The Conservation Status of Mallee in Western NSW

A Review - 1981

Department of Environment and Planning

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A Review - 1981

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INTRODUCTION

The Western Division and parts of the Central Division of NSW comprise the more arid areas of the State (see Map 1). Despite the low rainfall they are important agricultural regions, especially for grazing and, to a lesser extent, cereal cropping. The vegetation community known as 'mallee' also occurs widely throughout the area, extending from central and south-western NSW into north-west Victoria and the north-east of South Australia. This community, characterised by low-growing Eucalypt species with multiple stems, is dominant on sandy soils within the 250 mm to 400 mm annual average rainfall area. Because of their lack of natural stock feed and the difficulties they presented for clearing and cultivating these lands were among the last to be taken up as the Divisions were settled.

In the higher rainfall areas of the mallee, i.e. Central NSW, the present settlement pattern dates from the 1920s when the mallee lands were made available for wheat farming. In the Western Division, the present settlement pattern developed as a result of several waves of "closer settlement" from the 1920s through to the 1950s. The earlier large pastoral leases, of limited term, were broken up into units of one "home maintenance area", sufficient to support a man and his family, and issued as perpetual leases.

Land settlement in the Western Division is administered by the Western Lands Commission, which was established in 1902 following the enactment of the Western Lands Act in the previous year. The Act resulted from a Royal Commission into the "Condition of Crown Tenants in the Western Division" after a period of severe drought combined with economic depression, rabbit plagues and widespread erosion. Administrative control over the Crown lands in the Central Division remains the responsibility of the Crown Lands Office.

Land tenure throughout the Western Division is perpetual leasehold with the exception of about 3% held as freehold, mostly in small remnant areas. Leasehold is also the main form of tenure in the mallee lands of the Central Division.

These administrations have gradually extended the length of leases and decreased the size of holdings. Additionally, the Western Lands Commission introduced land management techniques whereby overstocking was brought under some measure of control.

The development and expansion of agriculture in the western areas of the State has had significant impact on the natural environment. Mallee has been cleared from much of its original area to provide grazing land.

A major part of the uncleared mallee is being used for extensive grazing. This normally occasions minimal environmental impact but can cause some localised floristic change to the community when foraging has been more intense (e.g. during drought). Greater floristic change is caused by fire, and the mallee is subject to both wildfires and prescribed burning.

Early farming ventures in the mallee during the 1920s and 1930s were limited in extent. However, the land suffered serious wind erosion as a result of overcropping. Progressive adjustment of farm size and improvements in land-use practices have aimed to repair the damage done in that early period.

The most recent developments of clearing for cropping began in the 1960s. The object of this clearing has been to improve the grazing capacity of the heavilly timbered country, using crops to clear the land of mallee regrowth. Returns from cropping have recovered some of the costs of the initial clearing. The success of this style of cultivation began a trend towards commercial grain cropping.

Dryland crops, however, cannot be grown reliably in the Western Division due to wide variations in rainfall. In spite of this about 30,000 ha are sown to crops each year. Wheat is the most common crop, with mean yields below 1 tonne per ha. Other crops are oats and barley.

The cereals industry has expanded in the districts around Balranald - Wentworth and Mt Hope-Euabalong.

There is no available data on the total extent of mallee clearing in NSW although it is generally estimated that nearly half the original amount of the community has been removed. In SA about a third and in Victoria between two thirds and three quarters has been cleared.

Most of the clearing in NSW has occurred in the Central Division. As yet only a small part of the mallee in the Western Division has been cleared for cropping but advances in cultivation techniques and plant breeding have made further clearing and farming feasible.

The increasing agricultural exploitation of the mallee environment makes it necessary to ensure that sufficient data exists for the formulation of appropriate management procedures.

Such data needs to address the following questions.

To what degree is the mallee threatened by clearing?

To what extent is the concern that injudicious use of mallee lands may lead to major erosion problems justified?

Do existing reserves adequately represent the vegetation community types?

What scale, distribution, and management of reserves would supply adequate mallee habitats for endemic fauna?

This paper attempts a preliminary examination of these questions by considering the mallee's natural attributes, its conservation and the threats to it from agriculture. Research and major involvements of Government and other agencies are reviewed.

THE MALLEE VEGETATION COMMUNITY

NATURAL ATTRIBUTES

The Mallee is best described as a community of low Eucalypt species growing in a stunted habit of numerous stems (rather than a single trunk). This growth form is an evolutionary response to the limitations of low moisture availability, low soil fertility and poor soil structure.

The physical parameters of the NSW Mallee (in common with that of Victoria and South Australia) are 230 mm - 400 mm average annual rainfall, and soils of three main soil groups: solonised brown soils, red loams and deep siliceous sands.

The density of the community is variable and the understorey can vary from a relatively dense shrub layer to sparse hummock grasses.

Floristics

There is some confusion as to what species characterise mallee, and how strongly they associate with each other. Community definition within the mallee is at present being investigated by the National Herbarium.

The most commonly cited array of mallee dominants is:

E. dumosa	(white or Congoo mallee)
E. oleosa	(red or acorn mallee)
E. socialis	(pointed-fruit or grey mallee)
E. gracilis	(white or Yorell mallee)
E. incrassata	(lerp or yellow mallee)

Important understorey species are:

Atriplex	*vesicaria*	(saltbush)
Triodia irritans	var. *laxispicata*	(porcupine grass)
Acacia spp.		

Variously identified floristic associations of the NSW mallee are:

Eucalyptus dumosa / E.socialis .....Specht (1970,1974)

E. socialis / E. dumosa ..... Hayden (1971)

E. oleosa / E.dumosa ..... Beadle (1948)
Williams & Wood (1960)
Stannard (1963)
Bowler & Magee (1978)

E. oleosa / Atriplex vesicaria .... Williams & Wood (1960)

E. socialis / Triodia irritans /
Sclerolaena parviflora ..... Noy-Meir (1971)

The range of different dominant associations described here can be explained in part by the misidentification of E. oleosa. In most cases this is in fact E. socialis. The latest work by the National Herbarium reports that the dominant association in western NSW is E. socialis / E. dumosa, although true E. oleosa also occurs in the south-west of the State.

The Victorian Land Conservation Council Report (1974) used a land-system concept defining the following structural units:

Mallee; Big Mallee; Hummock Grass-mallee; Scrub-mallee; Saltbush-mallee; Mallee-heath; Heath.

This approach was also used by Noble and Mulham (1980) in their paper which reviewed vegetation surveys of the past and the classificatory systems used.

Structure

Specht (1974) classifies NSW mallee under four structural forms in the "southern part of the Western and Far Western Plains":

"Low woodland": 5-10m tall with 10-30% projective foliage cover

"Low open forest":5-10m tall with 30-70% projective foliage cover

"Open scrub": 2- 8m tall with 30-70% projective foliage cover

"Tall shrubland": 2- 8m tall with 10-30% projective foliage cover

Distribution

Mallee communities extend from central NSW (Long. 147°E) through north-western Victoria, southern South Australia and to the south-west of Western Australia (Long. 118°E). The latitudinal range is from 30°S to 37°S.

Carnahan (1968) collated previous survey work in a national vegetation map. It shows the approximate original extent of mallee in Australia and is illustrated at Map 2.

Wildlife Habitat

Mallee as a wildlife habitat is discussed by Frith (1962 and 1973). No mammals rely upon the mallee habitat entirely although two species including the Western Grey Kangaroo (Macropus fuliginosus), which has a mallee sub-species, use it as a primary habitat.

An estimated further twenty nine mammal species (not identified by Frith) use the mallee as a suitable habitat but operate through a number of such habitats, and are therefore not dependent upon one only.

The mallee is a more important habitat for birds than for mammals. Among these is the Mallee Fowl (Leipoaocellata), a very rare and increasingly important conservation species. Twelve bird species rely entirely upon the mallee and another sixty one species occur commonly. Table 5 on page 80 of Frith (1973) shows the number of species of birds and mammals inhabiting the major Australian vegetation biomes. A comparison with other habitats shows that on the criterion of numbers of species, the mallee is not a rich habitat type. Its habitat significance is discussed in the next section.

The relationship between the animals and the mallee habitat is such that large areas are required to support viable populations. Many have developed territorial behaviour which maintains a very low density population. Probably at the root of this evolved behaviour, however, is the scarcity of food in the mallee and the need to forage over extensive areas. It is now thought by researchers in the National Parks and Wildlife Service that there are only sixty breeding pairs of mallee fowl in NSW.

CONSERVATION OF MALLEE

The location of mallee reserves as of 1977 is shown at Map 3.

In Specht (1974) the representation of the major vegetation associations within each State in protected nature reserves or national parks is tabulated and judged as "nil", "poor", "good", or "excellent".

The conservation status assessed in this way for all the structural forms of mallee in NSW except tall shrubland, is judged "excellent". The tall shrubland form is not protected in any reserve. This assessment, however, is based on a composite of vegetation surveys, none of which covers the whole area of mallee and very few of which include any structural analyses. A better assessment of the adequacy of existing reserves in representing all the structural sub-types of mallee will be able to be made following the completion of the National Herbarium survey.

The list of parks and reserves as of 1971 used in the assessment in Specht (1974) is presented in Table 1. An inspection of this list, shows that all but two of the areas are very small. Their purpose is given as : "for the breeding and/or study of mallee avifauna" yet their small size is less than ideal for viable natural populations. This is especially so for the Mallee Fowl. Frith (1962) documented the decline in Mallee Fowl numbers with the decrease in habitat area.

The other two reserves listed in Table 1 are Cocopara National Park and Cocopara Nature Reserve of 8,335 ha and 4,618 ha respectively. Only these two seem likely to be of sufficient size to function effectively as habitats and natural floral communities. They comprise open scrub and low open forest structural forms, and are in the higher rainfall eastern zone of the mallee lands. Also in this vicinity is the 40,684 ha Yathong Nature Reserve, taking in a large amount of the Roto-Mt Hope mallee belt, the ecotone between the habitats of the Red and Eastern Gray Kangaroos. This reserve was gazetted after the publication of Specht's survey. Its continued use for sheep grazing, while yielding management lessons, removes it from serious consideration as a conservation area. In the Western Division Mallee Cliffs National Park (58,000 ha, gazetted in 1977) has been dedicated as a relatively undisturbed sample of mallee and human impact has been kept strictly to a minimum. Similarly for Woggoon Nature Reserve (4,360 ha, gazetted in 1974) north-west of Condobolin, the main purpose of which is scientific reference and habitat preservation.

Specht's assessment of the adequacy of existing reserves is therefore too dated to be of use for the present study.

Support for the establishment of Yathong, Woggoon and Mallee Cliffs reserves dates back at least to the report of the Parks and Reserves Committee to the Minister for Lands (Moore and Johnson (1971)), which recommended investigation with a view to establishing reserves, of mallee lands north-east of Mildura and in the Roto-Mt Hope area. Investigations by the National Parks and Wildlife Service indicate that the mallee fowl seems to require much larger areas in the far west of the State than for its habitats in the central west. Certainly, there is higher rainfall in the central west and thus probably a higher availability (and reliability) of forage, but the research has yet to be done which expresses these differences in terms of habitat types. The implications are, however, that larger tracts of the south west mallee area in addition to Mallee Cliffs will need to be protected for habitats.

The soil types upon which mallee grows are prone to severe (wind) erosion when not stabilised by vegetation. The Soil Conservation Service has been working on erosion control in the arid regions for many years and while it has evolved successful management practices for gradational soils (see for example, Hunt (1980)) the other types are still regarded as highly erodible. This is especially true of sandhills and their continued clearing is viewed with concern.

MAJOR INVOLVEMENT OF GOVERNMENT AND OTHER AGENCIES

An understanding of the main issues involved in mallee clearing and mallee conservation depends in no small part on an appreciation of the roles which a number of key authorities play in the administration and/or management of those lands. This brief overview of the responsibilities of the main authorities presents a first appreciation. As such it makes no claim to detailed comprehension of the various administrations.

Briefly, mallee occurs in two of the major State Divisions in NSW, the Central and Western Divisions. The use of Crown land in the former is administered by the Crown Lands Office and the latter by the Western Lands Commission.

The Soil Conservation Service acts in an advisory capacity for landholders in both Divisions, the Forestry Commission issues clearing licences to landholders in respect of Crown timberlands and the National Parks and Wildlife Service has large holdings of conservation reserves in the area.

Other agencies such as the CSIRO and the National Herbarium are interested in the area by virtue of their research programs.

Western Lands Commission

As a result of a Royal Commission into "Conditions of the Crown Tenants" in the Western Division of NSW, the Western Lands Act of 1901 was passed. This placed the administration of all Crown Lands in the Division in the hands of the Western Lands Commission (originally the Western Lands Board).

The basic lease in this Division is a grazing lease in perpetuity. On these leases an operator must apply to the Commission to clear mallee. The terms of a grazing lease normally allow some cropping to occur since the Commission appreciates that the eventual aim is to improve grazing capacity and that returns from early grain crops are needed to cover the costs of clearing and development.

When a lessee desires to devote the lease solely to grain production the lease may be altered to a special agricultural lease but the requirement to obtain the Commissioner's permission for clearing remains.

The Act does not explicitly charge the Commission with the protection of the natural environment. The Commission, in seeking to ensure that these lands will be agriculturally productive in the long term, has sought technical advice from various agencies (notably the Soil Conservation Service of NSW) in the formulation of conditions to accompany approvals for clearing.

The main thrust of these conditions is to minimise soil erosion from the cleared land by limiting the size and pattern of clearing and controlling the subsequent crop rotations.

It needs to be emphasised that the nature of both agriculture and the rural communities in the Western Division may make it difficult to apply rigid management policies in all cases.

Crown Lands Office

The Crown Lands Office controls, manages and supervises all Crown Lands in the Eastern and Central Divisions, administering the Crown Lands Consolidation Act, 1913, and the Closer Settlement Acts. Its administrative role has related mainly to the tenure status of lands and the conveyancing of lands from one tenure to another. The Acts provide for operator performance specifications relating to leasehold lands but these tend to refer to capital improvements rather than to matters such as agricultural land management.

All recent leases, however, have conditions upon them which are prescribed by the Minister and these are supervised on a regional scale through Land Board Offices. These conditions spring from the new policies of the Crown Lands Office which state that "land management will be pro-active" and "the conservation of the environment will be a major consideration in land management". The conditions are drawn from schedules applying to each type of lease or from submissions from other Government agencies or can be inserted at the discretion of the local Land Board Office.

The recent trend has been to assess more critically applications for further alienation of Crown lands, since the Crown Lands Office now officially recognises the Crown estate as a valuable resource "which should be retained in Crown ownership so far as is practicable".(Section 4-1 of Crown Lands Office's "Objectives, Policies, and Programmes" (1979), Overall Policy Statements in respect of Crown Land Resources).

The ultimate aim, stated in the same document, is to prepare management plans for each parcel of Crown land having regard to its status, zoning, access, services, topography, environmental value and future likely use.

Unfortunately, conditions applied to leases which were registered in the years before these management objectives were promulgated, though relating to the conduct of agriculture, are less likely to include measures for the protection of the natural environment. An illustration of the environmental conflicts which could arise on older leases is the Watts vs. Forestry Commission case described below in the Threats to the Mallee Environment section.

National Parks and Wildlife Service of NSW

The National Parks and Wildlife Service has holdings totalling about 118,000 ha of mallee lands. These holdings have been discussed in the Conservation of Mallee section.

Recently the Service's concern has been chiefly for the Roto-Mt Hope area in the Central West where existing mallee has been extensively studied. A large additional area (in excess of 100,000 ha) is proposed for acquisition here in the near future.

The large mallee belts in the south west have been investigated less intensively.

A major aim of the activities of the Service is the conservation of endangered fauna. Most notable among these is the Mallee Fowl. As the largest animal dependent upon the mallee, its presence is used by the Service as an indicator of the ecological health of mallee communities. The Service's studies on the Mallee Fowl's distribution and habitat requirements are not yet complete.

Forestry Commission of NSW

The Forestry Commission's main responsibility is to "provide adequate supplies of timber" and the tending and management of timber on State Forests. (Section 8 of the Forestry Act). In this context any stands of mallee within State Forests have been separated from the main strand of production and maintained in a condition quite close to the original.

The Forestry Commission has had responsibility for the issue of clearing licences to landholders in respect of all Crown timberlands. "Crown Timberlands" refers to all common Crown leases in both the Central and Western Divisions in excess of 2 ha. In semi-arid areas of NSW there is a mosaic of vegetation types, including valuable timber species. e.g. Cypress Pine, and non-merchantable species, e.g. mallee. Conditions under which the Forestry Commission can refuse a clearing permit are prejudicial to the survival of mallee because they relate to merchantable timber only. The administrative situation is different in the Western Division. Here, since 1973, the authority to issue clearing licences has been delegated to the Western Lands Commission for all Crown lands and can therefore be exercised with regard to other land management conditions as the Western Lands Commission sees fit.

Soil Conservation Service of NSW

Under the Soil Conservation Act, 1938-1976, the Soil Conservation Service of New South Wales is authorised to investigate all aspects of erosion, undertake research and experimental works, conduct demonstrations, and advise and assist landholders generally with regard to erosion problems. In certain circumstances action can be taken, against landholders whose management or neglect results in the depreciation of adjoining lands.

The activity of the Service with most relevance to mallee is the advisory role it has in assisting the land management programs of the Western Lands Commission and the Crown Lands Office. Both administrations are assisted by the Service in formulating conditions to be placed on land use, particularly in the Western Division. The technical advice relates to factors such as the rate of stocking, degree and pattern of clearing, rotation of cropping with pasture, and tillage practices. It is drawn from the Service's study of each individual lease area and also from regional research surveys such as the Land Inventory/Classification Program. This program, which is presently underway in the Western Division, involves the mapping of land systems at a scale of 1:250,000.

National Herbarium

The National Herbarium has been compiling, since 1969, a vegetation map of the State. It is planned that four maps of the State at 1:1,000,000 scale and a series of 52 maps at 1:250,000 scale will be published, Fox (1980).

The mapping of mallee will be more detailed than in previously published surveys. The communities will be classified on the basis of structure and the floristic associations of the eucalypt species and the understorey. It is expected that at least four mallee associations will be mapped. There will be detailed surveys of selected sites and the information will be subjected to computer analysis. However, in the light of the analytical work done by Noy-Meir (1970), the Herbarium considers that detailed grid analysis is not necessary. Maps incorporating the major mallee areas in the south west corner of the State are expected to be published in late 1981.

Commonwealth Scientific and Industrial Research Organisation

The CSIRO, mainly through the Division of Land Resources located at Deniliquin, is carrying out research aimed at maintaining the productivity of the pastoral lands of arid NSW. Experiments are underway to determine the best management practices to maintain vegetation and soil in a stable and economically productive state. The grazing potential of various native plants is also being investigated.

One current research project with direct relevance to the mallee environment is a large scale investigation into the effects of a range of fire seasons, frequencies and intensities on the mallee community.

THREATS TO THE MALLEE ENVIRONMENT

Pastoral Industry

Since large areas of the mallee have been cleared to provide pasture, management has become important. This is true of all cleared country in semi-arid regions. The new vegetative cover is more susceptible to drought and overstocking than the original and a combination of adverse conditions may leave the soil surface unstabilised. Management concern is focused upon the protection of the vegetation on erosion-prone sandhills. On the cleared areas pastures are generally natural with an admixture of medics.

Although most uncleared mallee has been subjected to grazing by domestic animals for perhaps 50-100 years, grazing is confined mainly to open areas scattered throughout the mallee. In the dense mallee, most of the typical components of the vegetation are unpalatable to livestock, and it has little grazing value. When feed is scarce however, some areas of mallee can come under higher grazing pressure, causing some change to the species make-up of the community. If the grazing pressure is protracted this can result in long-term floristic change affecting the habitat value of the mallee. At worst, however, such impact is only local in significance.

A new aspect of pastoral management is being developed at present which has ramifications for the floristic makeup of the mallee. This is the use of prescribed burning to increase the proportion of palatable feed in the mallee community. The CSIRO is a prime mover in the development of this new rangelands management technique, beginning with observations on the natural recovery of the mallee after wildfires (significantly the 1974-75 fires in the Pooncarie area) and extending to experiments using prescribed burning. It has been found that after fire the fodder content of the community (mainly natural grasses of relatively high palatability) increases due to the curtailment of competition from the mallee trees and porcupine grass. The effect, however, is only temporary since the mallee not killed grows new stems from underground vegetative bodies (lignotubers) and dead trees are replaced by germination of the eucalypt seed which is set as a response to the fire. To achieve effective fodder production therefore requires a burning regime from which the mallee does not recover and its natural Eucalypt dominance and the floristic balance of the community is permanently changed to a grass and herbage dominance. The effects of varying frequencies and seasonality of fires are at present being studied.

It should be noted that this is an experimental program at the moment and if a management tool of wide application should arise from it, investigations will need to be made of the wider environmental implications.

Cropping

The opening up of new areas for cultivation, in recent years, has become a significant threat to mallee in both the Central and Western Divisions due to advances in cultivation technology (i.e. larger tractors and equipment) and the availability of more drought resistant grain varieties. Although yields are lower, profitability is grained by farming very large areas (thus reducing costs per hectare).

The Western Lands Commission may place a range of land management conditions on its leases, particularly those set by the soil Conservation Service in relation to cropping and cultivation practices, cropping frequency and rotations, and clearing regimes for protection against erosion. In addition, it has direct control of the clearing of all Crown timberlands (including mallee) in the Western Division. It has been common practice been to tie in a clearing permit with existing land management objectives.

There are occasional unofficial references, however, to cases where clearing has taken place without a permit, as well as to the situation, perhaps more common, where a larger area has been cleared than that for which permission has been obtained. Where breaches occur a range of remedial measures can be invoked up to and including forfeiture of a lease.

In areas cleared contrary to the conditions of a licence where the breach is detected early enough the mallee can be allowed to regenerate from root suckers and seedlings. The Western Lands Commission advises that this has been required in a few cases. The Commission also advises that in some cases lessees have been required to install soil conservation measures where cultivation has occurred on slopes that are steeper than those permitted under the conditions of a licence.

Controls over uses of Crown lands in the Central Division are essentially similar except for the issue of clearing. The Crown Lands Office exercises primary administrative control of leases and the Soil Conservation Service advises land owners on appropriate land management as does the NP & WS in some circumstances especially relating to wildlife protection. Significantly, the Forestry Commission must grant or reject clearing permits only under the terms of its own Act.

The emphasis in the Forestry Act on merchantable timber production renders the legislative conditions under which clearing permits can be granted or refused inapplicable to mallee vegetation. Illustrative of this, and of particular relevance to mallee conservation, is the recent Supreme Court case of Watts vs. Forestry Commission of NSW of August, 1980. In it, Mr Justice Woodward found against the Commission when it refused a clearing licence for a stand of mallee on the request of the NP& WS (which was investigating the area with a view to acquisition as an extension of Woggoon Nature Reserve). The judgement was based on the grounds of refusal being outside the Commission's discretionary powers under the Forestry Act.

In addition, large areas of land in the Central Division are freehold, over which the administrative controls of the Crown Lands Office do not apply. Clearing mallee on these lands requires no permit from the Forestry Commission. It is not known what percentage of the mallee which survives in the Central Division occurs on freehold land, but it is thought that there is now very little, if any.

CONCLUSIONS

The various strands of argument, introduced in the preceding sections, for which supportive data can be presented are summarised as follows:

* The vegetation community called mallee which is a remnant of an originally widespread native plant association in arid NSW is disappearing via clearing, and modified floristically via a range of agricultural management practices, at an unknown rate.

* Insufficient data is available to decide whether present reserves adequately represent and conserve all major forms of the mallee as a vegetation community. However, it is expected that the vegetation mapping and classification being carried on at present will supply this data. Work to date indicates the need for new reserves.

* Recent uncompleted studies indicate that large reserves are required to provide habitats which can sustain viable populations of endangered fauna species. The most significant endangered species is the Mallee Fowl.

* There is some question as to whether the present agricultural use of some mallee lands is appropriate due to the potential for environmental damage.

  The potential damages are at least threefold:

  (i) loss of native plant community;

  (ii) loss of a fauna habitat;

  (iii) loss of the natural stabilisation for soils (a large proportion of mallee soil types have been classed as potentially erodible).

* Mallee growing on older leases in the Central Division is generally unprotected by conditions of the lease and an operator only requires a licence from the Forestry Commission to clear it. It has been held to be beyond the discretionary powers of the Forestry Act for the Commission to consider relevant conservation criteria in the granting of the licence.

* Western Lands Leases and recent Crown Leases incorporate measures, via conditions of leasing and clearing permits, to control the clearing of mallee, but strict adherence to these conditions and the terms of permits is sometimes difficult to police.

RESPONSIBILITIES OF THE DEPARTMENT

The Department of Environment and Planning is responsible for the administration of the Environmental Planning and Assessment Act, 1979. The objects of this legislation under Section 5 include that of encouraging:

- "the proper management, development and conservation of natural and man-made resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment"; and

- "the protection of the environment".

The legislation enables the Department to undertake environmental studies and prepare environmental plans with respect to protecting, improving or utilising the environment to the best advantage.

Additionally the legislation imposes a duty on all public authorities to consider or take into account the environmental effects of any activity proposed to be undertaken by them or to be approved by them, and establishes a system of environmental impact accessment for activities which if carried out are likely to significantly affect the environment.

In exercising its responsibilities under the Environmental Planning and Assessment Act, the Department has a role in the carrying out of research into problems in environmental planning and assessment and assisting the development of co-ordinated approaches in this State for the management and conservation of natural resources.

The Department is preparing a report on the extent and complexities of the threat to mallee communities and the mallee environment. This task will consider the following:

- how existing mallee lands are used;

- how mallee lands are used after clearing;

- what is the rate of clearing and modification of mallee communities and what are the environmental implications of this.

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Selected Source Material

Landsat: Satellite Imagery.

Satellite sensing imagery is a very cost effective way of surveying vegetation in the arid region. A relevant reference is:

Leggett, E.K. Space Satellite surveys rural resources. Ag Gazette 88: 4 Aug. 1977.

This is a land use survey of Central Para north of Wentworth, which shows the image separation of wheat, rosewood/belah, mallee, bluebush/grass, pearly bluebush, and scald.

Satellite imagery is available for all mallee areas in all bands. Common scales of 1 : 1 x 10 and 1 : 250,000 are available. The successful separation of images described in the reference uses computer enhanced data.

Land Systems: Mapping available from Soil Conservation Service at 1 : 250,000. Incomplete coverage of South West NSW Pooncarie sheet only available, others in preparation.

The land system mapping grew out of the Land Inventory program carried on by the service for the landowners of the Western division by which each lease was studied in order to recommend elementary land-management practices.

Reference:

Newman, J.C. (1976). "Land Inventory Aids Arid Land Management". J. Soil. Con. Service NSW 32 : 3.

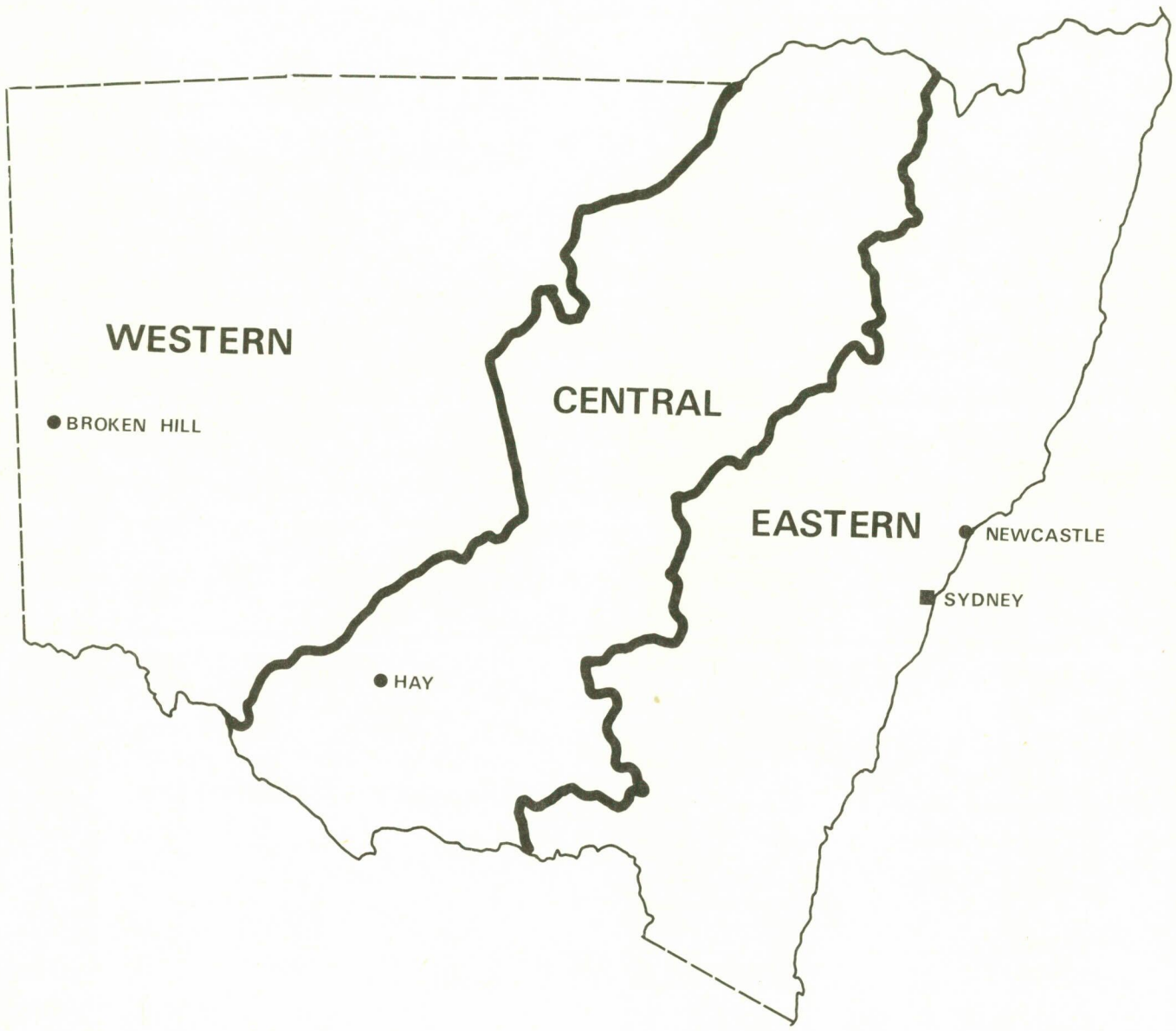
TABLE I

Conservation Area	Plant Communities
Buddigower N.R. No. 31 Co. Bourke Area 138 ha Reference: NPWS (1971) R.I: D	Woodland Woodland ?E, woollsiana Low open-forest/Open-scrub Mallee E. socialis-E. dumosa
Charcoal Tank N.R. No. 46 Co. Bland Area 86 ha Purpose: Breeding grounds for mallee fowl and water birds Reference: NPWS (1971) R.I: C-D	Low open-forest/Low woodland/ Open-scrub Mallee E. socialis-E. dumosa Low woodland E. woolsiana
Gubbatta N.R. No. 68 Co. Dowling Area 162 ha Purpose: Breeding grounds for mallee avifauna Reference: NPWS (1971)	Low woodland Mallee E. socialis-E. dumosa (plus Triodia sp. in understorey)
Pulletop N.R. No. 22 Co. Cooper Area 142 ha Purpose: Study area for mallee avifauna Reference: NPWS (1971) R.I: C-D	Low open-forest/Open-scrub mallee E. socialis-E. dumosa
Quanda N.R. No. 16 Co. Flinders Area 855 ha Reference: NPWS (1971) R.I: D	Woodland Shrub woodland E. populnea - Callitris columellaris subsp. (glauca) Low open-forest/Open-scrub mallee E. socialis-E. dumosa

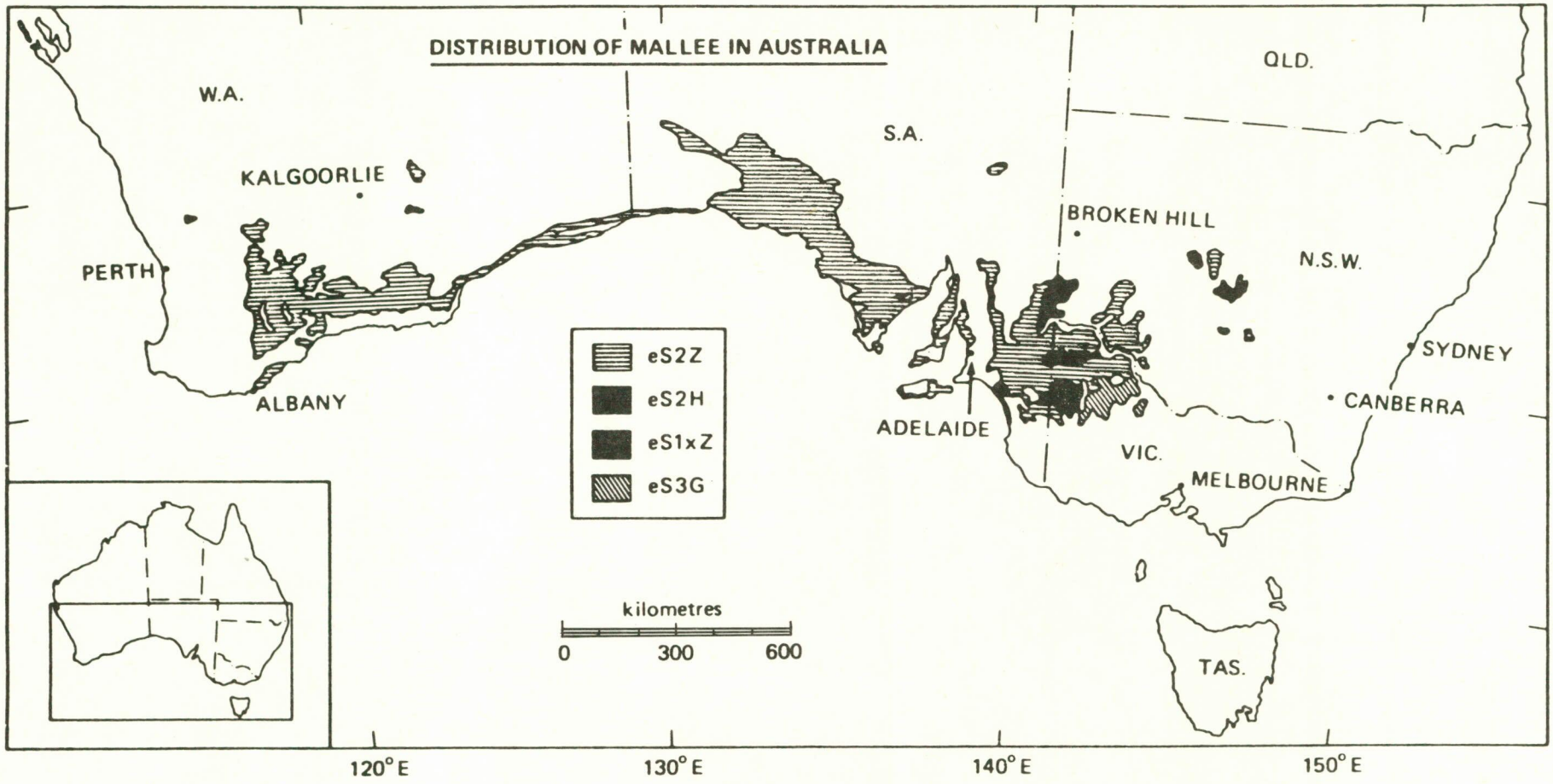
TABLE 1 (Cont'd.)

Conservation Area	Plant Communities
Coolbaggie N.R. No. 29 Co. Lincoln Area 1,443 ha Reference: N.P.W.S. (1971) R.I: D	Woodland Tall woodland (1) E. fibrosa subsp. nubila (2) E. crebra Low open-forest/Open-scrub Mallee E. viridis
Cocopara N.R. No. 32 Co. Cooper Area 4,618 ha Reference: N.P.W.S. (1971) R.I: C-D	Open-forest Dry sclerophyll forest E. dealbata-E. sideroxylon Woodland Woodland (1) E. woollsiana (2) E. populnea Low open-forest/Open-scrub Mallee E. socialis-E. dumosa
Cocopara N.P. Co. Cooper Area 8.335 ha R.I: C	Open-forest/Low open-forest Dry sclerophyll forest E. dealbata-E. sideroxylon Woodland/Low woodland Woodland (1) E. woollsiana (2) E. populnea + Open-scrub - Mallee E. socialis-E. dumosa

- from Specht et al. (1974).



MAP 1
NEW SOUTH WALES:
STATE DIVISIONS



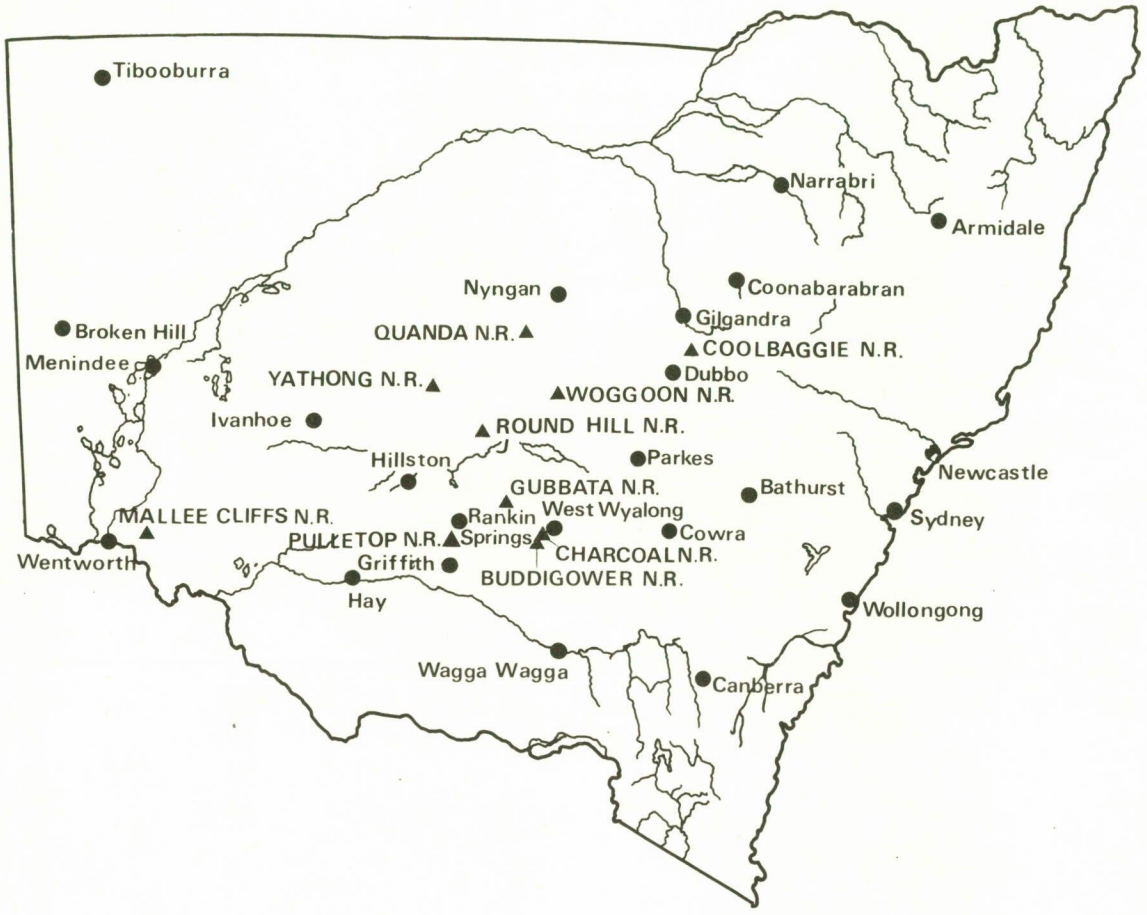
The distribution of mallee throughout southern Australia.

eS2Z – tall shrubland with low shrubs;
eS2H – tall shrubland with hummock grasses
eSlxZ – tall open-shrubland with low shrubs;
eS3G – tall shrubland with tussock grasses and graminoids.

(Taken from Carnahan, J.A. (1976). Natural vegetation. *In* 'Atlas of Australian Resources', Div. Nat. Mapp., Dept. Nat. Res., Canberra).

MAP 2
DISTRIBUTION OF MALLEE

FROM NOBLE, SMITH & LESLIE (1980)



MAP 3
NATURE RESERVES AND NATIONAL PARKS CONTAINING MALLEE (1977)

5484H 2.82 D. West, Government Printer