Stage 4 Little bush remaining through the *Bassia* spp.
Stage 5 Trace of bush remaining; mainly *Bassia* spp.
Stage 6 All bush gone. Ground layer dominated by *Bassia* spp.

The next step was to define these stages according to the number of bushes per unit area that each represented. Counts were made of bush numbers in each stage of degeneration by running one-tenth mile traverses with a car. By marking the point of commencement, driving one-tenth mile by the speedometer and walking back the plants are easily counted because the tyre marks remain plainly visible. This gives a strip five feet wide or a basal area 2/33 of an acre. All subsequent figures refer to the number of bushes in this unit of area. All bushes whose butts are on or within the wheelmarks are counted. When making the counts it is necessary to choose stands consisting of mature bushes, as seedlings often grow more densely than plants in a mature bush stand.

The following are the bush numbers on 2/33 acre areas for country in which *Kochia sedifolia* is the dominant species:

Stage 1 more than 46 bushes (Plate XXIII, Figure 4),
Stage 2 35 – 45 (Plate XXIV, Figure 1),
Stage 3 15 – 34 Plate XIX, Figure 3),
Stage 4 5 – 14 (Plate XXIV, Figure 2),
Stage 5 1 – 4 (Plate XXIV, Figure 3),
Stage 6 0;

while for *Atriplex vesicaria* and *K. planifolia* dominant areas the figures are as follows:

Stage 1 more than 160 bushes (Plate XXI, Figure 4),
Stage 2 135 – 159 (Plate XXIV, Figure 4),
Stage 3 55 – 134 (Plate XXV, Figure 1),
Stage 4 15 – 54 (Plate XXV, Figure 2),
Stage 5 1 – 14 (Plate XXV, Figure 3),
Stage 6 0.

However, bush density varies not only with the grazing treatment the country receives but also with the type of soil. Thus the lower stages do not always indicate degeneration from Stage 1 density. For example, when *K. sedifolia* grows on Wilgena soil the density of the bluebush is never sufficient to give a count of more than 29 bushes on 2/33 acre, so that even prior to stocking this type of country is never better than Stage 3. Stage 1 country is therefore the standard to which lower densities due to either grazing or soil type are referred.

To determine the amount of bush lost through grazing it is therefore necessary to record not only the present bush density but also to estimate the probable density of bush prior to grazing. A good correlation exists between the type of soil and the density of the bush that it supports. Thus, as pointed out, Wilgena soil supports Stage 3 *K. sedifolia* in unstocked and well-preserved areas throughout the North-West, so that even when all the bush has been removed by grazing it is reasonable to assume that originally the areas of this soil had a bush density equal to Stage 3. In addition to this correlation between soil and bush density, other evidence of the original density of the bush cover usually exists. It can often be determined from observations of adjacent paddocks, remains of dead bushes or portions of paddocks furthest away from stock watering points.

The maps showing bush density (fig. 12 and 13) are prepared from records compiled by making car traverses across the country on as detailed a grid as can be obtained. It is often possible to achieve sufficient coverage by driving the station tracks which link up the watering points and thus traverse all the paddocks. Where sufficient coverage cannot be obtained in this way it is necessary

PLAN SHOWING ORIGINAL BUSH DENSITY

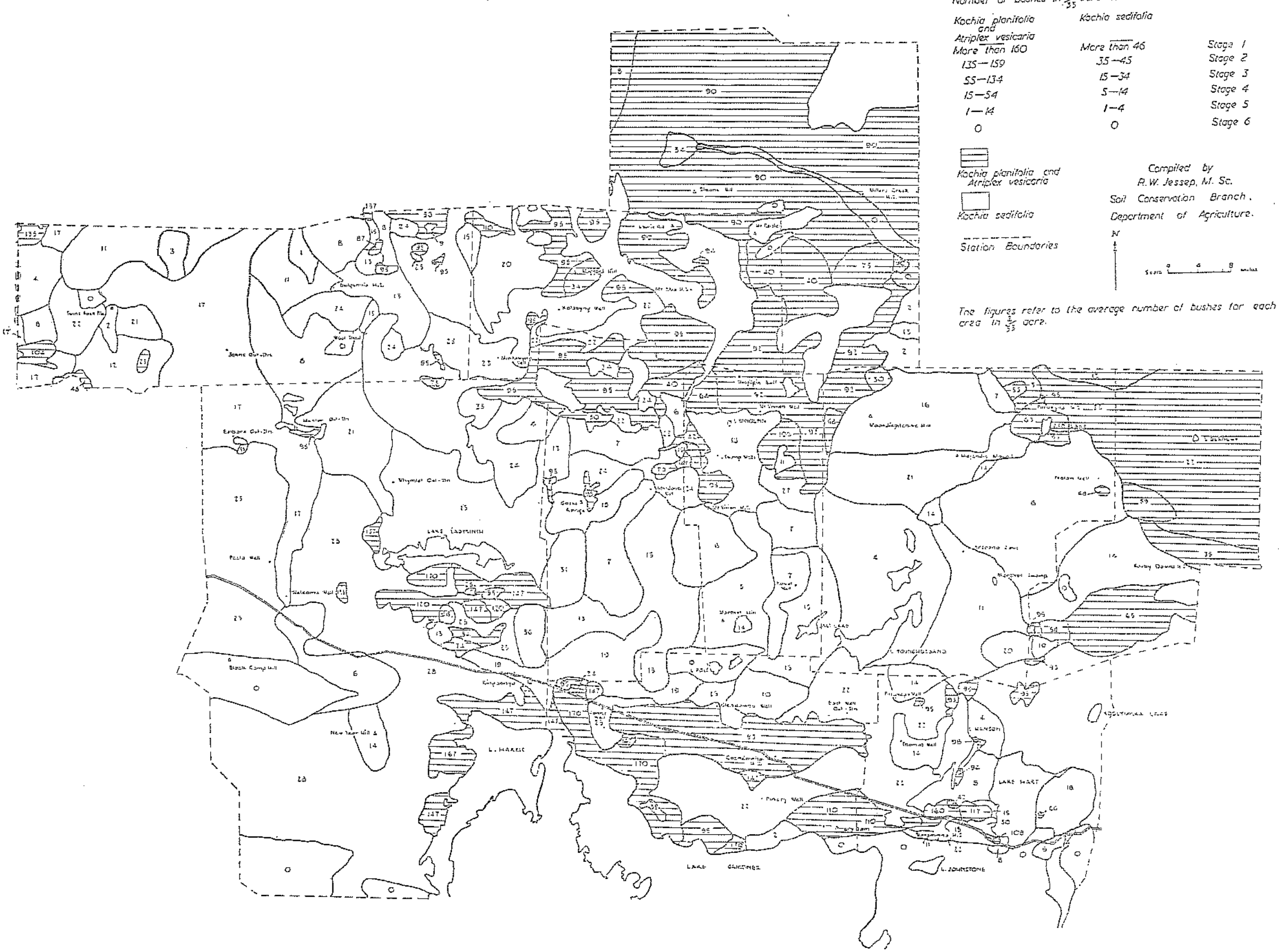

Fig. 12

to make cross-country traverses on compass bearings. Not all station tracks enable a correct impression to be formed of the general condition of the country they pass through. Thus they may tend to follow watercourses which contain only scattered *K. sedifolia* in the mulga and myall woodland country or sheep may be travelled down them to the woolshed for shearing. In these cases road traverses must be ignored in favour of cross-country observations.

The following is a typical record made in mulga-myall country (*Acacia aneura – A. brachystachya – – A. sowdenii – K. sedifolia* association complex):

Car speedometer reading when leaving Well No. 1, 65·2.

65·8	MyS	3 – 5	68·7	MyS	5
66·4	MyS	3 – 4	69·0	MS	3
66·7	M	6	69·2	MS	3 – 4
67·1	MyS	3	69·4	M	6
67·4	M	6			

Speedometer reading at Well No. 2, 69·4.

The speedometer readings refer to the points at which the different stages of bush density end, for example MyS 3 – 5 occurs from Well No. 1 (65·2) to 65·8, that is for ·6 mile. My is an abbreviation for myall, M for mulga and S for *Kochia sedifolia*. The figures in the right-hand column are the bush density stages; where two figures are recorded the first is the estimated density stage prior to stocking, while the second figure gives the present stage (thus 3 – 5 means originally Stage 3, now Stage 5). One figure in the right-hand column indicates that degeneration has not been sufficient to result in the country being placed in a lower density stage.

By multiplying the length of each stage over the total length of the transect by the number of bushes in the midpoint of the range for that stage and adding the results obtained for the different stages the average number of bushes in 2/33 acre for the area sampled by the transect, and hence its density stage, is obtained. If calculations are made using figures of present bush density and density prior to stocking the percentage of the original bush cover now remaining can be determined. Approximately 6,400 square miles of *Kochia sedifolia* dominant country were mapped quantitatively, and it has been calculated that this area retains 80% of its original bush cover. The *Atriplex vesicaria* and *Kochia planifolia* dominant areas (3,000 square miles) retain 65% of their original bush cover.

Fifty-seven plants of *Kochia sedifolia* on 2/33 acre was the maximum density of bluebush recorded. Actually stands containing 50 or more bluebushes are rarely encountered even where soil conditions are most favourable, so that for the country to fall into Stage 1 the bush density must usually be increased by the presence of bladder saltbush between the bluebushes. Most virgin stands of bluebush alone have a density equal to Stage 2. The change from Stage 1 to Stage 2, the first stage in the degeneration of bluebush country, is brought about by destruction of the bladder saltbush through grazing. Stages 1 and 2 are associated with Bon Bon and shallow Wirraminna soils, lower stages on these soils usually being the result of overgrazing. On Wilgena soil the bluebush count even under virgin conditions never exceeds 29 bluebushes on 2/33 acre.

A bluebush stand with a density equal to middle to higher Stage 3 appears to make an ideally balanced pasture, as sufficient bush is present to provide a drought-reserve of feed and to maintain soil stability, but at the same time competition is not so severe as to eliminate the growth of herbage and grass. Stages 4 and 5 occur naturally (that is without any degeneration through grazing) on the deeper sands and in watercourses.

PLAN SHOWING PRESENT BUSH DENSITY

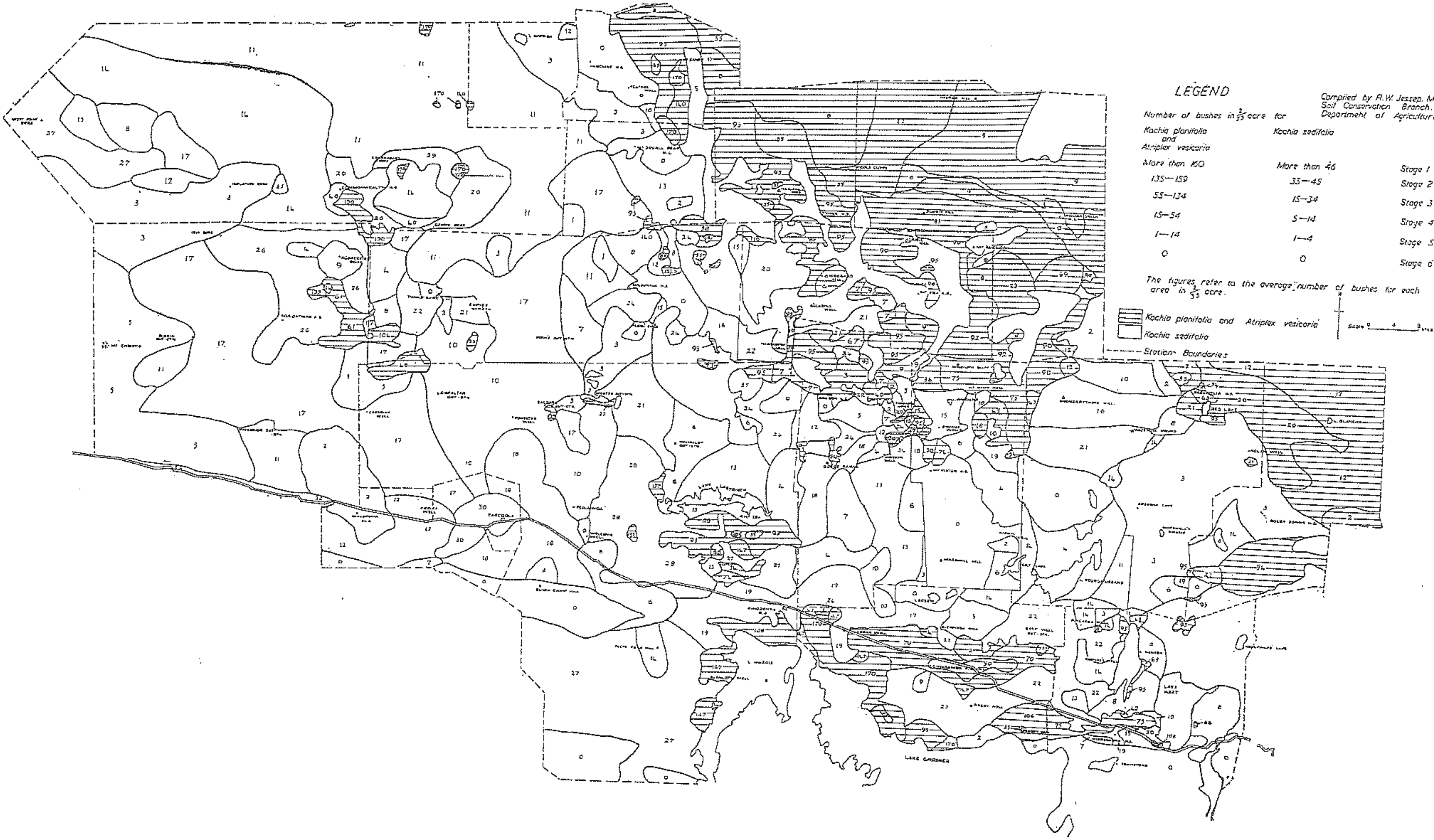

Fig. 13

Stands of bladder saltbush and low bluebush in the North-West only have a density equal to Stages 1 and 2 on the most favourable soil type, that is, Coondambo soil. On Twins soil, even under virgin conditions, the density is never greater than Stage 3 and the proportion of bluebush to saltbush in well-preserved country is about 7 to 1 on this soil. In Stage 1 stands of the two species on Coondambo soil the proportion of saltbush to low bluebush is about five to four, but in Stage 2 and 3 stands the proportion becomes about two to three, that is, grazing results in the destruction of a bigger proportion of saltbush than bluebush. Both species are about equally palatable but the saltbush is not as resistant to grazing. As with *Kochia sedifolia* an ideallly balanced pasture of low bluebush and bladder saltbush is apparently one with a bush density equal to middle to upper Stage 3.

DISCUSSION

The dominant trees and shrubs provide a drought reserve of feed and protection against soil erosion, but as the shrubs become defoliated under drought conditions, trees are more valuable than shrubs during a prolonged drought. As the trees are not destroyed by stocking with sheep at any rate, correct grazing management is centred upon maintenance of the shrub cover.

At the same time the balance between herbage, grass and shrubs is important. The carrying capacity of some bush stands has increased with stocking partly as a result of the benefits derived from judicious pruning of the bush through grazing but largely due to improvement in the shrub—herbage balance. Competition for moisture is so severe in dense bush stands that little herbage or grass appears between the bushes even in good seasons. Actually a paddock growing grass and bindyis (*Bassia* spp.) with little or no bush has a greater stock carrying capacity in good years than a well-bushed paddock, but during drought times stock losses occur earlier and they are heavier than in more densely bushed paddocks. A profitable line of scientific investigation would be to evaluate the merits of well-bushed, partly bushed and wholly denuded country in an endeavour to arrive at the most favourable balance between bush and herbage and grass. It would be possible perhaps to obtain an answer to the problem by carrying out studies on the chemical composition (particularly protein) and digestibility of the various species at different stages of growth. By relating these to the known palatabilities and to forage production the value of different pastures could be approximately determined.

The optimum density of bush stands is probably one equal to medium to higher Stage 3 (see quantitative estimates). Degeneration of bush country proceeds through lower Stage 3 to Stages 4 and 5 and ultimately to Stage 6, when no bush remains and the country carries a bindyi-dominant community. If grazing is still excessive the palatable bindyis are destroyed, leaving a grass-dominant stand whose protein supply is much lower than the bush-bindyi or bindyi stages. Ultimately overgrazing results in destruction of the palatable perennial grasses, leaving only ephemerals and unpalatable plants. Bladder saltbush (*Atriplex vesicaria*) is the most prolific seeder among the dominant shrubs. Bluebush (*Kochia sedifolia*) does not seed as heavily nor as frequently as saltbush but quite good seed crops are produced from time to time, whereas low bluebush (*K. planifolia*) produces little seed. Recolonization of a denuded paddock with bush is an extremely slow process even where the surrounding paddocks contain bush and hence a seed supply is available. Both saltbush and bluebush seed is equipped for wind dispersal, saltbush seed being contained within a bladdery fruit, while the bluebush fruit is winged. In spite of this, seed dispersal is poor and this is the cause of the slow recolonization. While scattered bushes remain through a paddock, however, regeneration can be quite rapid.

It has already been pointed out that competition for moisture is an important factor in the arid plant communities, and in this connection it is noteworthy that most regeneration of bush commonly occurs where stocking has been heavy, for example, around sheep yards and in corners of paddocks where sheep tend to congregate. This increased regeneration is due to removal of grass and herbage by the sheep, thereby allowing more moisture for bush seedling growth. If it is necessary to thicken up a bush stand it follows that when the shrubs seed (and this only happens during good years) the country should be grazed heavily to reduce grass and herbage competition and then stocked lightly to allow seedling establishment to take place.

Reseeding trials on denuded country carried out at Bimbowrie station in the north-east of South Australia have indicated that saltbush can be successfully resown artificially. However, seasonal conditions must be favourable, and even then costs of reseeding are out of proportion to the value of the land. In these experiments the country was first furrowed, but the natural regeneration which occurs in sparsely bushed paddocks indicates that ploughing should not be necessary and that it should be possible to reseed denuded country by broadcasting seed.

Experimental research is necessary to determine the most economic paddock size or the correct number of watering points for a given area of country. It has been pointed out that at present many of the paddocks are far too large, as sheep only occasionally graze beyond a four-mile radius of the watering points under normal rates of stocking. Even within this four-mile radius the grazing intensity varies enormously, the area around the water being overgrazed, while the country beyond about two and a half miles is undergrazed. Much of the damage around the watering points results from the tramping of the sheep, and furthermore in large paddocks energy and hence feed wastage must occur through the sheep walking in to water and out again in search of feed. Smaller paddocks result in more uniform grazing and more efficient utilization of the country. Smaller mobs on each water reduce destruction of bush through tramping and also energy wastage through walking. Increased efficiency of utilization means that more sheep can be carried, but at the same time the costs of improvements and maintenance of improvements are increased. The problem is an economic one of balancing increased sheep numbers and hence returns against increased capital expenditure. With the very small paddocks used in the myall-bluebush country at Yudnapinna Research Station (Woodroffe, 1941), it has been found possible to graze at the rate of 75 sheep to the square mile without bush loss. It is not suggested that these quarter square mile paddocks are of practical size, but they do indicate that small paddocks enable a greater number of stock to be carried per square mile.

The size of the paddocks will naturally vary according to the carrying capacity of the country, and while pastoral areas have no fixed carrying capacity, nevertheless, the relative carrying capacities of the different plant associations are known for the North-West. The community with the greatest carrying capacity is the *Atriplex vesicaria – Kochia planifolia* association, and if its carrying capacity is 100 the other communities would be rated approximately as follows: *Acacia sowdenii – K. sedifolia* association (myall country) 55, *A. aneura – A. brachystachya* association (mulga country) 45, *A. aneura – A. brachystachya – A. tetragonophylla* association 40, *K. sedifolia* association 35, *Atriplex vesicaria – Ixiolaena leptolepis* association 35, *A. vesicaria – Bassia* spp. association 35, *K. planifolia – Bassia* spp. association 30, *Acacia linophylla – A. ramulosa* association 25, *Zygochloa paradoxa* association 20, *Kochia planifolia – Atriplex vesicaria – K. sedifolia* association 20, *A. rhagodioides* association 14, and *K. planifolia* association 14.

These ratings refer to the above communities only where they occur in the North-West, that is, on particular soils and in a particular climatic zone. Communities dominated by the same species in other parts of the pastoral country will not necessarily have the same relative carrying capacities.

As in all the pastoral country of South Australia, in the North-West there is no significant regeneration of the dominant trees, in this case the mulgas and myall. The factors responsible for this state of affairs are not fully known and progress in this direction requires knowledge of the autecology of the species. Possible contributing causes include seasonal conditions, absence of firing, lack of seed, competition with parent trees and effects of rabbits and stock. While loss of surface soil or deterioration in soil structure may be of some importance elsewhere, these factors can play no part in the sandy soil areas of the North-West. Regeneration is equally poor in the unoccupied country west of the area discussed in this paper.

Practically the only areas where established seedlings are found are where the country has been burned and in some swamps and watercourses. The seeds of these species have hard coats which are cracked by the fires and this may be at least partly responsible for the increased germination following burning. There is ample evidence throughout the mulga and myall woodlands that prior to white settlement much of the country had been burned. Most of these fires were probably started by blacks as a means of securing game. Firing no longer takes place to any extent.

The fact that other than in burned country regeneration is mostly restricted to swamps and watercourses suggests that moisture may be a limiting factor preventing widespread regeneration. The writer has read that regeneration of mulga following rolling is a common occurrence in Queensland where the average rainfall is between 11 and 13 inches. In South Australia, however, the mulga country is more arid receiving between 5 and 8 inches average annual rainfall. From the records available it appears that the little regeneration of mulga and myall that has occurred in this State has followed very heavy rains. Some interesting information in this connection has been supplied concerning a growth of young mulgas around the Bulgunnia homestead. This is situated in a depression and following 587 points of rain in 13 hours in February 1938 the homestead was flooded. Seedling mulgas "were first noticed around the homestead between January and June 1949". For the first six months of 1939 good rains were again experienced and the mulgas became firmly established. By July of 1946 they had reached a height of 2′ 6″ to 3′. However, some of them had appeared in the homestead garden where they were not dependent solely on natural rainfall but received additional water and these had reached a height of 8′–12′ by July 1946. All the records indicate that the young mulgas depending on natural rainfall have averaged an increased growth in height of 4″-6″ each year, but this is of no value as a measure of growth rate.

However, during the last five years there have been other rains similar to those of 1938 and a run of very good seasons has been experienced and yet practically no regeneration or even germination has been observed. An interesting point arises here. Mulgas (and myalls) must be very long-lived trees and yet some of the recent rains have resulted in so much water collecting in the swamps that many of the mature mulgas growing in them have been killed as a result of being flooded, that is, the swamps have recently contained water for a longer period than at any previous time during the life of the trees.

Competition with parent trees may play some part in preventing regeneration but this can no longer be considered a very important factor because, as pointed out earlier, about one-third of the mature mulgas and one-fifth of the mature myalls have died. Tree death seems to be equally severe in the unoccupied country. It is interesting to note that competition among young myalls does not result in reduction in the density of the stand until the trees are well established. Thus in the country which was burned on Yudnapinna in 1922 there is now a very dense growth of "young" myalls, so much so that the trees are frequently touching, and yet no deaths have occurred and, in fact, all the trees appear very vigorous. In stands of mature myalls, on the other hand, the individual trees are quite scattered.

Lack of seed may well be an important factor preventing widespread regeneration. Although the mulgas in particular seed very abundantly during good years, an examination of the pods while still on the trees shows that a large proportion of the seeds are destroyed by insects. It is even more difficult to find undamaged seeds on the ground. Stock graze young mulgas under certain conditions but rarely to the extent of killing them, and furthermore regeneration is no better in the unstocked country. Rabbits, too, ringbark many of the young plants, but it is felt that neither stock nor rabbits are primarily responsible for the absence of widespread regeneration and that the fundamental fact is that there is actually a lack of germination. A combination of several factors is likely to be important, for example, seed supply and favourable seasonal conditions.

APPENDIX A

The Ecotypes of Saltbush (Atriplex vesicaria)

Wood (1936) has described three ecotypes of *A. vesicaria* from Koonamore station in the north-east of South Australia. The ecotype associated with soils containing heavy lime at shallow depth (Form A) is an erect woody bush. It occurs in the North-West on Wilgena and Bon Bon soils in association with bluebush (*Kochia sedifolia*), mulga and myall. Bladders are most commonly absent from the fruiting calyx or small bladders less than half the size of the bracts may be present. At Koonamore the average dimensions of this ecotype are height 32 cm and diameter 34 cm., but in the North-West both average height (37 cm.) and diameter (42 cm.) are slightly greater.

The second ecotype (Form B) is found on silty and sandy soils at Koonamore, but in the North-West is confined to Twins soil. As Wood (1936) points out fruits are generally without bladders, although occasionally bladders up to a third the size of the bracts are present. Form B is a very woody bush with a more erect growth habit than Form C. The bushes are larger than those of any other strain—at Koonamore they average 40 cm. high and have narrow lanceolate leaves, while in the North-West the leaves are obovate and the average height is 58 cm. and the average diameter is 73 cm.

Form C is found on silty soils at Koonamore and is a robust, rounded bush about 50 cm. high. Very large bladders are present on the calyx. In the North-West the form has comparatively small leaves and is restricted to soils containing clay within an inch or two of the surface (Mount Eba, Arcoona and Coober Pedy soils). Bushes growing on Mount Eba soil have an average height of 45 cm. and an average diameter of 52 cm. and larger bladders than those developed when the ecotype is growing on the other soils. On Coober Pedy and Arcoona soils the bushes are somewhat smaller (average height 35 cm. and average diameter 46 cm.).

A previously undescribed ecotype (Form D) is associated with deep sandy soils (Wirraminna type) in the North-West. It is characterised by an erect woody growth habit and by the presence of very large bladders on the fruiting calyx. Form D is a large ecotype having an average height of 55 cm. and an average diameter of 52 cm.

The natural soil preferences of the various ecotypes of saltbush should be considered when reseeding areas of country to this species. Better results are likely to be obtained by using Form A on calcareous soils, Form C on heavy-textured soils containing little or no lime and Form D on sandy soils.

Form C is both vigorous and a very prolific seeder, while Form A is also a prolific seeder and Form B is fairly prolific. Form D seeds less heavily than the other ecotypes and is not resistant to grazing.

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The writer lived at the various station homesteads scattered throughout the North-West while carrying out the field work, and without the co-operation and hospitality of the pastoralists the work could not have been done. For 18 months Mount Eba, formerly on the Adelaide to Darwin airline, was the centre from which the field work was carried out, and it is to Mr. and Mrs. Crombie of Mount Eba that the writer is most indebted. Mr. Crombie also provided facilities which enabled the writer to carry out maintenance work on the vehicle used on the survey. The writer is also extremely grateful to the following people for their hospitality and assistance: Mr. and Mrs. K. Neill of Bulgunnia, Mr. and Mrs. T. C. Young of Kingoonya, formerly of North Well, Mr. and Mrs. R. Jenkins of Wirraminna, Mr. and Mrs. J. Pick of Coondambo, Mr. and Mrs. C. Goode formerly of Malbooma, Mr. and Mrs. C. Greenfield of Billa Kalina, and Mr. and Mrs. F. Stoddart of Mount Vivian.

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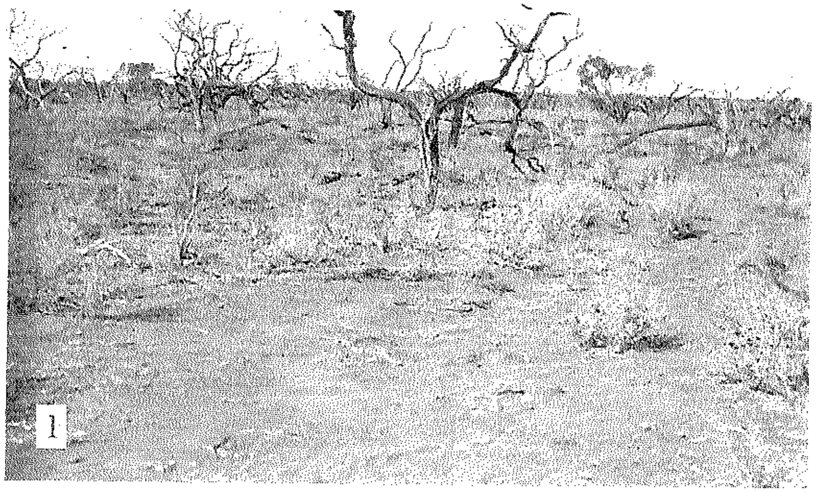
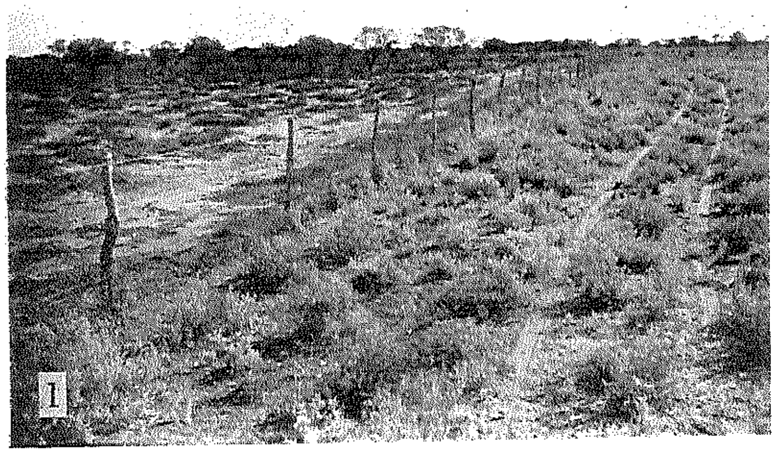


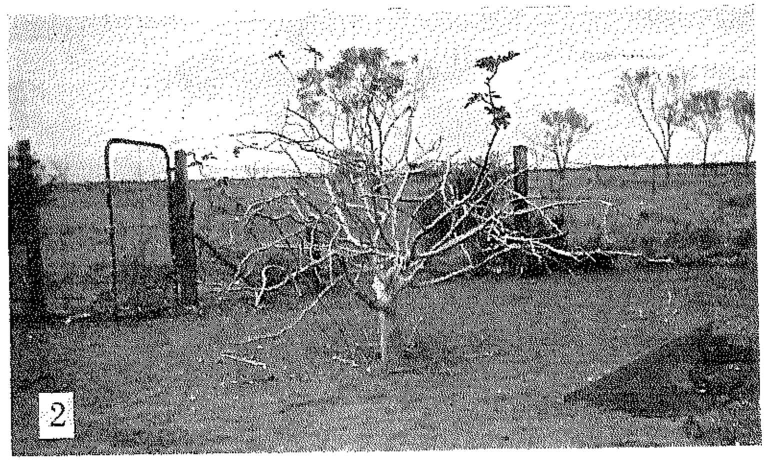
Fig. 1
Damage caused by a severe hail storm on Coondambo station. All the myall trees have been killed and the bluebush completely destroyed. Death results from complete defoliation through the breaking off of the smaller branches. The undershrub (*Kochia triptera* var. *erioclada*) has colonized the area after the destruction of the bluebush.

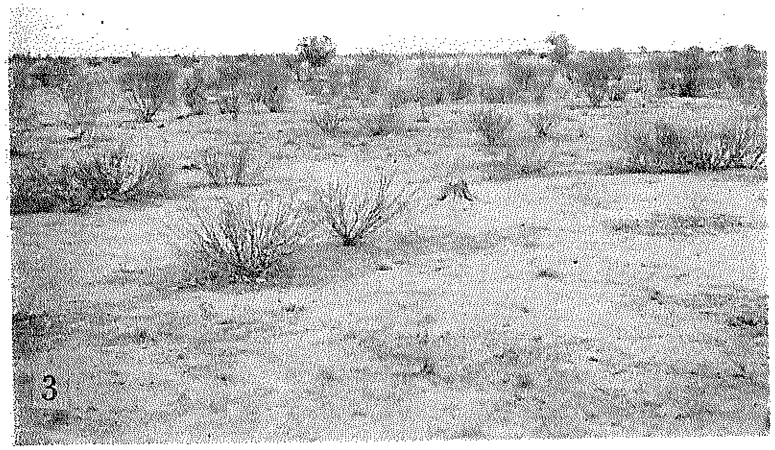
Fig. 2
Mulgas broken by a windstorm. Wirraminna station.

Fig. 3
Typical station sheep at Coondambo.

Fig. 4
A mob of cattle on Mabel Creek.







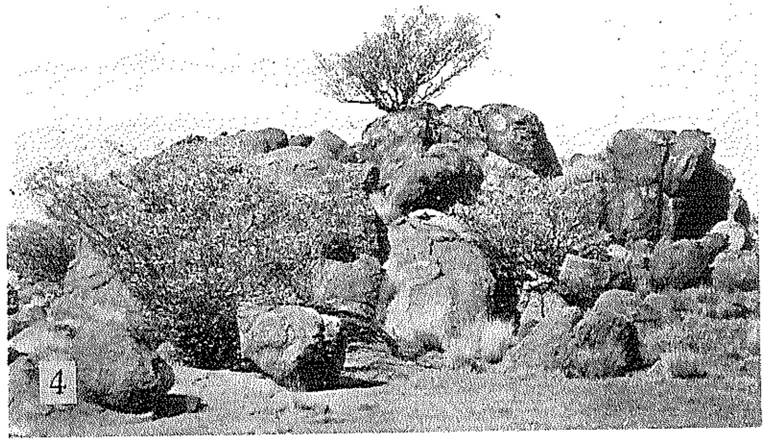


Fig. 1

A rare example of saltbush killed by rabbits. The photo was taken along the southern boundary of Coondambo station. In the foreground is a very good stand of saltbush which has survived in spite of quite heavy stocking. The country through the vermin fence is unoccupied and consequently never stocked. However, the northern shore of Lake Gairdner is only ¼ mile away and here very large numbers of rabbits breed, as they can obtain moisture by burrowing around the edge of the lake. The rabbits feed in the narrow strip of country between the lake and the vermin fence and have caused the death of the saltbush.

Fig. 2

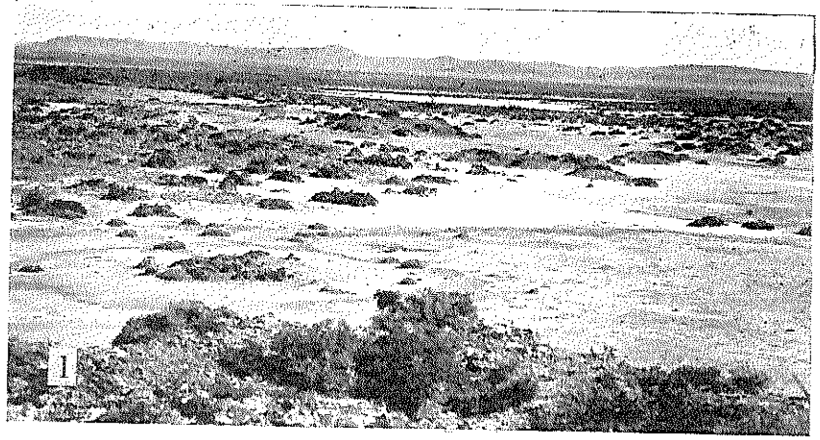
A fig tree in the abandoned garden at old Mount Vivian homestead, which was almost completely barked by rabbits in 1948.

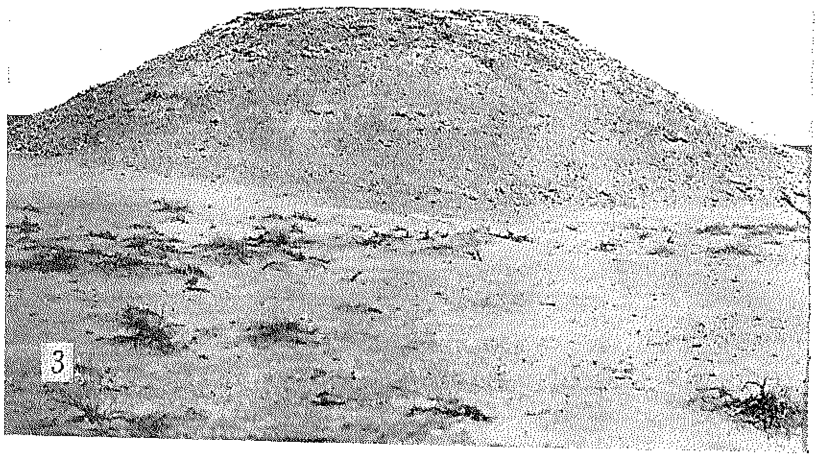
Fig. 3

Shrubs of *Cassia* eaten off by rabbits about a foot above the ground on Roxby Downs station during 1948. All the herbage and grass between the shrubs has been removed.

Fig. 4

An outcrop of granite on Bulgunnia station. The shrubs are granite wattle (*Acacia tarculensis*), a species always associated with granite outcrops.





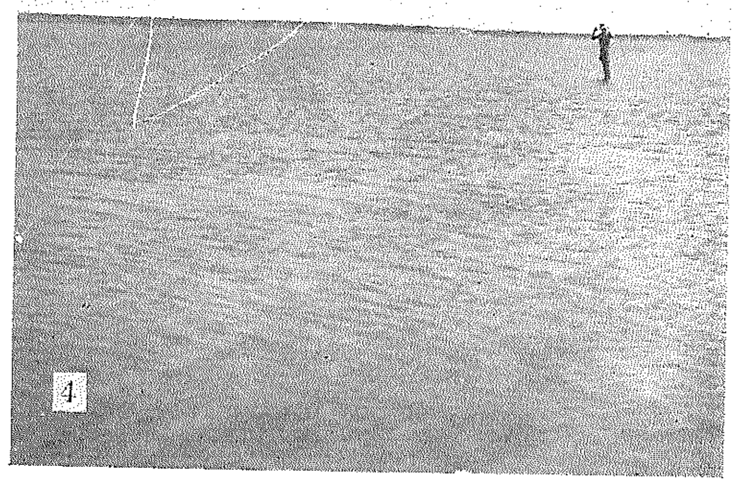
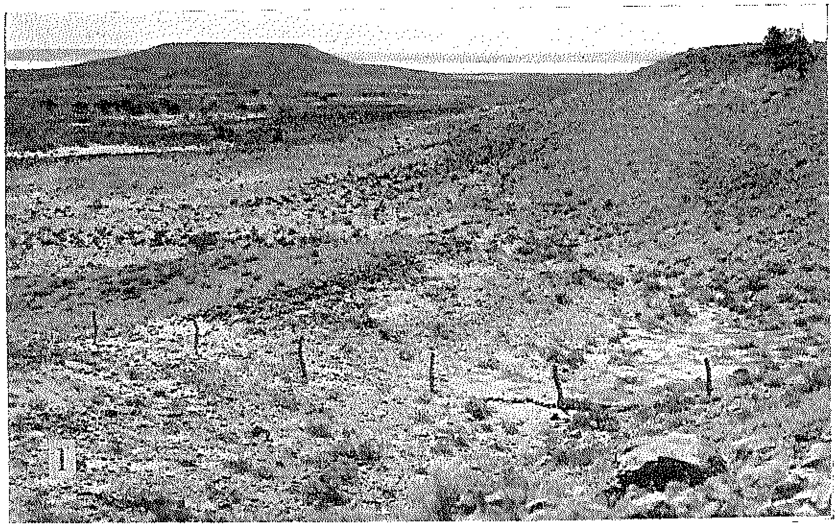


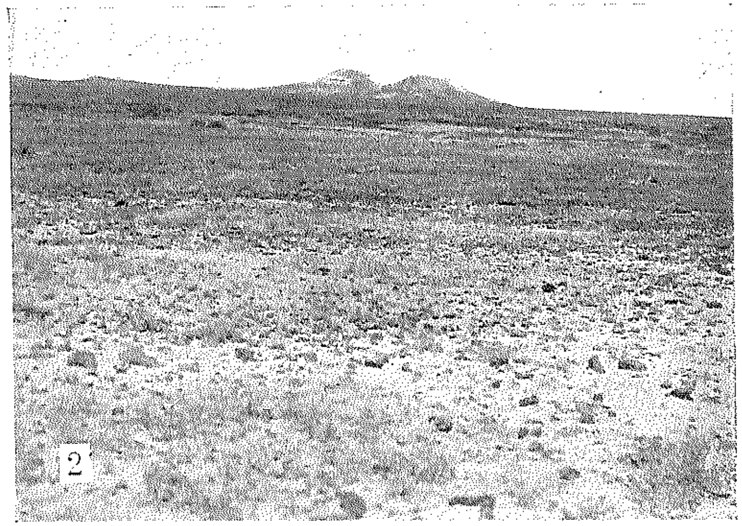
Fig. 1
The Denison Range south of Oodnadatta, looking towards its eastern side. The mounds in the foreground have been formed by springs which pour forth water from the Artesian Basin. The ground between the mound springs is always saline.

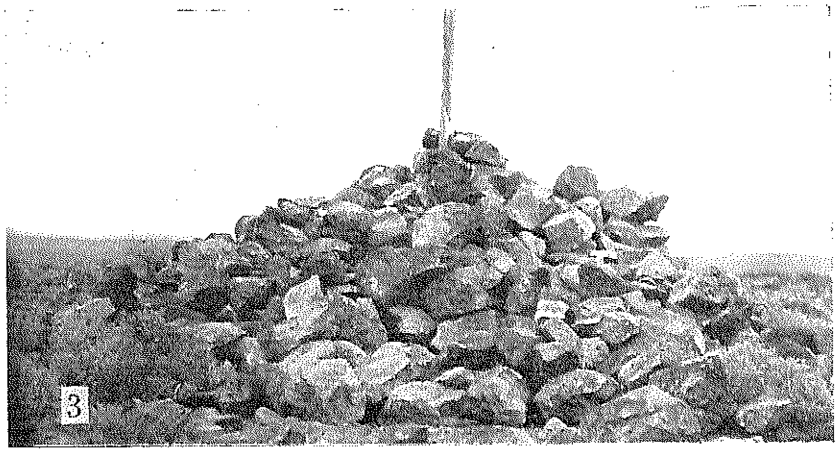
Fig. 2
Mounds of bleached Cretaceous shale around the opal diggings at Andamooka opal field.

Fig. 3
A hill on Miller's Creek station consisting of siliceous limestone overlying bleached Cretaceous shale.

Fig. 4
Two to three inches of water in Lake Hart following exceptionally heavy rains.







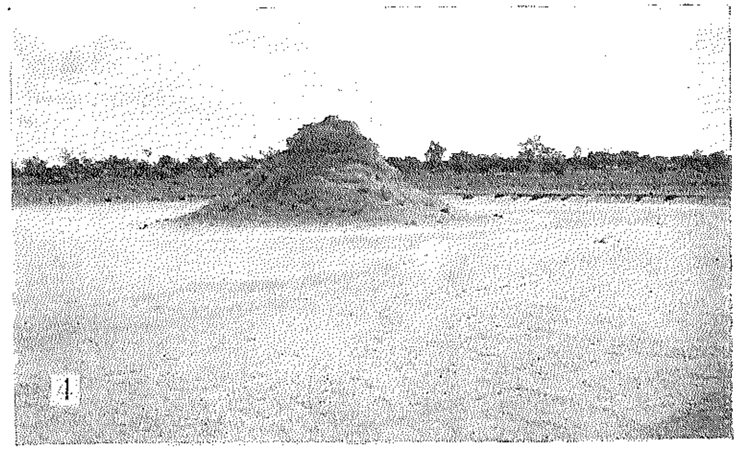


Fig. 1

Flat-topped residual hills on Wirraminna station. The white background is the salt crust of Lake Hanson. The level horizon is the surface of the tableland country.

Fig. 2

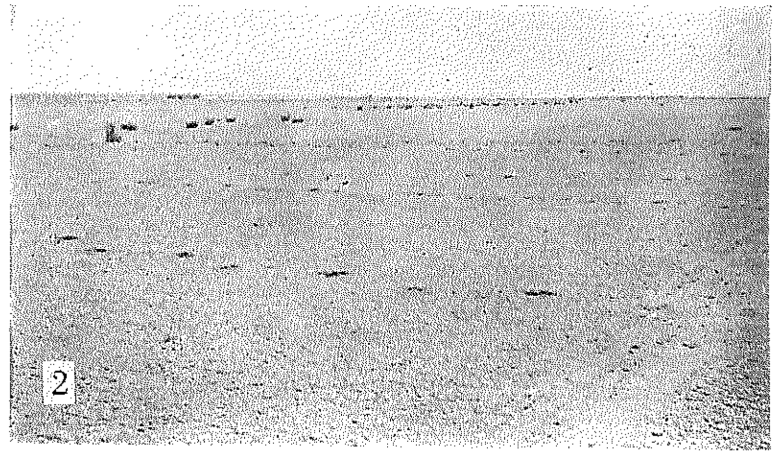
Two residual hills on Miller's Creek station, showing white patches where the bleached shale is exposed and darker patches where the surface is covered with billy scree.

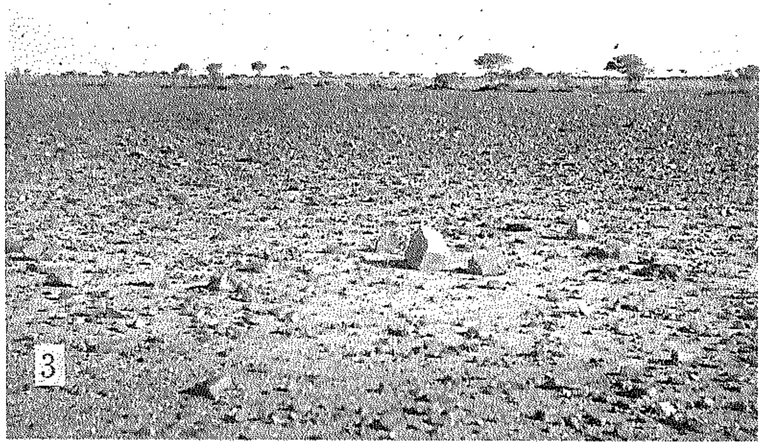
Fig. 3

Large boulders of billy which have been piled up to form a surveyor's trig. point on the top of Mount Paisley. The maximum thickness of the boulders, and hence the siliceous horizon from which they are derived, is two feet.

Fig. 4

A mound of gypsum (kopi) in the middle of a saltlake on Malbooma station. The gypsum deposit originally covered the whole of the lake, as indicated by the presence of other mounds on its surface. Under drier climatic conditions the gypsum was largely blown off the lake to form kopi dunes about its margins. The present surface of the lake is covered with a salt crust.





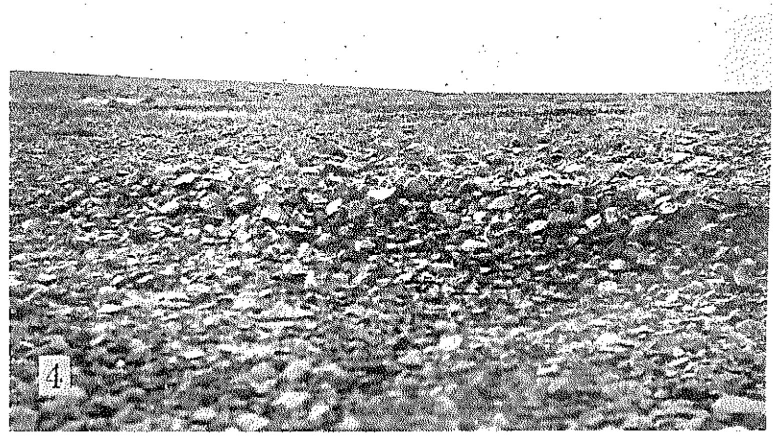


Fig. 1
Stuart's "range", composed of residuals of the Pliocene landscape, near Coober Pedy.

Fig. 2
The Devil's Playground, a large claypan on Billa Kalina station. The plants are swamp canegrass.

Fig. 3
A claypan on Ingomar station with a surface cover of billy gibbers.

Fig. 4
Gibber-covered puffs and shelves of Arcoona soil.

Fig. 1
Vertical photo of the Coober Pedy soil surface showing the mantle of billy pebbles and gibbers.

Fig. 2
Vertical photo of the Wilgena soil surface showing typical mantle of billy pebbles.

Fig. 3
Typical pebble cover on the surface of the Mount Eba soil. Vertical photo.

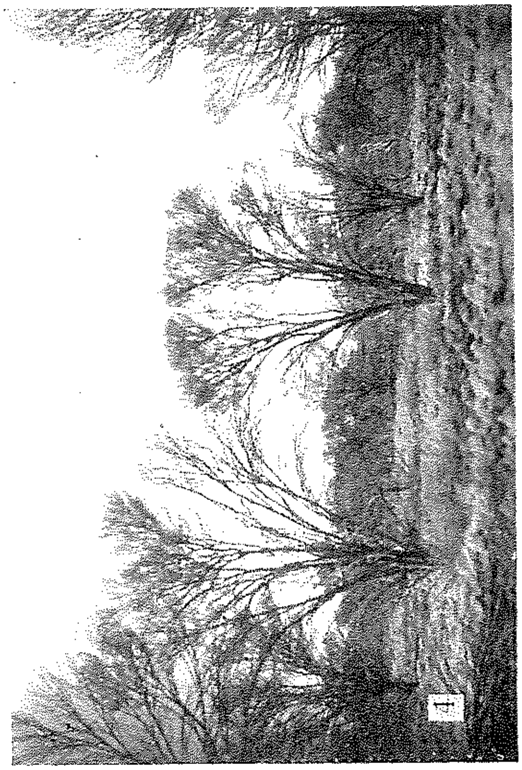
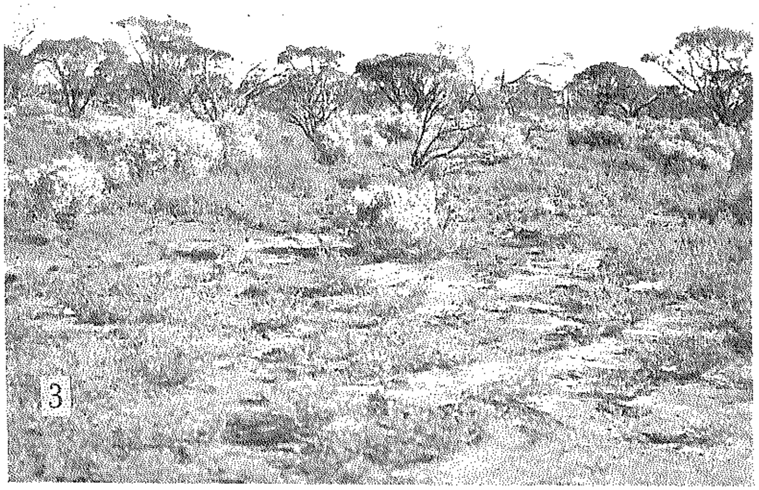


Fig. 4
Dense mulga woodland on Wirraminna station. The grass beneath the trees is mulga grass (*Aristida arenaria*).



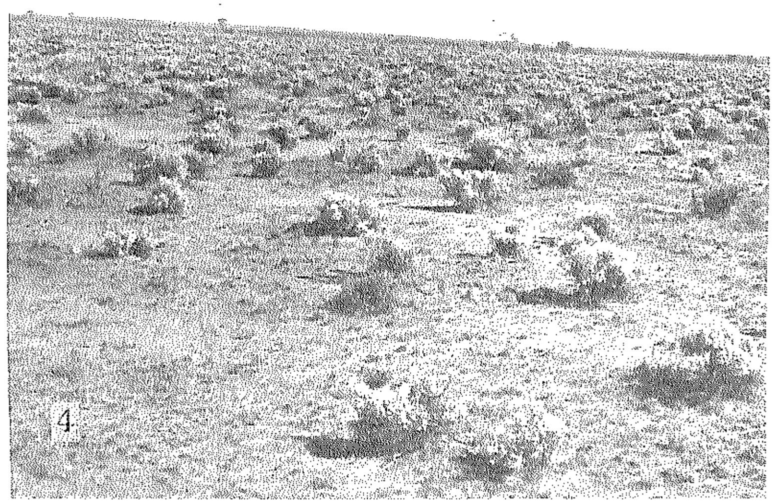
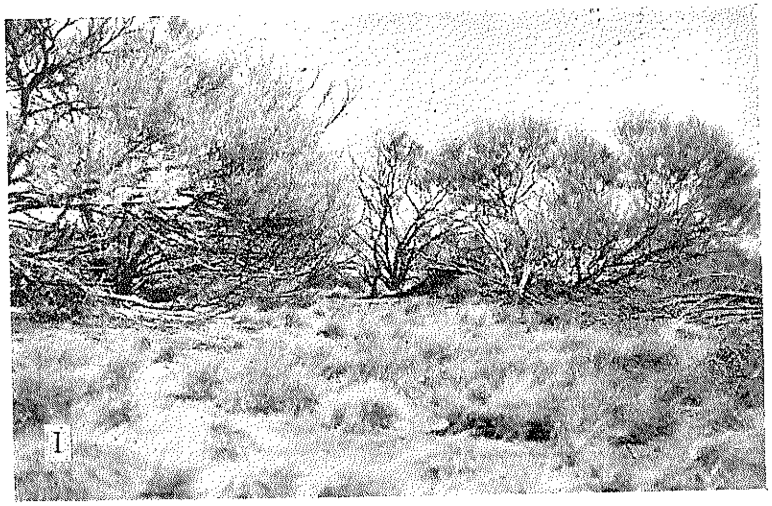


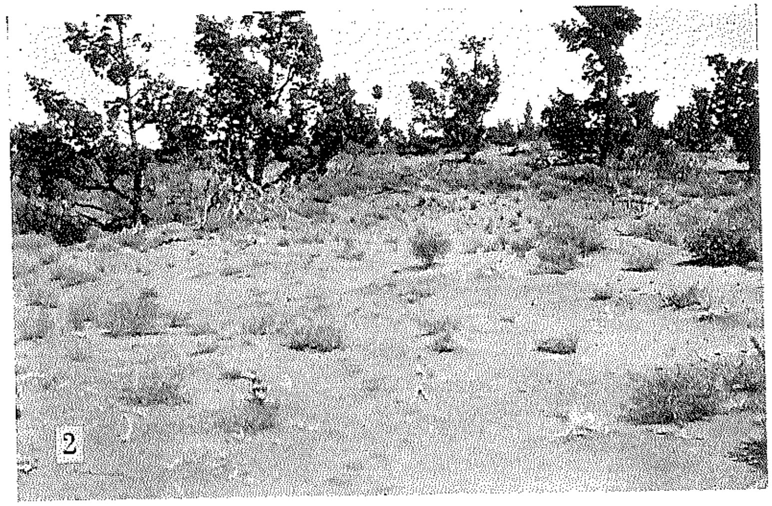
Fig. 1
More open mulga woodland on McDouall Peak station. The grass is principally mulga grass. A few firebushes are present in the centre of the photograph. This country was previously stocked with cattle, with the result that the mulgas have been trimmed up to a considerable height.

Fig. 2
An ungrazed tree of myall, showing foliage sweeping to the ground.

Fig. 3
The myall - bluebush community on Roxby Downs station. Associated species is bindyi.

Fig. 4
A view of the bluebush community on Bon Bon soil, Wilgena station.





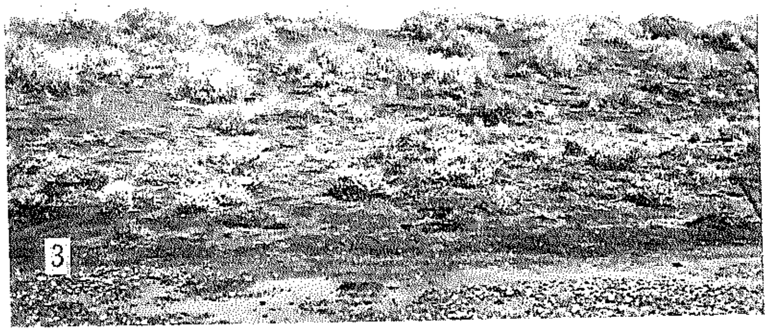
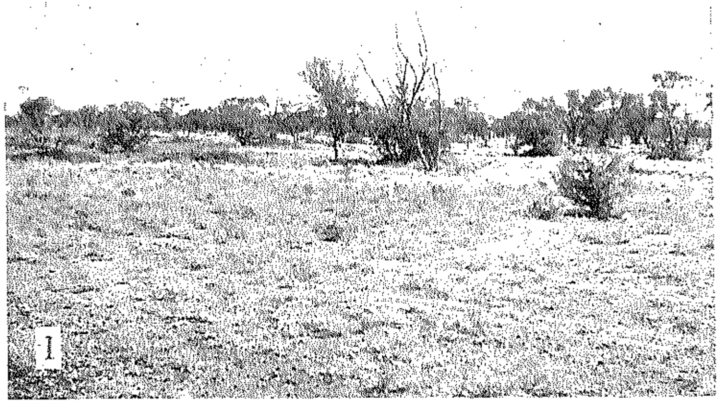


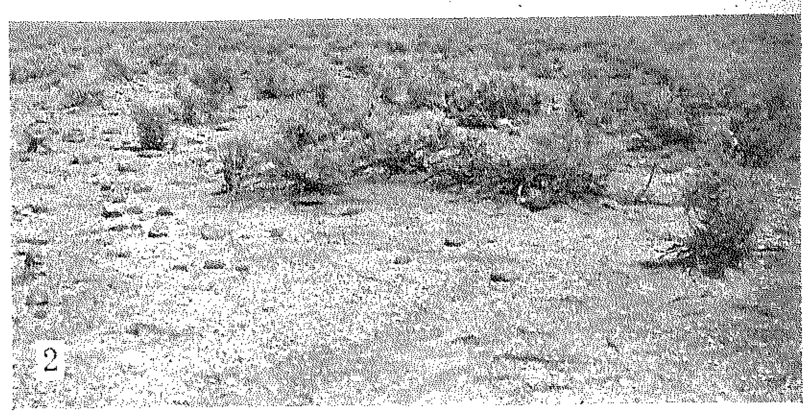
Fig. 1
Acacia linophylla – A. ramulosa association on a sandhill on Wirraminna station. The associated grass is *Aristida browniana.*

Fig. 2
Pines (*Callitris glauca*) on a sandhill on Parakylia station.

Fig. 3
Sandhill canegrass (*Zygochloa paradoxa*) on a dune near Anna Creek.

Fig. 4
Acacia aneura – A. brachystachya – A. tetragonophylla association on Mount Eba station. The associated species is principally mulga grass (*Aristida arenaria*). Note the bare patches, which are typical of the country even during good seasons.





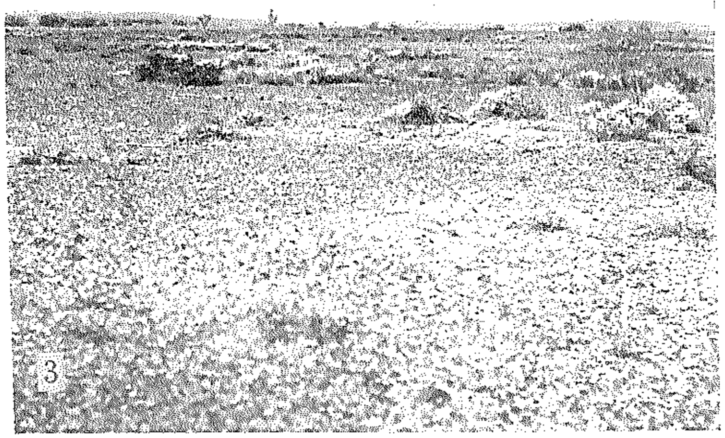


Fig. 1

The foreground, which now carries only *Bassia* spp., originally supported the *Kochia planifolia* – *Bassia* spp. association. In the background is a broad watercourse with species typical of the *Acacia aneura* – *A. brachystachya* – *A. tetragonophylla* association. Mount Eba station.

Fig. 2

Kochia planifolia association on Twins soil, Wirraminna station. Here the bushes are uniformly distributed.

Fig. 3

Kochia planifolia association, Miller's Creek station. Note that the bushes are restricted to slight depressions. The areas between (where shale is exposed) are devoid of growth even during good seasons.

Fig. 4

Bladder saltbush and low bluebush on Coondambo soil, Wilgena station. Photo taken during very favourable seasonal conditions, but note absence of herbage and grass between bushes because of severe competition due to very high bush density. Mulga on watercourse in background.

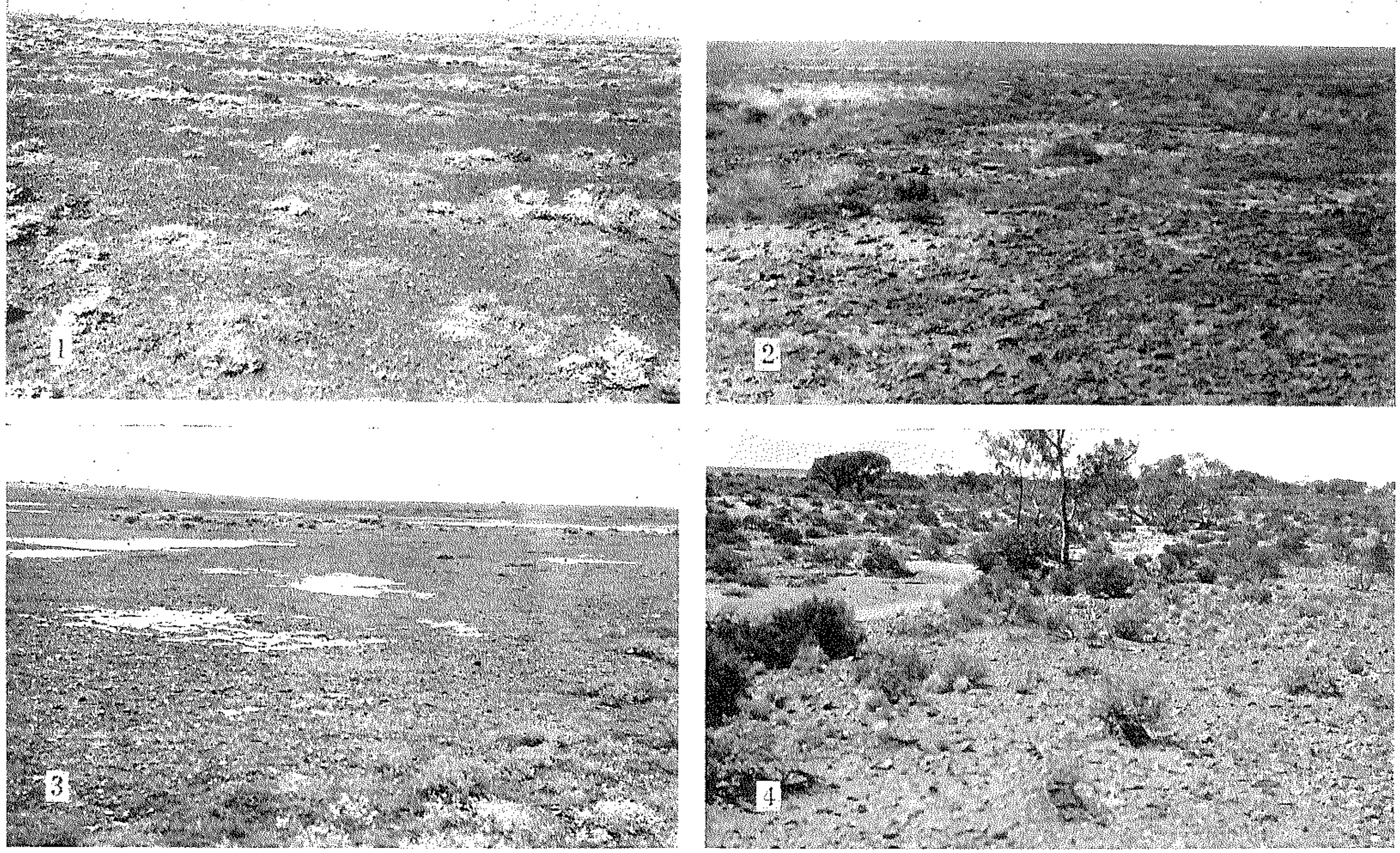


Fig. 1
Atriplex vesicaria–Bassia spp. association on Coober Pedy soil, Coondambo station. Note that growth is practically restricted to the crabholes.

Fig. 2
A typical view of tableland country supporting bladder saltbush—*Ixiolaena leptolepis* association. Wirraminna station.

Fig. 3
Atriplex rhagodioides (silver saltbush) association on tableland country near Oodnadatta. Note the extensive bare gibber-covered shelves. Photo taken after recent rain.

Fig. 4
A relic occurrence of mallee (*Eucalyptus oleosa*) on a small creek near the shore of Lake Hanson.

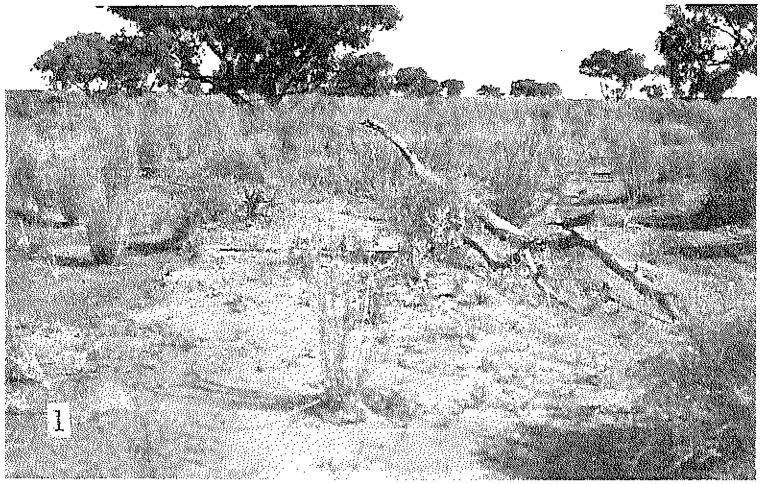


Fig. 1
Coolibah and swamp canegrass (*Eragrostis australasica*) among the interlacing channels of the Miller's Creek watercourse.

Fig. 2
Coolibah fringing a waterhole in Miller's Creek. Billa Kalina station.

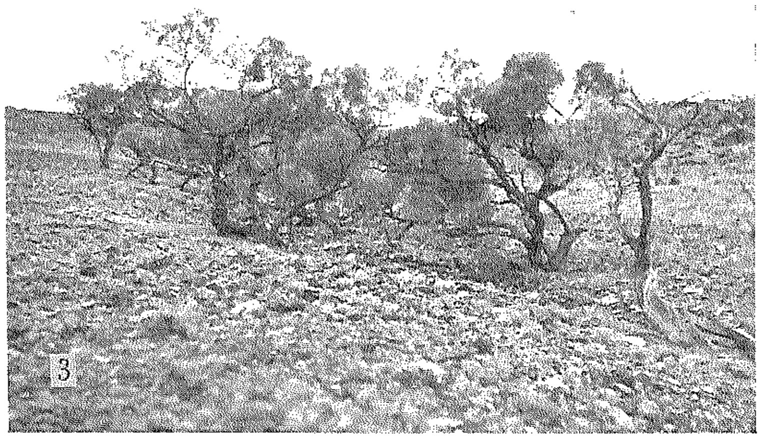
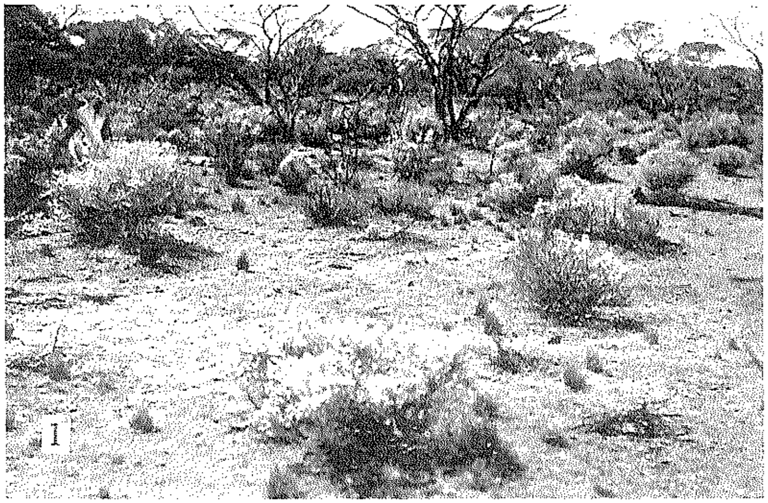
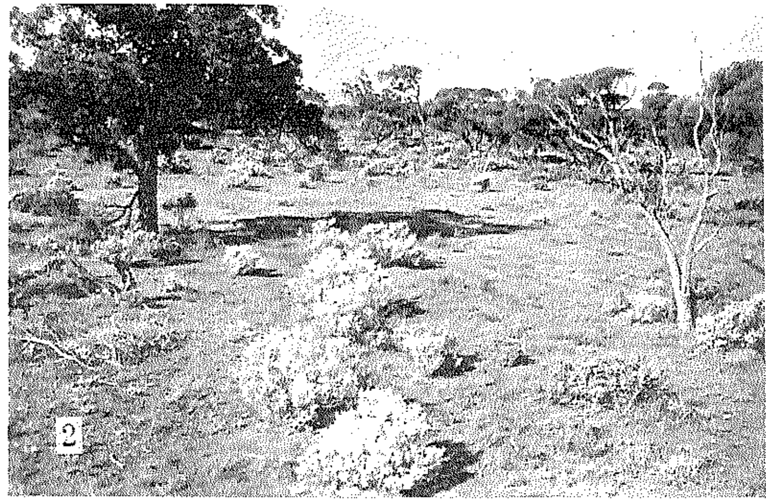


Fig. 3
Gidgea in a wadi in tableland country near Oodnadatta.

Fig. 4
Myall country with bush with density equal to Stage 1. Coondambo station, south of Pinery well. Bushes of bladder saltbush can be seen between the bluebushes.





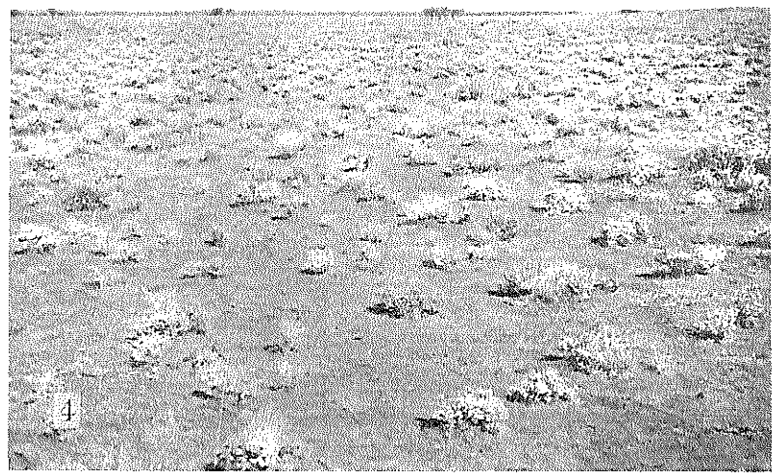
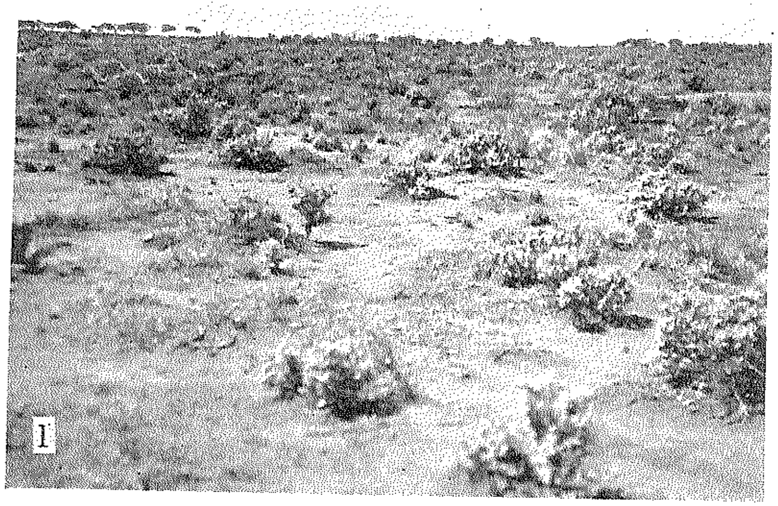


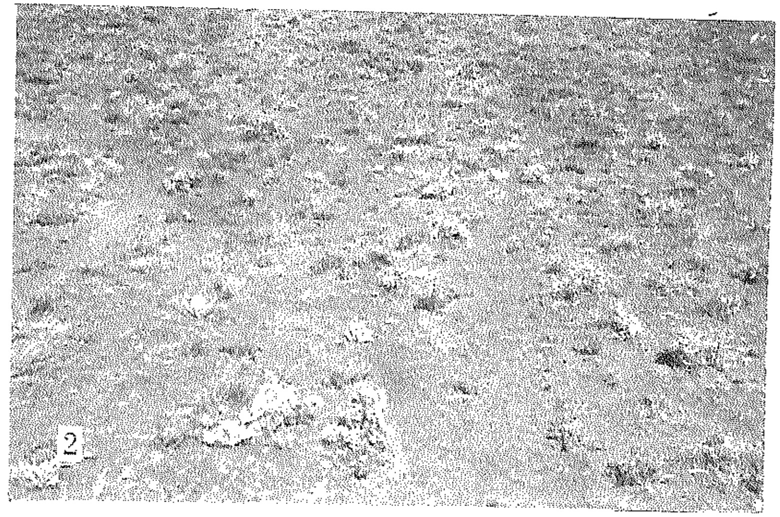
Fig. 1
Myall country with bluebush with density equal to Stage 2. This country is adjacent to that in Plate XXIII, Figure 4, but there is no bladder saltbush between the bluebushes.

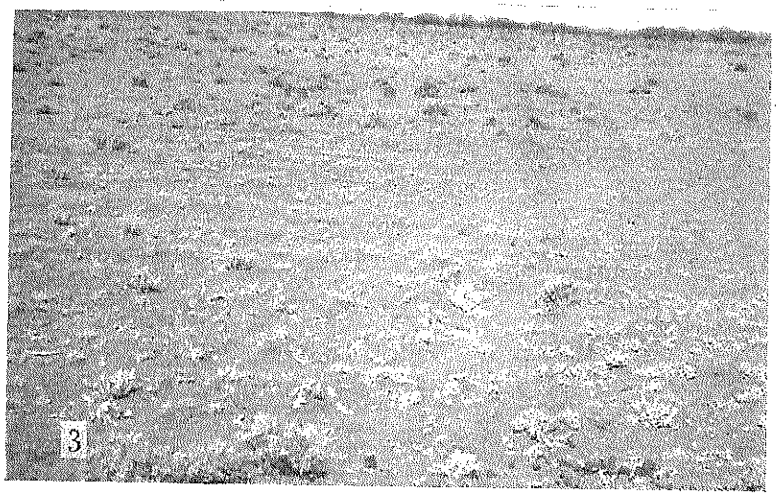
Fig. 2
Stage 4, bluebush country near Port Augusta.

Fig. 3
Stage 5, bluebush country near Port Augusta.

Fig. 4
Bladder saltbush and low bluebush with a density equal to Stage 2.







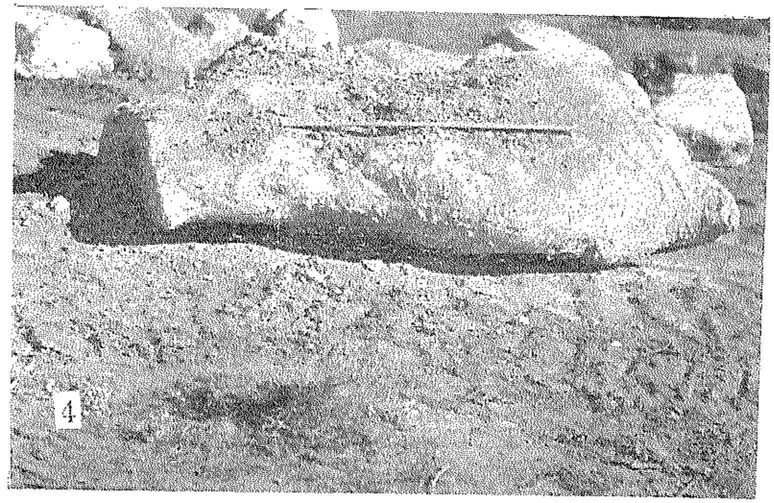


Fig. 1
Low bluebush with a density equal to Stage 3.

Fig. 2
Bladder saltbush and low bluebush with a density equal to Stage 4.

Fig. 3
Bladder saltbush and low bluebush with a density equal to Stage 5 (in the foreground and middle of the photo).

Fig. 4
A very large billy boulder exposed during dam-sinking at Yudnapinna Station. The siliceous horizon from which it was derived was approximately 2 feet in thickness. The rule is one metre long.

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