Mallee " is the term used primarily to describe the shrub-like multi-stemmed habit of growth of eucalypts which are the dominant plant species in these communities.

The native vegetation of the north-west has a low value for grazing and a low carrying capacity. These regions have a history of early settlement by pastoralists who operated very large holdings with extremely low carrying capacities as of the order of 1 sheep to 12 ha.[5] A frequent management technique to improve grazing was the periodic burning of the scrub. With the exception of mallee heaths and heaths (which although wetter have a very low nutrient status) much of the Crown land originally carrying these communities has been alienated and cleared for arable farming, in particular cereal production.[5]

Saltbush Steppes

The low rainfall mallee particularly the shrub steppe-mallee, shrub steppe-woodland and shrub steppe communities is still utilised as grazing land. These areas have sparsely scattered trees and much higher numbers of scrub and grass species than other mallee communities. They are generally classified as xenophytic midgrass grazing lands.[5] In Victoria these communities are confined to the far north-west in the regions known as the Sunset Country, Raak Plains and Ned's Corner. The plants of most grazing value are the characteristic shrub steppe species.

The vegetation of these grazing lands has deteriorated, principally because of domestic and introduced feral grazing animals coupled with the effects of drought. As long ago as 1936, Francis Ratcliffe who was commissioned by the then C.S.I.R. to investigate soil drift in the arid pastoral areas of South Australia, reported that arid saltbush steppe country was " fundamentally unsuited to stocking at a constant level unless that level is determined on a " poor season " basis. Periodic overstocking is otherwise inevitable ".[35] This opinion is supported by numerous subsequent writers such as Specht who states that " in an arid environment overstocking for even a short time may lead to destruction of perennial flora and to erosion of the surface soil by wind and water. When this has occurred regeneration of most species is poor even after sheep have been excluded from an area and rabbit numbers reduced ".[41]

In contrast to the other mallee communities previously discussed almost the whole vegetation of the saltbush steppe formation—grasses, forbs, shrubs and even some trees—comprise the grazed species. In good years, after rain, many species of ephemerals or annual grasses and forbs grow between the perennial shrubs and being more palatable, are preferentially grazed by stock.[34] During dry periods these species cease growing and grazing is sustained by the less palatable shrubs which then become the major part of the grazing animals' diet. The shrubs are susceptible to heavy grazing and in many areas stands have been greatly reduced or eliminated.[34]

When edible shrubs are eliminated by heavy grazing from these communities they are replaced by grasses, non-edible shrubs and in extreme cases bare ground, thus achieving a new grazing-induced " equilibrium " which cannot be reversed. Special management procedures should be devised and implemented for areas of deteriorating saltbush country which have not yet stabilised under severe grazing pressure to preserve desirable species that are sensitive to grazing.[52]

According to the Land Conservation Council about 50,000 sheep and 3,000 cattle are grazed on 500,000 ha of public land in the north-west held under leases or licences covering mainly the public land in the Sunset, Millewa and Murray River blocks.[25] In the Sunset and Millewa blocks grazing is most intense on the grassland and savannah where spear grasses (*Stipa* spp.) and exotic grasses are the main forage plants with a secondary contribution from scattered saltbushes (*Atriplex* spp.), bluebush (*Kochia* spp.) and other edible shrubs. As mentioned previously the production of grasses is dependent on favourable seasonal rainfall. Important exotic species which contribute most significantly to forage production are Barley Grass (*Hordeum leporinum*) and various medics such as Burr Medic (*Medicago polymorpha*), Woolly Burr Medic (*Medicago minima*) and Barrel Medic (*Medicago truncatula*). On vast tracts of the Mallee overgrazing has caused degeneration of the vegetation and initiated soil erosion and salting problems. In the Raak Land System grazing and trampling have caused degeneration of the Samphire (*Arthrocnemum halocnemoides).* This appears to have caused a rise in surface salinity with consequent further degeneration of the stands by wind sheeting of the soil surface.[38]

Because of the low carrying capacity, there is little point in investigating methods for regenerating samphire and it is better to exclude grazing from such areas altogether.

In the Ned's Corner Land System, native vegetation has frequently been modified by overgrazing. One of the major effects appears to be the replacement of the more palatable saltbush by bluebush. In addition new communities have appeared; for example stands of Bamboo Grass, (*Eragrostis australasica*) particularly in sites which become flooded after heavy rain.

Subordinate species which are present in the saltbush-dominated communities may become dominants due to overgrazing.[38]

Such species include the unpalatable glassworts (*Pachycornia* spp.) and pigface which are almost untouched by grazing animals and assume dominance as a result of heavy grazing pressures.

Areas of wind scald create drift which is trapped by the Dillon Bush *(Nitraria schoberi),* an important soil stabiliser.[38]

This Mallee eucalypt's lignotuber would once have been just below the surface of the dune.

5. The Effects of Grazing on Sub-alpine Communities

There is probably no investigation of grazing in Australia which has commanded so much attention as the study into the grazing of the high country. There are a large number of original papers and reviews covering this subject, many of them the result of the prolific work of the Australian ecologist Dr. A. B. Costin.

Although sub-alpine and alpine grazing lands in terms of area (and productivity) rank as less than 0.1% of Australia's grazing lands they are significant in this investigation as they are principally public lands. Moreover, the study of grazing in these areas has helped to clarify some of the more general problems of free-range grazing. In Victoria the limits of sub-alpine and alpine communities are defined geographically by altitude, their lower limit being between 4,500 and 5,000 ft. (1370 to 1520m) which is the level of the one-month snow line. Sub-alpine woodlands are the climatic climax vegetation and the characteristic dominant is *Eucalyptus niphophila* (syn *E. pauciflora*.) The understorey has a strong herbaceous component characterised by snow grasses *Poa caespitosa* (syn *P. australis*) and a wide range of perennial herbs and scattered shrubs. Alpine communities generally occur above 6,000 ft. (1830m) where woodland gives way to alpine herbfields or heaths (in rocky situations) which are the climatic climax at these altitudes.[14]

With the settlement of the surrounding river valleys and lowlands these communities have been substantially modified by management practices of graziers seeking to provide summer or drought relief for grazing for their stock. These modifying practices were predominantly the grazing itself as a selective agent and the use of fire to render the vegetation more palatable to stock (also acting as a selective agent). In Victoria because of the widely scattered distribution of these communities as small units surrounded by steep heavily timbered country, stocking has largely been with cattle. Fire and grazing have tended to act together in bringing about a degeneration of the vegetation.[14]

The tree species, although easily killed by fire, normally regenerate from the lignotubers but constant and more selective browsing especially by sheep can eventually kill the trees. This has resulted in a change to disclimax communities of heath and grassland. Both climax (naturally occurring heath) and disclimax (modified woodland) communities are then susceptible to further fires and grazing which open up the vegetation exposing bare earth which then is prone to invasion by shrubs. Cattle do considerable damage, not only by grazing but by trampling, particularly in sensitive peat swamps and snow patch communities.[14]

In Victoria grazing in the high country has been subject to review by the Soil Conservation Authority and as a consequence, grazing above 4,000 ft. (1220m) is prohibited. The length of the grazing period is usually fixed and maximum stock numbers are usually specified for a particular grazing licence. Burning to promote more palatable growth which was once a widespread management practice is now prohibited in high country in Victoria.[14]

Costin is sceptical about these restrictions, particularly with respect to limiting stocking rates, and offers some interesting inferences that effective stocking rates in the early days were not necessarily any higher than at present, even though there were more livestock. He substantiates this suggestion by referring to the changes in botanical composition and the highly selective nature of the grazing animals. Evidence from enclosures and old botanical data suggests that many palatable species have become much less common or have virtually disappeared. Such species include:—

the grasses:—

Agropyron velutinum
Agrostis spp.
Danthonia frigida
Trisetum subspicatum

the sedges:—

Carex hebes
Carex breviculmis
Luzula campestris

and various forbs:—

Ranunculus spp.
Euphrasia spp.
Aciphylla spp.
Craspedia uniflora

and other composites. In their place the unpalatable snow grasses are almost entirely dominant. Because the distribution of grazing pressures is obviously patchy, bogs, fens and snow patch vegetation are preferentially visited both for more palatable plants which grow there and for drinking water.[14] The opening up of the sward, the result of the now discontinued practice of burning, has produced numerous bare and semi-bare areas of ground. These have undergone secondary successions principally to introduced species and a few native herbs. Introductions include *Rumex acetosella, Hypochoeris radicata, Taraxacum officinale, Trifolium repens,* and *Trifolium fragiferum* which are palatable and widespread and now provide an important part of the diet of grazing animals.[14]

Some of the consequences of higher stocking rates are not in the interest of water catchment values. These include removal of plant cover and soil compaction with resultant surface runoff, prevention of regeneration of trees with their beneficial effect on the amount and timing of water yield, and drying out of swamps which improve water quality and have a sustaining effect on streamflow in summer.[14]

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Botanical Names

Genus	*Species*	*Vernacular*
Acacia	aculeatissima	Thin-leaf Wattle
Aciphylla	spp.	Aciphyll
Agropyron	velutinum	Mountain Wheat-grass
Agrostis	spp.	Bent
*Ammophila	arenaria	Marram Grass
Anguillaria	dioica	Early Nancy
*Arctotheca	calendula	Cape Weed
Arthrocnemum	halocnemoides	Samphire
*Asphodelus	fistulosus	Onion Weed
Astroloma	humifusum	Cranberry Heath
Atriplex	spp.	Orache
Bassia	spp.	Bassia
Bossiaea	prostrata	Creeping Bossiaea
*Bromus	diandrus	Great Brome
Caesia	vittata	Blue Grass-lily
Caladenia	dilatata	Green-comb Spider-orchid
Callitris	spp.	Native Pine
Carex	breviculmis	Sedge
Carex	hebes	Sedge
Casuarina	luehmannii	Buloke
Chamaescilla	corymbosa	Blue Stars
Craspedia	uniflora	Common Billy-buttons
Danthonia	auriculata	Lobed Wallaby-grass
Danthonia	carphoides	Short Wallaby-grass
Danthonia	frigida	Robust Wallaby-grass
Deyeuxia	spp.	Bent-grass
Dianella	revoluta	Black-anther Flax-lily
Diuris	longifolia	Wallflower Orchid
Diuris	pedunculata	Golden Moths
Drosera	spp.	Sundew
*Echium	lycopsis	Paterson's Curse
Enchylaena	tomentosa	Ruby Saltbush
Eragrostis	australasica	Bamboo Grass
Eriochilus	cucullatus	Parson's Bands
Eucalyptus	camaldulensis	River Red Gum
Eucalyptus	largiflorens	Black Box
Eucalyptus	niphophila (syn pauciflora)	Snow Gum
Euphrasia	spp.	Eyebright
Goodenia	geniculata	Bent Goodenia
Helichrysum	spp.	Everlasting
Hibbertia	australis	Guinea-flower
*Homeria	spp.	Cape Tulip
*Hordeum	leporinum	Barley-grass
*Hypochoeris	radicata	Cat's-ear
Hypoxis	spp.	Hypoxis
Kennedia	prostrata	Running Postman
Kochia	spp.	Bluebush
Leptorhynchos	spp.	Buttons
Leucopogon	spp.	Beard-heath
Lissanthe	strigosa	Peach Heath
Luzula	campestris	Field Woodrush
*Medicago	minima	Woolly Burr Medic
*Medicago	polymorpha	Burr Medic
*Medicago	truncatula	Barrel Medic
Nitraria	schoberi	Dillon Bush
*Oxalis	pes-caprae	Soursob
Oxalis	corniculata	Yellow Wood-sorrel
Pachycornia	spp.	Glasswort
*Paspalum	dilatatum	Paspalum
Pelargonium	rodneyanum	Magenta Stork's-bill
*Pinus	radiata	Monterey Pine
Poa	caespitosa (syn australis)	Tussock Grass
Pterostylis	spp.	Greenhood
Ranunculus	spp.	Buttercup
*Romulea	rosea	Onion Grass
*Rumex	acetosella	Sheep Sorrel
Stipa	aristiglumis (syn bigeniculata)	Plump Spear-grass
Stipa	falcata	Variable Spear-grass
Stipa	tuckeri	Spear-grass
*Taraxacum	officinale	Dandelion
Tetratheca	ciliata	Pink-bells
Themeda	australis	Kangaroo Grass
Themeda	avenacea	Native Oat Grass
Tricoryne	elatior	Yellow Rush-lily
*Trifolium	fragiferum	Strawberry Clover
*Trifolium	repens	White Clover
*Trifolium	subterraneum	Subterranean Clover
Trisetum	subspicatum	Bristle-grass
*Vulpia	myuros	Rat's-tail Fescue
Xanthorrhoea	minor	Small Grass-tree

*denotes naturalised species

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