Chapter 1

INTRODUCTION

1.1 Justification of the Study

Land degradation, according to Woods (1984), "... has been identified as the most significant single issue in the Australian environmental scene today." Reviewing data collected during a 1975 national survey of land degradation, Woods calculated that about half of the pastoral lease land in Australia's arid zone was degraded to some extent, but that about 40 per cent of that degradation could be recovered by changes in land management strategies alone.

Exploring the economic status of the grazing industry in Australia, Musgrave (1982 1983) suggested, firstly, that graziers in the pastoral zone were, relative to those in other zones, losing competitiveness in their attempts to cope with declining terms of trade and, secondly, that an important impediment to adjustment, was land tenure which emphasised the equitable distribution of land rather than its efficient land management.

Young (1979, 1980) identified those aspects of pastoral land tenure which impede adjustment to changes in property size, limit the range of land management strategies open to graziers, and which create uncertainties over property rights. The most important aspects impeding adjustment are property size restrictions, some short term leases, ownership constraints and land dealings.

The possibility that present pastoral land tenure and administration restrict the ability of graziers to adjust to economic and social pressures, and so induce them to adopt management strategies that result in higher rates of land degradation, is the central issue in this study. Woods' estimate, that 40 per cent of pastoral land degradation could be regenerated through the modification of existing management practices is of little use if his suggested modifications are illegal or made unprofitable by current institutional arrangements.
Implicit in the justification of this study is the notion that there is scope for reform of institutional arrangements that would both allow graziers increased productivity and facilitate a more efficient use of society's pastoral land resource. While such reform could be an attractive strategy for government because it generally would not involve outlays from consolidated revenue, identification of the actual winners and losers from such a change would be a complex task, (Wills, 1985). Musgrave, (1983) suggests that identification of the optimal path of reform will require research into the "legal, administrative, managerial and economic dimensions" of the alternate policy options available.

This study is a report on the preliminary results of an investigation into three related areas of concern in Australian pastoral land management: land tenure and administration, pastoral property viability and land condition.

The intention was to explore the interconnection between these three concerns through the simulation of various property management strategies in a variety of pastoral ecosystems. The outcomes of each simulation are assessed on the basis of economic return, impact on land condition status and whether or not practical implementation of the strategy is constrained by existing land tenure and administrative arrangements. This report deals with the initial stages of this exploration.

Throughout the study, key assumptions about the linkages between management strategies and land condition are based on advice and validation of experts in these fields.

In a period of increased public concern over the quality of pastoral land management, (WDSC, 1984a, p.11, Messer and Mosely, 1982, p.26), and of rapid legislative change, the welfare of all land users and the landscapes they manage is best served by new policies based on an objective flow of information validated by both the biological and social sciences. An important source of conflict in the present public debate over the future use of the pastoral zone is the lack of definition of the nature and causes of land degradation. This study will make only a partial contribution to the resolution of that conflict.
The ultimate purpose of this study is to contribute to the search for forms of pastoral land tenure and administration which, hopefully, are simultaneously conducive to efficient property management and to the attainment of the conservation objectives.

1.2 Outline of the Study

This study is being carried out within the framework of the Conservation and Pastoral Land Administration Project, which is entirely funded by the National Soil Conservation Programme. This section consists of a description of the objectives of the study, the hypothesis being tested and of the study area.

1.2.1 Objectives

The overall objective of the project, has been to explore the impact of alternative land tenure and administrative arrangements on pastoral property organisation and viability, and on land condition, in a number of Pastoral Zone scenarios.

The specific objectives were:

(a) to develop an existing operational model of a pastoral property to incorporate links between property management and land condition;

(b) to validate this model;

(c) to assess the financial performance of a range of property types in a variety of rangelands under climatic sequences generated by Monte Carlo sampling methods;

(d) to incorporate a range of alternative tenure and administration scenarios into the model, and to assess their impact on the financial performance of the representative holdings; and

(e) to assess the impact of alternative managerial strategies on land condition.

1.2.2 Hypothesis

The hypothesis tested in this study was that present land tenure and administration are a significant cause of land degradation. In this
respect note should be taken of economic studies by Hassall and Associates, (1982) which have shown that pastoral properties with inadequate (land) resource bases are most prone to high costs of unit production, debt problems and a propensity to degrade land in order to maintain standards of living. Psychological studies by Young, (1980) tend to support these findings. An important argument underlying the study is that tenure policy has perpetuated the existence of pastoral properties with inadequate resource bases.

1.2.3 The study area

The study area covers the mulga country around Charleville and the chenopod shrublands of the Broken Hill district.

1.3 Methods

1.3.1 Surveys

Two surveys were conducted in the last three months of 1985. Following the suggestion of Musgrave (1983) that more research was needed on the relationships between grazier behaviour and land status, a mail survey of over 300 graziers in New South Wales, Queensland and South Australia was carried out to determine grazier perceptions and attitudes to issues of land degradation. In order to explore more fully the interface between graziers and the State, a telephone survey of all Pastoral Inspectors was conducted in New South Wales and South Australia to assess their perceptions and attitudes to issues of pastoral land degradation. (Queensland Land Inspectors were also surveyed but the responses have yet to be released by that State's Land Administration Commission).

The two surveys are largely based on a common questionnaire, and the results will be published subsequently.

1.3.2 Property management simulations

A simulation model of livestock production in arid rangelands, developed by the Bureau of Agricultural Economics (Reeves, et al 1974) was used to investigate the economic and land degradation consequences
of various property management scenarios. The major scenarios studied include property size, conservative and exploitative management, types of ownership and drought assistance.

From secondary data sources, an animal production and economic performance profile was compiled of 'typical' pastoral properties in a particular district. The model, data sets and simulated outcomes of various management strategies were presented to district 'experts' for validation. As well as assessing the various performance measures employed, these experts suggested likely land condition outcomes of the strategies being simulated, and the rates at which regeneration and degradation might take place under various forms of management.

1.3.3 Review of Major inquiries and existing tenure legislation

There have been five major inquiries into pastoral land use in the last six years. The reports resulting from these enquiries are;

- The Jennings Report (1979), Western Australia;
- The Martin Report (1980), Northern Territory;
- The Vickery Report (1981), South Australia;
- The Hassall Report (1982), New South Wales; and
- The Western Division Select Committee (1983), New South Wales.

(An extensive review of Queensland pastoral land legislation was carried out in 1982/83 but the report has not yet been released).

The inquiries were a watershed in Australian Pastoral land tenure history in that they provided the necessary evidence and generated sufficient political momentum to enable the abandonment of closer settlement as the basis of pastoral land policy. All States with pastoral land have made or are in the process of making appropriate changes to their tenure legislation.

Recent amendments have also emphasised the role of land agencies in land management and have made greater demands on graziers to improve pastoral land condition. An attempt has been made in Chapter 3 to extract and examine those sections of existing legislation bearing directly on the land management of pastoral leases.
1.4 Structure of the Report

Chapter 2 outlines the way in which the pastoral industry utilises its land resource. The various factors which constrain the use of the land, including natural resource endowment, the goals and values of the grazier and the economic environment are described.

Chapter 3 is a review of the present system of land tenure and administration in the pastoral zone. The evolution of the system, the nature of present policies, and those sections of the legislation dealing with pastoral land management are outlined. The five major pastoral land use inquiries conducted since 1979 are also reviewed, as is the influence of the Commonwealth Government on pastoral land use. Finally the pastoral land management problem is restated.

Chapter 4 is concerned with the methodology used in the study. The land management scenarios tested with the simulation model and the sources of data are described.

In Chapters 5 and 6, the methodology is applied to representative properties in the Charleville and Broken Hill districts. The results for both regions are discussed.

Chapter 7 contains conclusions to this stage of the study, including some recommendations for the 1986 research programme and policy implications.
2.1 The Pastoral Zone Defined

Land, in this study, is seen as a renewable resource system and is defined as "all factors of the land surface of importance to man's existence and success" (Christian, 1958).

There are four broad categories of rural land use in continental Australia, namely the high rainfall zone, the wheat-sheep zone, the pastoral zone and vacant Crown Land (Figure 2.1). A little under half of the continent is held as pastoral lease.

The Pastoral Zone is defined by the Bureau of Agricultural Economics as those regions where ..."land use...is characterised by extensive grazing of native pastures. Cropping is impracticable on many farms because of inadequate rainfall", (B.A.E. 1985, p.88). The pastoral zone encompasses the arid zone (Figure 2.1), and the northern continental fringe where either low effective rainfall or a lack of agricultural development have lead to the retention of extensive grazing of livestock as the most appropriate form of land use.

The characteristics of the Pastoral Zone are, according to Childs (1977):

(a) a varied and unreliable rainfall distribution;
(b) very limited opportunities for land and pasture development, so that there has been an historical concentration on improving animal rather than pasture productivity;
(c) long distances to market;
(d) expansion of land management knowledge by trial and error; and
closely knit, and strong social groups. (These groupings are probably now under pressure because of the extension of better roads and telecommunication facilities into pastoral areas, effectively widening the range of social contact for graziers.)

Using data from the Atlas of Australian Resources (Commonwealth of Australia, 1980), the pastoral zone in Australia can also be defined in terms of its productive capacity. In 1976 the pastoral zone had

(a) an estimated gross value of agricultural operations of less than $6/hectare;
(b) an average property size in excess of 3200 hectares;
(c) a grazing density of less than 0.5 hectares per dry sheep equivalent;
(d) an average sheep turnoff for slaughter of less than 15% of total flock size;
(e) an average cattle turnoff of less than 30% of total herd numbers;
(f) a population density of less than 30 persons per 100 square kilometres.

Within the pastoral zone there are pocket of intensively cultivated and irrigated land, particularly in New South Wales and Queensland. Large areas of South Australia and the Northern Territory have been reserved for aboriginals. With the exception of Queensland, all States have significant areas of national parks many of which have been created since 1970. Significant areas of South and Western Australia are still vacant Crown land. The majority of the pastoral zone in every State, however, is held as pastoral lease for the grazing of sheep and cattle and it is these areas that are the subject of this study.

2.2 Geographical Influences

2.2.1 Climate

The Australian pastoral zone has three broad climatic patterns. The northern subtropical and tropical section receives predominantly summer rainfall of a unimodal distribution. Northern South Australia
and most of the Western Division of New South Wales have a 'uniform' rainfall pattern, where this is no identifiable seasonal dominance of rainfall. The southern fringe of the pastoral zone has a dominant winter rainfall pattern with a tendency to be bimodal in nature. Figure 2.2 shows the seasonal rainfall zones in the pastoral zone. The areas about Charleville and Broken Hill are broadly representative of the summer and uniform-winter climatic patterns respectively.

While the pastoral zone receives high and relatively constant levels of insolation, the two most variable, and hence limiting elements of climate are rainfall and wind. From an economic viewpoint, rainfall is a major factor in determining both the livestock asset structure and individual animal productivity. Rainfall and wind are also the major agents of land degradation in the pastoral zone with "...current erosional and depositional events (reflecting)...extremes of rainfall and windflow over relatively short time periods", (Johns et al, 1984 p.27).

The key feature of rainfall in the zone is its highly variable nature. The parameter 'annual average rainfall' is relatively meaningless because first, the average is often well above the median or most common event and second a year in which rainfall is much below the 'average' can be an excellent year for animal production if it is spread evenly throughout the year and not, as is often the case, occurring as intense isolated storms. Rationalisation of such a stochastic rainfall environment is depicted by the statement that "in our area we don’t have droughts, we just have a dry time, with occasional wetter times," Nichoson (1982).

2.2.2 Soils

The Australian pastoral zone is characterized by a landscape of slight slope with virtually zero rates of soil formation. Most soils have shallow depth, low levels of organic matter and little available soil phosphorus and nitrogen. (Johns et al 1984, Queensland 1984).

The work of Northcote et al (1975) suggests there are five basic soils types in the pastoral zone. Red sands and clay-sands cover about one third of the zone, red and yellow earths about another third, the
cracking clays about one quarter, and duplex soils and calcareous earths the remainder. Few properties, however are located on the red sands and clayey sands because of their infertile nature, poor moisture retention capacity, and the unproductive arid hummock grasslands they support. Johns et al. suggest that the (old) age of Australian rangeland soils, many of which have been through several cycles of development and geological erosion, present particular difficulties to land managers, such as low fertility and water storage capacity.

The low fertility of many pastoral zone soils also inhibits their development for production. For instance Noble, Cunningham and Mulham (1984 p.111176) cite the very low levels of available phosphorous as a particular inhibiting factor to the introduction of improved pasture species from overseas.

The process of soil degradation, which Johns et al. suggest "...encompasses structural breakdown erosion by wind and water, nutrient losses and salinisation", is primarily due to the action of wind and water.

The soils must susceptible to wind erosion are those with a weak surface texture and, on this basis 15 per cent of Australian rangeland soils are claimed to be highly erodible and 60 per cent moderately erodible by wind.

Since many pastoral zone soils occur on areas of slight slope, where particularly heavy rainfall events have to be received to initiate serious erosion, Johns et al. also suggests that raindrop splash and impaction may be a more serious source of land degradation than the horizontal movement of soil by wind and water. Consequences of raindrop action on bare soil include structural collapse and surface sealing.

The critical nature of adequate perennial plant cover to the protection of soils from high wind velocities and raindrop splash is noted by Johns et al. (p.36). While wind and water erosion is recognised as a natural process, livestock and wildlife grazing pressure can also significantly affect the rate of degradation by surface soils by reducing the vigor of plant communities and by dispersal of the litter layer.
2.2.3 **Vegetation**

Nine main types of rangeland vegetation are identified in Australia by Young, Walker, and Cocks (1984 p. 342), and their relative abundance is outlined in Table 2.1.

<table>
<thead>
<tr>
<th>Rangeland Type</th>
<th>Area (km²)</th>
<th>Proportions of Rangelands (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-arid woodlands</td>
<td>500,000</td>
<td>8</td>
</tr>
<tr>
<td>Saltbush and Bluebush</td>
<td>500,000</td>
<td>8</td>
</tr>
<tr>
<td>Mallee</td>
<td>100,000</td>
<td>2</td>
</tr>
<tr>
<td>Mitchell grasslands</td>
<td>320,000</td>
<td>5</td>
</tr>
<tr>
<td>Tropical and subtropical woodlands</td>
<td>960,000</td>
<td>15</td>
</tr>
<tr>
<td>Hummock grasslands</td>
<td>2,010,000</td>
<td>31</td>
</tr>
<tr>
<td>Arid mulga woodlands</td>
<td>700,000</td>
<td>11</td>
</tr>
<tr>
<td>Central arid woodlands</td>
<td>460,000</td>
<td>7</td>
</tr>
<tr>
<td>Mixed tussock grasslands</td>
<td>130,000</td>
<td>2</td>
</tr>
<tr>
<td>Other (includes lakes)</td>
<td>770,000</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,450,000</td>
<td></td>
</tr>
</tbody>
</table>

Adapted to growth in an arid environment which as historically received regular burning and light grazing pressure, most pastoral zone vegetation is perennial relatively unpalatable to sheep and cattle throughout the year, and woody in character. Natural grasslands make up less than 10% of that portion of the pastoral zone occupied by graziers.

The form and productivity of Australian rangelands are dominated by the local rainfall regime. In the northern, tropical and subtropical summer rainfall dominant regions, grasslands dominate with large areas also having an open Eucalyptus species cover. Semi arid woodlands and hummock grasslands are most common in the zone of uniform rainfall, while the winter rainfall zones have large areas of saltbush/bluebush, Mallee scrub and semi arid woodlands.

Basic to the management of Australian rangeland vegetation is "recognition of the long-lasting influence of extreme environmental events..." Harrington, G.N. et al. (1984) p.48. The particular soil moisture conditions required for the successful germination of many perennial species occurs infrequently while death caused by drought, or excessive stock in droughts, is a more common event, especially among the more palatable species.

Livestock grazing and burning can both promote and impede rangeland productivity, depending on their respective intensity of use and timing of application. These two forms of vegetative management that are largely under the control of the land manager, represent respectively the continuous and intermittent, selective and non selective forms of consumption of plant growth.

2.3 Historical and Cultural Constraints

2.3.1 Background

In this section three sets of constraints on the ability of the grazier to survive and prosper from pastoral land use are nominated. They are the resource base of the property business, the psychological makeup of the grazier and a range of socio-economic influences. All three sets of constraints may be significantly influenced by government land policy.
The timing of entry into the pastoral industry is also critical to success. As is demonstrated in Chapter 5, early droughts can bankrupt the most efficiently run properties.

Pastoral land tenure and administration represents a special form of socio-economic influence and is examined in detail in Chapter 3.

2.3.2 Historical influences

The initial occupation of the zone was rapid. Figure 2.3 shows that most of the pastoral zone destined to be used for grazing livestock had been taken up in the years to 1880. The shepherding of domesticated, ruminant livestock was a totally alien technology to the local aboriginals. There was no transfer of land management knowledge to graziers by aborigines, such as occurred in the European settlement of southern Africa, (Davidson, 1981). Given the rapid occupation of the zone there was in any case little time in which to transfer knowledge before such massive droughts as that of 1898-1902. Hence large areas of the zone were more or less simultaneously subjected to quite serious degradation as the pioneer graziers learnt, by trial and error, to better estimate the long term productivity of their leases.

Publicly sponsored rangeland management research only began in earnest after World War II. In the first eight years of occupation, graziers had to rely on their own resourcefulness in improving pastoral land management practices.

The South Australian Royal Commission into the Pastoral Industry, of 1927 indicates that insecure and restrictive land tenure was a common feature of pastoral land production till well into the twentieth century.

In the first fifty years of Australian settlement the restrictive nature of the land grant system forced graziers to illegally occupy vacant Crown Land, a practise known as "squatting". The advent of land sales and annual grazing licences in 1831 provided the first impetus for "squatters" to move further inland, but it was the demand for farming land after the goldrushes of the 1850's that forced a lot of graziers to occupy the pastoral zone. Had land tenure in those early years been more secure and less restrictive occupation of the pastoral zone may have been
achieved at a slower rate avoiding much of the massive degradation that occurred at that time. For instance the New South Wales Crown Lands Act of 1884 automatically resumed half of every existing pastoral lease, a policy decision which resulted in graziers rapidly shifting their capital investments and livestock onto the half of the lease they still retained. This decision, at a time when graziers were still quite ignorant of long term productivity, doubled the stocking rate on half of the occupied land.

Graziers in New South Wales were not offered security of title and perpetual lease till 1932 while in South Australia, Western Australia and most of the Queensland pastoral zone is still held under term leasehold of from 30 to 50 years in duration.

Closely asssociated with the leasehold tenure of pastoral land in Australia has been the policy of closer settlement. The initial areas of pastoral land occupied by graziers, known as 'runs', were very large, with properties carrying in excess of 100,000 sheep being not uncommon in the late nineteenth century. The policy of closer settlement involved the Crown forcibly resuming and subdividing most of the land on these large runs into properties which were supposed to be of sufficient size to provide a grazier and his family with a reasonable standard of living.

The policy extended land clearance for the cultivation of wheat crops well into the pastoral zone. In South Australia the result was degradation of a lot of valuable grazing land (Meinig, 1963) and the creation of many small properties. Owners of these small properties tend to overstock in order to provide a reasonable standard of living. (Hassall and Associates, 1982).

The subdivision of properties and other restrictive features of pastoral land tenure intended to promote closer settlement have only recently ceased to be a feature of pastoral land policy in most States.
2.3.3 **Psychological makeup of the pastoral zone grazier**

Related to both lack of awareness of pastoral land potential and closer settlement policies is the newly emergent issue of multiple land use. In the first century of pastoral land occupation it was widely assumed that the pastoral zone could only be used for grazing livestock, or left as empty desert. The discovery of massive mineral deposits throughout the pastoral zone, and better roads have given the Australian public a greater awareness of the recreational and scientific value of the zone. The 1980's in particular have seen serious challenges made to the traditional rights of graziers (vickery et al 1981, WDCS 1984a), exposing serious deficiencies in current legislation to adequately protect the legitimate interests of graziers in the matter of public access to pastoral leases.

The development of the pastoral zone for livestock production has been characterized by chronic shortages of labour, high transport costs, 'booms and busts' in the fortunes of graziers and the fundamental isolation of the zone (Davidson, 1931; Shaw, 1982).

Set against a background of limited land management experience and restrictive land policy the above characteristics of development are suggested to have made most graziers:

a) Individualistic;
b) resilient;
c) reluctant to employ labour;
d) essentially anti-government and to a lesser extent; anti-corporation and anti-farmer;
e) conservative and traditional in outlook.

These characteristics all have an important bearing on land management and hence land condition. They are each discussed below.
a) **Individualism and graziers**

Childs (1977, p.170) states that the most significant factor in determining the attitudes of pastoral property managers in south-west Queensland was "the essential individuality of each person". This particularly strong trait, suggests the need for flexible land tenure to cope with a wide variety of attitudes to land management.

The various pastoral land laws, notably those of Queensland and New South Wales have postively encouraged the development of individualism in the grazier community. The whole thrust of closer settlement has been to allocate small parcels of land to (individuals) families.

b) **Resilience**

Shaw (1982 p.3) notes from characteristics of Australian rural development which he considered to be important in the development of the resilient, individualistic grazier. They were a highly variable climate, unstable commodity markets, physical isolation and a widespread notion that to be a successful grazier one only had to have a little land and a strong back. The last characteristic persisted till the 1960's despite the findings of several Royal Commissions that the settlement of inexperienced families on small parcels of pastoral land led to hardship for those people and considerable land degradation.

Childs (1977, p.170) concluded that success as a grazier came from long experience on a property and a measure of resilience, an extension of which is the 'battler mentality' discussed by Nalson (1982 p.192). The battler is the individual who is constantly under challenge from climatic and economic adversities, but who overcomes them through hard work and determination. Nalson further suggested that a battler mentality among many small graziers may impede structural adjustment making it difficult for government to encourage the sale of small properties, or rapidly improve the economic viability of surrounding properties.
c) **Reluctance to employ labour**

A recent survey of pastoral inspectors (Robertson, 1986 unpublished data) suggests that many graziers would not expand property size if permanent labour would have to be employed on the enlarged holding. If such attitudes were widespread they could seriously impede structural adjustment in the pastoral industry, and be an indirect cause of land degradation.

d) **Grazier antipathy to government, corporations and farmers**

The anti-governent attitudes of many graziers was inherited from the gold miners (Davidson, 1986, pers.comm) and developed from a century-long struggle for security of tenure.

Most corporations are perceived as the antithesis of the 'battling' leasehold by many graziers. Goodwin (1985 p.33) notes that the freeholding of pastoral land in Queensland was introduced very slowly because "... of local antagonism to company ownership of large tracts of freehold land". Antipathy to corporate ownership of pastoral leases may however, prevent the more efficient use of marginal pastoral land. (Davidson 1981, p.423). Corporations usually have better access to the large capital resources necessary to develop marginal land and to ride out droughts, than do graziers.

Land policy in Australia has always favoured agricultural development pushing out grazing interests, encouraging land clearance and cultivation to extend into the pastoral zone and causing much land degradation (Meining, 1963; WDCS, 1984b).

e) **Conservative and traditional attitudes**

The arid, uncertain and isolated pastoral zone environment has made conservatism and traditionalism a rational attitude to livestock production (Crouch and Payne, 1983). The scope for forward planning is extremely limited when rainfall and commodity prices are highly variable, and Crouch and Payne found that those managers who based their decisions on information passed down from older generations could be "...more successful than persons who are described as innovators". (ibid, p.21).
A reliance on previously acquired knowledge as the basis for managerial decisions does not, however, preclude graziers from, "...looking forward, anticipating the future" (Childs, 1977, p.1700). Indeed, Holmes (1980) found that most graziers in the Charleville area had a definite preference for security of future income over short term profit maximization goals in management, and that rural adjustment schemes which assume graziers to be motivated only by short term income flows are likely to fail.

2.3.4 Discussion of historical and psychological constraints

While historical experience has been important, the overriding influence in the evolution of grazier psychology has been the physical environment of the pastoral zone. Further, the development of such traits as individualism, resilience and conservatism are not only considered to be natural reactions to a demanding uncertain environment, (Crouchi and Payne 1983), but vital to long term enterprise survival.

No attempt has been made to quantify the above generalisations about grazier psychological makeup. Nevertheless it is suggested that in periods of extreme social and economic stress the above traits may inhibit structural adjustment and slow down the adoption of more conservative land management standards.

2.4 Growth of the conservation movement

Nineteenth century Australian society regarded the pastoral zone as having very little value, (see for instance the Waste Lands Acts of 1846 and 1872 in South Australia). Little concern was displayed for the condition of, what was then, an abundant resource. Towards the end of the century this attitude began to change.

In 1874, when drought devastated marginal, arid lands that were being cultivated near the Flinders Ranges the notion of desert lands 'invading' better landscapes was initiated (Heathcote, 1983, 1983 p.7).
Public concern, in N.S.W., over the condition of grazing lands was first manifested in the (1883) Inquiry into Public Lands. This inquiry found that "...conservatism and beneficial management of Crown lands were found to be generally disregarded in the scramble for property", between 1861 and 1882.

Heathcote claims the 1901 Royal Commission into the Western Division of N.S.W. and Ratcliffe's (1937) soil erosion surveys in S.A. and Queensland reflected public 'concern' over the "advancing desert". This 'concern' was, however, not firmly established. Hallam (1983) claims that "...public opinion in 1941 was scarcely aware of the problem of...soil conservation in relation to agriculture. The parallel task of preserving unique areas of our environment was largely unacknowledged".

To Wills (1985 p.1) public concern over natural resource use has been increasing over the last twenty years. A more informed appreciation of wilderness areas has led to a greater diversity of demand for rural land services and a perception that agricultural (and pastoral) lands are being progressively degraded (WDSC,1984a). Uncertainty about the long term impact of current land use technologies, and unpredictable public access rights to rural lands led to a plethora of legislation concerned with environmental protection and, ultimately the five major inquiries into pastoral lands outlined in Section 1.33. The value of pastoral land had effectively risen due to the emergence of a new set of land users. This new group was demanding more conservative standards of management than those imposed by the existing land administrations.

In response to public pressure land policy has moved away from the administration of policies which were concerned with equitable land distribution to an emphasis on the monitoring and evaluation of land management, and efficiency of land use.

2.5 Current economic influences

The attitudes of graziers toward land management may be influenced by economic influences that originate on and off the property.
2.5.1 **Exogenous economic influences**

There are three interrelated levels of off-farm economic influence. They are international, national and regional in origin.

The major products of the pastoral zone are fine grade wool, meat and live animals, and almost all is exported from Australia. Grazier incomes are therefore very dependant on international markets. To the extent that there is a linkage between grazer income levels and land degradation, international commodity markets may have a strong influence on pastoral land condition. It is not only international commodity prices, however, that may influence land condition. For instance bans on the importation of kangaroo products reduce the numbers of kangaroos culled for export thus raising the feral grazing pressure on pastoral land.

At the national level, government policies on taxation, mineral exploration and exchange rates can have a significant impact on grazer incomes and capital investment on pastoral properties (BAE, 1985).

State governments, through their direct control of land administration and transport infrastructure, have a strong influence on the profitability of pastoral enterprises.

At a regional level, the contraction of property service industries to larger regional centres, and the consequent demise of small country towns, has meant greater isolation and social stress for graziers (Powell, 1978).

2.5.2 **Property level influences**

At the property level the exogenous influences outlined above have created considerable and continuing pressure to improve productivity. Such productivity increases have been achieved, in part, through a reduction in the use of hired labour, increased use of family labour and where possible, increases in the size of the property.
The shedding of hired labour has been most pronounced in New South Wales where the Western Division pastoral industry put off 70% to its employed labour between 1962 and 1975 (Hasseall and Associates 1982 p.77).

Declining levels of profitability on many properties has resulted in a trend toward more off-farm employment by graziers, especially in drought periods (Hassall and Associates 1987, p.18). Tenure imposed limits on property size may have contributed to this trend, which leaves less time for land management.

2.5.3 Discussion

The pastoral industry has a growing interdependence with the rest of the Australian economy, (Edwards and Watson, 1978) and a diminishing ability to influence government policy at a State and Federal level due to a declining relative contribution to the national economy and a steady loss of personnel.

In its brief history the pastoral industry has been through several economic crises from which it has managed to recover. The current declining terms of trade, however, have been particularly severe over the last ten years, at the very time when graziers are being pressured to adopt more conservative land management practices. While many properties, particularly in New South Wales and Queensland, are in urgent need of structural adjustment, it will be important that the newly emerging pastoral land administrations proceed carefully with the implementation of more conservative land management standards.

2.6 The alleged status of pastoral zone lands

The only comprehensive assessment of land condition in the pastoral zone was carried out as part of a national survey conducted by the Commonwealth and State Government Collaborative Soil Conservation Study in 1975. (Department of the Environment, 1978).

Data for the study was taken from the survey of field officers of the various state Soil Conservation Services, who estimated degradation from aerial photographs, without field verification. The Study also experienced problems associated with a lack of comparability of data from the different services.
Despite these and other shortcomings the Study provides the best available assessment of the order of magnitude of pastoral land degradation. The resulting estimates of rangeland condition in the occupied arid land, which includes most of the pastoral zone, are presented in Table 2.2.

The Table indicates that 1.8 million km$^2$ of the arid zone was reported to require regeneration treatment, but that 40% of this area could be treated by simply changing land management strategies. The Study implied that the required changes in the management would be costless. For the other 60% of the arid zone requiring treatment with physical works, the initial capital cost of regeneration was estimated at $65m., in 1975. New South Wales was reported to have the most degraded arid zone, and the highest proportion of its land in the worst condition. In all States, however, the Study estimated that degradation was widespread and affecting at least half of the land used for grazing livestock.

An attempt was made to measure the trend of arid land condition by estimating the urgency with which the treatment with works were required (Table 2.3). While Table 2.2 indicates that land condition in New South Wales is poor, Table 2.3 suggests that the trend of that condition is quite stable. In contrast the trend in Western Australia rangelands indicates a rapid decline in condition for the 43% of lands presently requiring treatment for degradation.

Stanley (1982), Harrington (1982) and the WDSC (1984b, p.30) all lament the absence of objective data and methodologies for the assessment of range condition and trend in Australia. The principal obstacle to development of methodologies for assessment is the lack of consensus on what it is that is being measured.

For instance, to the WDSC (1984a, p.32) land condition "...encompasses aspects of soil integrity, plant productivity, and climatic influences". To Wilson and Tupper, in Stanley (1982, p.14) land condition relates the present state of a piece of land to the potential of that land type, with a causal relationship between use or management implied*. Perhaps neither definition adequately captures the dynamic nature of arid ecosystems.
Table 2.2

Degradation requiring treatment in Australia's Arid Zone, 1975
('000 square kilometres)

<table>
<thead>
<tr>
<th></th>
<th>AUSTRALIA</th>
<th>N.S.W.</th>
<th>Qld.</th>
<th>S.A.</th>
<th>W.A.</th>
<th>N.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area in use</td>
<td>3356</td>
<td>315</td>
<td>840</td>
<td>441</td>
<td>1114</td>
<td>626</td>
</tr>
<tr>
<td>Area not requiring treatment</td>
<td>1506</td>
<td>—</td>
<td>404</td>
<td>81</td>
<td>634</td>
<td>387</td>
</tr>
<tr>
<td>Area affected by:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation degradation</td>
<td>950</td>
<td>32</td>
<td>234</td>
<td>173</td>
<td>372</td>
<td>139</td>
</tr>
<tr>
<td>and little erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation degradation</td>
<td>467</td>
<td>150</td>
<td>80</td>
<td>120</td>
<td>61</td>
<td>56</td>
</tr>
<tr>
<td>and some erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation degradation</td>
<td>284</td>
<td>110</td>
<td>50</td>
<td>56</td>
<td>39</td>
<td>29</td>
</tr>
<tr>
<td>and substantial erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation degradation</td>
<td>148</td>
<td>43</td>
<td>71</td>
<td>12</td>
<td>7.3</td>
<td>15</td>
</tr>
<tr>
<td>and severe erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dryland salinity –</td>
<td>1.1</td>
<td>—</td>
<td>1.1</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>sometimes in combination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with water erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total area needing treatment</td>
<td>1850</td>
<td>335</td>
<td>436</td>
<td>360</td>
<td>480</td>
<td>239</td>
</tr>
</tbody>
</table>

All values are approximate only.

While about half of the occupied pastoral zone in Australia was reported to have some land degradation in 1975, it is estimated by Harrington (1982) that the trend of that condition is stabilizing due to "... affluence, public opinion and improving ecological understanding". The same author suggests that arid land degradation in Australia is less advanced than in similar zones elsewhere in the world.

Table 2.3

The trend of Australian arid zone land condition in 1975

<table>
<thead>
<tr>
<th>URGENCY LEVEL</th>
<th>N.S.W.</th>
<th>Qld.</th>
<th>S.A.</th>
<th>W.A.</th>
<th>N.T.</th>
<th>AUSTRALIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion expressed as a percentage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16</td>
<td>13</td>
<td>16</td>
<td>52</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>87</td>
<td>49</td>
<td>34</td>
<td>45</td>
<td>42</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>0</td>
<td>37</td>
<td>14</td>
<td>37</td>
<td>40</td>
</tr>
</tbody>
</table>

Level 1 = treatment to prevent irreversible and serious damage necessary over the next 10 years.

2 = treatment (to stabilise degradation) necessary in next 20 years.

3 = treatment not essential over next 20 years.

Source: Department of the Environment (1978).
Chapter 3

PRESENT PASTORAL LAND TENURE AND ADMINISTRATION

3.1 History of Development

The settlement of pastoral land in Australia was based on an official expectation of land development for cultivation and intensive farming. Fee simple freehold title was only to be given to settled farmers. Pastoral runs were to remain under leasehold tenure until such time as they could be surveyed, subdivided, sold to farmers, and cultivated. Remnants of this policy can still be seen for instance in the South Australian Pastoral Act (SAPA), which is framed to encourage the Pastoral Board "...to make every effort to transfer pastoral lands...to agricultural purposes", (Vickery et al, 1981, p. 9.6).

In the last century land sales and lease rentals were an important source of government revenue. Land administration was directed at the distribution of Crown land and collection of these revenues. Limited administrative resources and an almost complete ignorance of the long or short terms productivity of the relatively abundant pastoral land resource resulted in little attention being paid to efficient land management. The 1883 (New South Wales) Inquiry into the State of Public Lands found that the conservation and proper management of all Crown lands were generally "...disregarded in the scramble for property" that flowed from the policy of 'selection before survey' in the years 1861 to 1883.

The enactment of closer settlement policy in the 1880's paved the way for extensive administrative reform. The Crown Lands Acts of 1884 not only required State land administrations to carry out more surveying activity to subdivide large pastoral properties, but many new regulations related to ownership, transfer and development of pastoral leases had to be administered.

By 1900, problems of land degradation, excessive pastoral lease rentals and direct political control of land dealings strengthened the case for administrative and tenurial reform.
Initial development of the pastoral zone was based on a considerable lack of knowledge about the long term carrying capacity of Australian rangelands. The initial resilience of the land and generally good seasons allowed the rapid escalation of livestock numbers. The capacity of the rangeland to cope with these pressures broke under the inevitable serious drought.

For instance in N.S.W. the drought of 1898-1901 reduced stock numbers in the Western Division from 10.7m sheep equivalents in 1897 to 4.0m in 1902, as shown in Figure 3.1.

Concern over the land degradation that accompanied this drought was largely responsible for initiation of the 1901 Royal Commission into the Western Division (Heathcote 1983, p.7). The Royal Commission recommended the creation of a Western Lands Board, increased term and security of lease tenure and a review of land rentals.

High pastoral lease rentals were found to be having a major deterrent effect on pastoral land settlement by the 1891 South Australian Royal Commission into pastoral lands and the 1901 Royal Commission into the Western Division of New South Wales.

The 1883 New South Wales inquiry into the state of public lands found that "...unnecessary and pernicious exercise of ministerial discretion" had produced a "...vicious policy of land law" that had hindered pastoral land settlement. Mistrust of Parliament in matters affecting land administration was found to be a deterrent to pastoral settlement by the 1891 South Australian Royal Commission into pastoral lands.

In order to more efficiently fix pastoral lease rents, remove most routine land administration from direct ministerial control and to provide more specialised administration to pastoral lands, the South Australian Pastoral Act of 1893 established the South Australian Pastoral Board. After 1910 the pastoral leases in all States except Queensland were being administered by land boards responsible to the Minister of Lands or the permanent head of the Lands Department.
Figure 3.1 Livestock in the Western Division, 1897–1965.
From 1910 to the 1930's the Australian pastoral industry experienced generally poor seasonal conditions and low commodity prices. Despite earlier administrative reforms rents remained a deterrent to industry development and land administration was considered inadequate.

The 1927 Report of the Queensland Land Settlement Advisory Board emphasised that pastoral lessees took all the risks and that the "least Government can do is give tenants really expert and efficient administration". Particular note was made in the report of the need to have equitable dealings with lessees who were restructured in the implementation of closer settlement policy. 'Living area' standards were proving to be too small and a legacy of poverty was unfolding. The report recommended the formation of a Land Administration Board to determine leasehold areas, rentals, forms of tenure and development conditions for Crown land in Queensland.

The 1927 Report of the Royal Commission of the Pastoral Industry of South Australia recommended that "...the administration of the pastoral laws be vested in a politically independent Pastoral Board". Like the Queensland Land Administration Board, the South Australian Pastoral Board was to consist of three senior public servants, all appointed from within the Lands Department.

From the 1930's to the 1970's pastoral land administration changed little in structure or emphasis. The various State Departments of Lands retained firm control over land policy while small, specialised agencies had been developed internally to administer the pastoral zone. Limited staff resources were concentrated on the implementation of closer settlement policy and land development with little attention being paid to pastoral land condition.

The growth of the conservation movement in the 1970's arose partly as a result of public concern about land condition and public access in the pastoral zone. One result of this development was the proliferation of specialist government agencies concerned with monitoring of environmental condition. These new agencies then began to press the incumbent land administration structures to include a wider cross section of public interest groups in the land administration process and to pay more attention to issues of land management.
The 1970's, and 1980's in particular, have seen rapid and significant change to pastoral land tenure. Many of the property size and other restrictions to viable pastoral production have been removed and there are proposals to give graziers perpetual leases in those states presently offering only term leases. New regulations, however, have been created to encourage more conservative land management.

The history of land tenure and administrative development in Australia has been one of gradual evolution in response to increased knowledge about the management of pastoral lands and changes in social objectives. This evolution is best illustrated in the growth of the term of tenure in pastoral leases shown in Table 3.0. By the end of this century it is likely that most pastoral land will be held under some form of perpetual lease.

### 3.2 Present Pastoral Land Policies

Pastoral land policies in all States are currently undergoing rapid change. While there is unanimous agreement about the need to abandon closer settlement as the basic thrust of land policy (WDSC 1984a, South Australia Year Book 1985, Land Administration Commission 1982 p. 2), the new policies vary considerably.

In New South Wales, South Australia and Western Australia the new emphasis of policy is on the conservative management of pastoral lands. Individual land holders are to be held more responsible for land management and considerable emphasis is being placed on the physical monitoring of range condition and trend. While it was expected that South Australia would have a completely new Pastoral Act in 1986, and Western Australia is anticipated to have a new Land Act before 1988, the New South Wales Government rejected the advice of the WDSC to replace the Western Lands Act of 1901. In 1985, however, the more restrictive elements of closer settlement were removed from the Western Lands Act.

In Queensland land policy has changed emphasis from closer settlement to the "...consolidation and stabilisation of land settlement" (Land Administration Commission, 1984). Property size was to be restructured
### Table 3.0

The Growth of Term of Tenure in Pastoral Leases in Australia

<table>
<thead>
<tr>
<th>Year</th>
<th>N.S.W.</th>
<th>Queensland</th>
<th>S.A.</th>
<th>N.T.</th>
<th>W.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1827</td>
<td>Annual Licence</td>
<td>same as N.S.W.</td>
<td>1846 (Waste Lands Act) Annual License</td>
<td>same as S.A.</td>
<td>1847, Annual licence for up to 4000 acres</td>
</tr>
<tr>
<td></td>
<td>1846 (Waste Lands Act) Lease up to 14 years with pre-emptive right to purchase only part at one pound per acre</td>
<td>1846 (Waste Lands Act) Annual lease (none issued)</td>
<td>1872 25 year lease</td>
<td>1872 14 year lease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1851 14 year lease</td>
<td>1863 14 year lease (First lease issued)</td>
<td>1876 (First lease issued)</td>
<td>1890 42 year lease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1860 14 year lease</td>
<td>1863 14 year lease (none issued)</td>
<td>1872 25 year lease</td>
<td>1872 14 year lease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1884 15 year lease over leasehold area, annual lease lease<a href="a">注</a></td>
<td>1884 30 year lease</td>
<td>1898 42 year lease</td>
<td>1898 50 year lease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1889 21 year lease</td>
<td>1893 21 year leases (Land Class A and B) 21+21 year lease (Land Class C)</td>
<td>1898 42 year lease</td>
<td>1898 50 year lease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1895 28 year lease</td>
<td>1902 Up to 42 years</td>
<td>1898 42 year lease</td>
<td>1898 50 year lease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1901 42 year lease</td>
<td>1958 Grazing Homestead Free-holding lease (40 years)</td>
<td>1953(b) 50 years</td>
<td>1982 Perpetual lease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1932 Perpetual Lease</td>
<td>1962 Pastoral Development holdings (up to 50 years)</td>
<td>1975 Grazing Homestead Perpetual lease</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

(a) Agricultural selection tenure allowed for up to 518 hectares to be held as freehold anywhere in Queensland but it was not extensively used in the pastoral zone.

(b) Five Pastoral Homestead Perpetual leases issued.

**Sources:** Various Land Acts.
towards larger units, there were to be no more resumptions of land from established pastoral leases and security of tenure was to be improved in the more closely settled pastoral areas through the granting of perpetual leases with the option of freeholding.

Northern Territory policy is still strongly oriented toward land development and agriculture. Perpetual lease pastoral tenure is now available. Removal of the Crown's right to forfeit the lease for non-fulfilment of lease conditions and the considerable freedom of the lessee over the form of land development undertaken makes the title almost indistinguishable from freehold.

Present land policy is attempting to give pastoral property managers every opportunity for the buildup of property size. New regulations are being introduced, however, to encourage more conservative land management, the more important of which are discussed in Section 3.5.

3.3 Present Tenure Arrangements

3.3.1 Terms of pastoral leases

All States offer a range of terms for the use of pastoral lands. These are listed in Table 3.1.

Only Queensland presently offers freehold title to pastoral land. In New South Wales almost all pastoral land is held under perpetual lease. The existing 50 year pastoral leases in the Northern Territory are being converted to perpetual leases. All current Western Australian (50 year) pastoral leases expire in 2015 and most South Australian (42 year) pastoral leases are due to expire in 2003.

Most of the land tenures in Queensland, (only the major forms of which are shown in Table 3.1), were established in 1861 to enable administrators a maximum of flexibility in the allocation of land of differing potential. In the other states, pastoral leases evolved over a century of experience. They are likely to continue to change as graziers seek more security of tenure and government seeks to change land policy from the administration of closer settlement to land management.
Table 3.1

The Terms of Pastoral Land Tenure in Australia (1985)

<table>
<thead>
<tr>
<th>Queensland</th>
<th>New South Wales</th>
<th>Northern Territory</th>
<th>Western Australia</th>
<th>South Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing Homestead</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freeholding Lease</td>
<td>(a) (40 yrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perpetual Lease</td>
<td>Western Lands</td>
<td>Perpetual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(perpetuity)</td>
<td>Perpetual</td>
<td>Pastoral</td>
<td></td>
<td>(c)</td>
</tr>
<tr>
<td></td>
<td>Lease</td>
<td>Lease</td>
<td></td>
<td>(perpetuity)(b)</td>
</tr>
<tr>
<td>Pastoral Holding</td>
<td>Pastoral</td>
<td>Pastoral</td>
<td>All pastoral</td>
<td>Pastoral</td>
</tr>
<tr>
<td>(d) (30 years)</td>
<td>lease (40 years)</td>
<td>lease (50 years)</td>
<td>leases expire in</td>
<td>lease (e)</td>
</tr>
<tr>
<td>Preferential</td>
<td></td>
<td></td>
<td>(21 or June 2015</td>
<td>42 years)</td>
</tr>
<tr>
<td>Pastoral Holding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) (30 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pastoral Development Holding</td>
<td>Pastoral</td>
<td>Pastoral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(up to 50 years)</td>
<td></td>
<td>lease (40 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Lease</td>
<td>Special lease</td>
<td>-</td>
<td>(21 years)</td>
<td>Special lease</td>
</tr>
<tr>
<td>of Forest Reserves</td>
<td>(f) (40 years,</td>
<td>-</td>
<td>(g) lease (42</td>
<td></td>
</tr>
<tr>
<td>(30 yrs)</td>
<td>or perpetuity)</td>
<td></td>
<td>years)</td>
<td></td>
</tr>
<tr>
<td>Stud lease (h)</td>
<td>Stud lease</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(75 years)</td>
<td>(40 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation licence</td>
<td>Annual licence</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(annual, unless renewed on payment of annual rent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) After the purchase price of the land has been paid in 40 annual instalments the grazier is granted restricted freehold title. Recent amendments to the Act are designed to encourage the speeding up of payments. The Grazing Homestead Freeholding lease can only be derived from the surrender of a Grazing Homestead Perpetual Lease.

(b) Not liable to forfeiture.

(c) Perpetual leases exist in the marginal agricultural areas on what is, technically, land suitable only for extensive grazing.

(d) Legislation has been proposed to increase the term of all pastoral leases to a minimum of 50 years.

(e) The term of 42 years was set in 1893, to represent a normal man's working life. Due to a 1960 amendment, most South Australian pastoral leases are due to expire in 2003.

(f) Western Lands Act 1901, Section 28A. Few of these leases.

(g) Issued for small areas adjacent to pastoral leases, for instance to depasture the horses of mustering plants.

(h) All stud leases subsisting in May 1984 have been extended to 2058.
Currently most pastoral land in Queensland, South Australia and Western Australia is held under term lease, ranging from 21 to 75 years. The considerable encouragement given to graziers in Queensland to convert existing term leases to perpetual lease (and restricted freehold), and the likely outcomes of new legislation in South Australia and Western Australia seem to indicate that by the turn of this century most pastoral land in Australia will be held under some form of perpetual lease.

### 3.3.2 Size restrictions

From the very beginning of settlement in Australia size restrictions have been applied to agricultural as well as pastoral lands. First settlement in all the States began on productive lands, in an era when a square mile was thought to be a lot of land for a family. Land was a measure of wealth to the individual and an important source of government revenue and was to be carefully distributed. The pastoral zone was initially occupied in defiance of the law.

The restrictions on pastoral property size in the various States are given in Table 3.2.

There are no size restrictions on South Australian or Queensland pastoral leases. In the Northern Territory an individual may not hold pastoral leases in excess of two million hectares, and in Western Australia half a million hectares. In Queensland an individual may not hold more than two Grazing Homestead Perpetual Leases if the combined area of those leases substantially exceeds two "living areas or about 20,000 sheep equivalents". In New South Wales a Western Division grazier may not hold more than two Home Maintenance Areas, or a property carrying 12,000 sheep.
Table 3.2

Restrictions on the size and ownership of Pastoral Leases (30/12/85)

<table>
<thead>
<tr>
<th></th>
<th>Maximum Size</th>
<th>Minimum Size</th>
<th>Minimum Age of Lessee</th>
<th>Corporate Ownership</th>
<th>Personal Residence Requirements</th>
<th>Mortgagee Rights</th>
<th>Ministerial Consent for Mortgage</th>
<th>Sub-leasing</th>
<th>Agistment</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.S.W.</td>
<td>Perpetual lease = 2HMA Stud lease = 4HMA</td>
<td>Perpetual lease = 2HMA</td>
<td>None (L)</td>
<td>Corporations May only become lessees now as mortgagees. If already lessees may only lease 2HMA (m)</td>
<td>5 years (S.18f)</td>
<td>3 years Required</td>
<td>Minister's consent required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.A.</td>
<td>None (j)</td>
<td>None (j)</td>
<td>None</td>
<td>No restrictions</td>
<td>None</td>
<td>Period of lease</td>
<td>Not required</td>
<td>Minister's consent required</td>
<td>No restrictions, but there are maximum stock numbers for each lease</td>
</tr>
<tr>
<td>QLD (d)</td>
<td>Pastoral lease (none) GHPL=2 Living Areas</td>
<td>Pastoral lease (none) GHPL=2 Living Areas</td>
<td>18</td>
<td>All land may be by companies except PPH, GHPL, GHFL</td>
<td>PPH, GHPL, GHFL, 7 years (f)</td>
<td>2 years (a)</td>
<td>Not required</td>
<td>PPH (c) GHPL</td>
<td>PPH (S63) GHPL ($131(6)) 6 mths (e) GHFL ($144A)</td>
</tr>
<tr>
<td>N.T.</td>
<td>2.0 m. ha (g) 1 Economic Area</td>
<td>2.0 m. ha (g) 1 Economic Area</td>
<td>18</td>
<td>No restrictions</td>
<td>None</td>
<td>5 years</td>
<td>Required</td>
<td>Minister's consent required</td>
<td>No restrictions</td>
</tr>
<tr>
<td>W.A.</td>
<td>500,000 ha (S.113) an economically viable pastoral unit (S.98)</td>
<td>500,000 ha (S.113) an economically viable pastoral unit (S.98)</td>
<td>16</td>
<td>Minister's recommendation required (m) (i) (S.9(3))</td>
<td>None</td>
<td>Not stated but considered to be period of lease</td>
<td>Board's permission required</td>
<td>Minister's consent required</td>
<td></td>
</tr>
</tbody>
</table>
Notes for Table 3.2

(a) A mortgagee may only hold a lease which has a residence condition for one year.
(b) Except for PPH and GHPL where lessee must apply to Minister, unless mortgagee is a bank (Section 278, QLA)
(c) Subleasing prohibited while the lease is subject to condition of personal residence.
(d) As a general rule the laws of succession override all the provisions of the Land Act which restricts the holding of leases whether on a personal or area basis.
(e) If stock is agisted for more than 6 months in a year, Minister's written approval required.
(f) No residence or occupancy required on GHPL if, in the opinion of the Minister, it is less than a living area.
(g) Freehold grants of land limited to 150 km². Normally individuals may not hold more than 12,950 km², but with Minister's consent can hold up to 20,000 km².
(i) S.115 of the Land Act also places restrictions on the transfer of shares in (existing) pastoral companies.
(j) Section 42c of the Act, however, limits the amount of land that the Minister may add to an existing lease to 50 km² inside the dog fence and 500 km² outside the dog fence.
S.140. The maximum lease size to be granted to charitable incorporated bodies on Aboriginal reserves to 2,600 square kilometres.
S.90II. If land is acquired by the Crown for property enlargement, then it will be subdivided into blocks, none of which shall be of greater carrying capacity than 10,000 sheep.
S.90VI. Unlawful for any person to acquire a lease of any block offered for build up, if his aggregate holdings were to be greater than 10,000 sheep.
(k) S109(2)"...consideration given to encouraging and promoting the working of pastoral leases as family units".
(l) Minors may hold lease if it is inherited.
(m) Companies are actively discouraged from applying for leases.
(n) Corporate ownership not prohibited, though government policy has been to ensure 50% Australian interest. S115, 115A limits the dealings in shares of corporations who hold pastoral leases, and also states that on transfer to a corporation the Minister may require additional terms and conditions.
(o) Subleasing not encouraged, but allowed under special circumstances. For instance mining companies which have purchased leases but only use a small portion are generally allowed to sublease the remainder, for five years at a time. The Lessee, not the tenant, carries responsibility for compliance with lease conditions.

Abbreviations
HMA = Home Maintenance area
GHFL = Grazing homestead freeholding lease
GHPL = Grazing homestead perpetual lease
PPL = Preferential pastoral holding
S. = Section of relevant state land act
3.3.3 Ownership restrictions

State land administrations, since first settlement, have had the objective of resident, family ownership of pastoral properties, whether the land be held under freehold title or lease.

The restrictions on ownership currently in force in Australia are shown in Table 3.2.

Corporations were only permitted to hold land in Queensland for the purpose of developing land. The intention was that all land would be eventually held by families under freehold title. The realities of pastoral production in more remote areas and a recognition of their advantages, have ensured the survival of corporate ownership in Queensland to this day. Corporations are tolerated in South Australia and the Northern Territory, discouraged in Western Australia and prohibited from holding any pastoral leases in New South Wales.

In justifying its recommendation that corporations be prohibited from acquiring leases within the Western Division, the WDSC asserted that their land management was exploitative prior to 1900 and the Government had had difficulty resuming their leases. (WDSC, 1984a). This statement is suggested to spring from a lack of appreciation of the history of corporate land ownership in New South Wales. Before the great drought of 1898-1902 there were many large properties held by absentee owners and corporations but the massive degradation that occurred at that time was due more to a widespread ignorance of the long term carrying capacity of the land than to corporate ownership. Further, the extensive erosion evidenced on leases held by corporations in the 1930's and 1940's could well have been due to the then government policy of forcibly resuming all corporate holdings, thus removing any incentive for conservative land management.
The WDSC did recognise that "...we do not believe that resident owner-managers are better managers per se than managers employed by an absent owner", (WDSC, 1984a). If the fundamental issues in pastoral land use are to be those of conservative resource management then there seems to be no reason why corporate holdings of pastoral leases should be excluded as an option in ownership.

Mortgagee rights are extremely attenuated in all States except South Australia and the Northern Territory. These rights were limited to prevent a repetition of the situation where banks became the major land holders after drought. Only in South Australia and the Northern Territory may a mortgagee hold a pastoral lease for its full remaining term. As can be seen from Table 3.2 the mortgagee of a pastoral lease in New South Wales does not receive title to a perpetual lease but rather to a lease that must be disposed of in less than three years. An exception to this policy concerns leases under mortgage to the State Bank which has the rights of a conventional lessee (WLA, Section 12).

These attenuated mortgagee rights are suggested to be a significant reason for the apparent reluctance of banks to take pastoral leases as security for commercial loans.

3.4 Present Pastoral Land Administration

Of all the States, only New South Wales defines a pastoral zone with a statutory authority to administer it. The Western Division was defined in 1884 and the Western Lands Commission was established in 1901, using as a model the South Australian Pastoral Board (itself created in 1894).

In New South Wales, the Western Lands Commission is administered by a single Western Lands Commissioner who has considerable statutory powers. The Commissioner is responsible to the Minister through the Under Secretary of the Department of Lands. The Commissioner directs two Assistant Commissioners, one of whom is Chairman of each of the eleven Land Boards in the Western Division. Two local graziers make up the membership of each Land Board. The primary functions of these Boards are to reallocate land made available through expiring leases and to administer the development conditions of pastoral leases (WDSC, 1984a p. 33).
The Western Lands Commission maintains eight Pastoral Inspectors throughout the Western Division to monitor compliance with lease conditions.

In Queensland the Land Administration Commission administers all Crown Lands in the State. The Commission consists of a Chief Commissioner of Lands and two other members. The Chief Commissioner reports directly to the Minister.

Pastoral Lands in South Australia, the Northern Territory and Western Australia are administered by Boards with four, fourteen and five members respectively.

In South Australia, till the late 1970's, Pastoral Board members accompanied Pastoral Inspectors on tours of inspection, which were carried out at least every three years on each pastoral property. The purpose of this arrangement was to allow lessees to raise problems of an administrative nature with a member of the Board who was often able to make an immediate decision on the matter. This system of close cooperation between lessee and administrator has been proposed by Young (1983 p. 262) as a possible reason why South Australian rangelands are widely believed to be the least degraded in Australia.

The most comprehensive system of appeal in matters of land administration exists in Queensland. In that state the Land Court is the first court of appeal, while higher appeals may be made to the Land Appeal Court, and finally the Full Court.

By contrast, graziers in New South Wales have very limited avenues of appeal within the land administration framework (WDSC 1984a p.33) in certain circumstances being refused appeal to the Land and Environment Court (WLA Sections 26(4) and 27).

3.5 The degree of emphasis on Land Condition

3.5.1 Introduction

The three major causes of artificially induced or accelerated land degradation that are nominated in pastoral land legislation are:
clearing of vegetation;
(ii) overstocking; and
(iii) cultivation of land.

Until very recently, the only penalty provided for land degradation diagnosed as being due to these causes was forfeiture of the lease. This severe form penalty had to be invoked by the Minister, and was, in political terms, almost unenforceable. Consequently it has been rarely used. In recent years a range of monetary fines for land degradation have been introduced to complement the penalty of forfeiture. These fines are more easily imposed, more reasonable and should help to curb at least the most exploitative land use practices.

In this section only the contents of the five most relevant Acts have been considered. These deal with the tenure and administration of pastoral lands and are:

The New South Wales WESTERN LAND ACT, 1901; (WLA);
The Queensland LAND ACT 1962-1985; (QLA);
The South Australian PASTORAL ACT, 1936-1970; (SAPA);
The Western Australian LAND ACT 1933; (WALA);
The Northern Territory CROWN LANDS ACT; (NTCLA).

The sections of these five principal Acts relevant to the issues of land degradation and regeneration are shown in Appendix A.

In recent years various sections of the above Acts have become subject to the conditions of other Acts and nowhere is this tendency more pronounced than in the sphere of environmental control. In all States pastoral lands are now subject to various legislation relating to controls on soil conservation, forestry, wildlife, environmental and water resource use. With detracting from the issues addressed in these various Acts, their requirements are not judged to be of sufficient importance to warrant their explicit recognition in this study. The proliferation of legislation affecting the management of pastoral land suggests that consolidation of legislation is needed to facilitate ready comprehension by land managers and practicable enforcement by land administrations.
3.5.2 Clearing of vegetation

"The clearing of vegetation...has the potential for the greatest adverse environmental impact of all activities imposed...by man" (WDSC 1984b, p.37). The 1984/85 Annual Report of the Western Lands Commission notes that in those areas where extensive clearing for cropping has taken place, lessees have experienced declining incomes due to bush encroachment.

In all States the permission of the Minister of Lands is required for the clearing of timber trees.

A major form of vegetation destruction in Australia is the firing of rangelands. Given the considerable long term impacts this practice has on rangelands, (Hodgkinson 1983, p.48), and the large number of State Lands Departments that also administer Bushfire Brigades, it is curious that none of the Acts attempts to control the burning of rangelands.

In the Northern Territory, Queensland (and until recently South Australia) the clearing of vegetation is officially prescribed as a form of land 'development'. The QLA encourages the clearing of 'useless vegetation' and the development of 'waste lands'. Indeed development work is defined as any work (including clearing) that "...has the effect of increasing the carrying capacity or productivity of land or making it suitable for habitation..." (QLA, Section 5).

In Queensland, the clearing of scrub or the authorised clearing of trees can be deemed an 'improvement' and as such has to be valued for compensation if a lease or portion of a lease is resumed or transferred (QLA, Section 240). By contrast, the WALA specifically precludes the possibility of land clearing, even if authorised for pasture improvement, being taken into account in determining compensation (WALA Section 107(3)).
3.5.3 **Overstocking**

All the Acts, with the exception of the NTCLA have specific requirements that pastoral leases shall not be 'overstocked'. The NTCLA is primarily concerned that leases will be actually stocked, only noting that the Soil Conservation and Land Utilisation Ordinance imposes some limitations on stocking rates. Only the NTCLA, the WALA and the SAPA have minimum stocking requirements for pastoral leases.

Only the WLA specifically puts the onus on lessees to ensure that overstocking does not occur. In Western Australia, South Australia and Queensland the Minister determines what constitutes overstocking. In New South Wales the Western Lands Commissioner is the final arbiter. Only S.A. enforces strict upper limits on the number of stock that may be carried on each pastoral lease.

The definitions of what constitutes overstocking is vague in all legislation. The WLA and the NTCLA do not attempt to define overstocking. In Western Australia and South Australia overstocking occurs when the ordinary capacity of the land for depasturing stock is depreciated (SAPA, Schedule 1c). This is a more conservative definition than that of Queensland where overstocking is associated with the likelihood of permanent injury to land (QLA, Section 233).

Given the current lack of knowledge about pastoral land degradation, writing into legislation clear definitions of "overstocking" and acceptable standards of land condition would be difficult. It is probably better, at this time, that the definition of overstocking be loosely defined.

3.5.4 **Cultivation**

The NTCLA positively encourages the cultivation of pastoral leases and only requires the lessee to notify the Minister of intent to cultivate. In Queensland there is no restriction of cultivation on pastoral leases. In South Australia "agriculture" is permitted on pastoral leases if the produce is to be used for consumption on the lease, otherwise the Minister's consent is required. In New South Wales cultivation is only permitted after the issue of a cultivation licence by the Western Lands
Commissioner and the consent of the Commissioner of the Soil Conservation Service. These (NSW) restrictions were only introduced in 1979. In Western Australia the Minister may only permit cultivation of pastoral leases for the sowing of non-indigenous pasture species (WALA Section 105(2)), but special licences can be issued for fodder grown for consumption on the lease (Jennings et al., 113) Other cultivation is prohibited even though such action is not specifically mentioned in the Act (Russell 1985 pers. comm.).

Given the potential for irreversible damage to pastoral land that can come from cultivation (WDSC, 1984b p.40), the fact that all the Acts, with the exception of the WLA, are not more specific in their definition of cultivation and control over it is surprising.

3.5.5 Conclusions

In summary the present provisions of the Acts, reflect the difficulty of defining concepts such as overstocking and acceptable levels of land clearance.

If the States are to enter into successful future contracts with graziers aimed at improving land management standards then all environmental conditions imposed on pastoral lessees must not only be measurable but economically realistic and clearly stated.

3.6 Pastoral land use enquiries since 1979

The major inquiries into Australian pastoral land use are listed in Table 3.3. Until 1979, none of the States had had a major inquiry into pastoral land use for about 30 years, during which time there had been considerable changes in both the economic status of the pastoral industry and in public attitudes to the use and management of land resources. Since 1979 there has been a spate of inquiries.

The Jennings Report on the state of the pastoral industry in Western Australia (Jennings et al. 1979), was quickly followed by four other major enquiries into pastoral land use and tenure in the other states. Of these, that in Queensland has yet to be released. These inquiries provide valuable insight into the problems of designing land
Table 3.3

Major inquiries into pastoral land use in Australia, (1883-1984)

<table>
<thead>
<tr>
<th>Years</th>
<th>N.S.W.</th>
<th>S.A.</th>
<th>QLD</th>
<th>W.A.</th>
<th>NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Federation</td>
<td>(1883) BI Public lands, operations of land laws</td>
<td>(1891) Pastoral lands Commission</td>
<td>Before 1911 N.T. part of S.A. and included in 1891, 92, 98 (S.A.) inquiries (1895) Northern Territory Commission</td>
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<td></td>
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<tr>
<td></td>
<td>(1889) RC Rabbit problem</td>
<td>(1892) RC Valuations of pastoral improvements</td>
<td>(1897) Pastoral Land Commission</td>
<td>(1897) RC Land Settlement</td>
<td></td>
</tr>
<tr>
<td>1901-10</td>
<td>(1901) RC Western Division</td>
<td></td>
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<tr>
<td>1911-20</td>
<td>(1919) SC Land Development in Western Division</td>
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<td></td>
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<tr>
<td>1920's</td>
<td>(1927) RC Pastoral Industry</td>
<td>(1927) Land Settlement Advisory Board (1928) RC Beef Cattle Industry</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1930's</td>
<td>(1931) RC Western Division</td>
<td>(1930) Soil Conservation Committee (1930) RC Rabbits Dingoes Stockroutes</td>
<td></td>
<td>(1937) BI Land, land industries</td>
<td></td>
</tr>
<tr>
<td>1940's</td>
<td>(1947) BI Pastoral and marginal lands</td>
<td></td>
<td>(1940) RC Pastoral Industry</td>
<td></td>
<td></td>
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<tr>
<td>1950's</td>
<td></td>
<td></td>
<td>(1951) RC Pastoral Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1984) SC Western Division</td>
<td></td>
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</tbody>
</table>

Abbreviations: BI, Board of Inquiry
RC, Royal Commission
SC, Select Committee
use policy for the pastoral zone. This section notes the areas of common ground between the recommendations of the inquiries but, more especially, highlights the different disciplinary perspectives on pastoral land use displayed in them.

3.6.1 Historical perspectives

Before Federation the grazing industry was very important to the economies of the various States and any serious downturn in productivity was likely to be the subject of an enquiry. These enquiries generally resulted in increased security of lease tenure, the consolidation of legislation, better land administration systems, lower rentals and other assistance to pastoral lessees. An example is provided by the 1891 Royal Commission on Pastoral Lands in South Australia which found that development of the pastoral industry was being deterred by low prices, competition from other colonies, rabbits and wild dogs, distance from markets, lack of water and the mistrust of Parliament by graziers in matters affecting lands occupation. The Royal Commission recommended the creation of a Pastoral Board, improved lease conditions and the abolition of the 'auction test'.

From federation to the second world war, Royal Commissions and other forms of inquiry coincided with grazier anxiety over the renewal of leases and the occurrence of major droughts. The recommendations of enquiries such as the South Australian 1927 Royal Commission on the Pastoral Industry continued to advance the security of tenure, lower lease rentals and improve systems of land administration. Additional emphasis was given to the need for better stock and land management and the provision of public funds for research.

With respect to the present study the recent spate of inquiries is particularly important. They are:

The Jennings Report which was a response by the Western Australian Government to the "...poor economic conditions existing over much of the pastoral areas", in 1977. (Jennings et al, 1979 p.3). Aside from the strong emphasis on property-level financial analysis the report paid considerable attention to the issue of land condition.
The Martin Report was initiated in response to a felt need for the development of the Northern Territory pastoral industry. It attempted to lay down firm objectives for pastoral land tenure and administration. (Martin, Wells and Lanhupuy, 1980).

The Vickery Report was a limited enquiry into the South Australian Pastoral Act and was principally concerned with reform of pastoral land administration and management. (Vickery et al., 1981).

The Hassall Report was initiated by the Western Lands Commission in response to a perceived reduction in the standards of living of graziers, the lack of capital investment in pastoral leases and concern about overstocking. The report was an economic analysis of 922 properties from 1977 to 1980. (Hassall and Associates, 1982).

The Western Division Select Committee (WDSC) was initiated by a group of New South Wales politicians with a strong interest in the Western Division, a region not examined by a Parliamentary inquiry since 1901 (McCarthy, 1985 pers. comm.). The WDSC examined all aspects of land use, conservation and community needs.

The terms of reference for the five inquiries are listed in Appendix B and their membership in Appendix C.

3.6.2 General recommendations

Taken together these five reports represent both a watershed in attitudes toward pastoral land tenure and administration and a valuable collective insight into the complex of issues surrounding the private leasing of public rangelands.

The five reports provided the evidence for dismantling legislation supporting closer settlement and provided an administrative framework for the alternative policy of land management. WDSC inquiries were notable for the extent of public participation in its deliberations probably marking an end to the previous pattern of pastoral land inquiries and commissions, taking evidence only from bodies directly involved with the pastoral industry.
The reports emphasised the need to build up property size, consider alternative uses for pastoral lands, develop more objective data on and methodologies for the monitoring of land condition, and called for more biological research. Considerable emphasis was also laid on the need for land administrations to improve their monitoring of land management and to increase the scope and size of the data base on which decisions are made.

Pastoral land was perceived in the reports as being in a degraded condition, though the extent of any associated loss of productivity was not quantified. Most reports recommended the introduction of monetary fines to strengthen the enforcement potential of the land agencies and for appeals to be dealt with by the Courts.

3.6.3 Recommendations relating to pastoral land administration

The administrative structures recommended by the Jennings, Vickery and WDSC Reports are outlined in Appendix D.

The Martin Report made no recommendations for changes to the structure or function of the Northern Territory Land Board. The Report noted the "...the Board is well regarded by those involved in the Industry". (Martin, Wells and Lanhupuy, 1980 p.25).

The Jennings, Vickery and WDSC Reports all recommended expanded administrative structures to accommodate both the scientific staff thought necessary to improve rangeland condition monitoring, and a wider representation of community interests in the policy making arena. All of the proposed structures were to be directly responsible to the Minister of Lands.

The three reports were also unanimous on the necessity to administer pastoral lands through a tenure system. The Jennings and Vickery Reports emphasised the need to use grazier peer group pressure to achieve higher standards of land management while the WDSC recommended greater State control. The suggested expansion and committee structure of the new authorities was dominated by senior level public servants with actual land user, particularly grazier,
representation, being much reduced. The expanded scope of representation on the new authorities was an attempt to reflect the wider array of pastoral land users that have emerged since the early 1970's.

(a) Western Australian land administration

The Jennings Report justified reform of the old Pastoral Appraisal Board on the grounds of administrative shortcomings that had to be rectified before essential pastoral industry restructuring could take place. There was a need to 'centralise' decisions about pastoral leases into a new Pastoral Board which would be expanded to receive more advice and hence improve its competence in respect of matters of land management.

Pastoral zone committees, or small groups of pastoralists from different regions were advocated as devices to curb land degradation because the review committee "...was convinced that neither coercion nor the close supervision of pastoralists is desirable or necessary". (Jennings et al. 1979 p. 139).

The system of Pastoral Inspectors was to be retained as was the arrangement whereby the Department of Lands and Surveys, as landlord, provided the administrative input and the Department of Agriculture the inputs to monitor rangeland condition.

(b) South Australian land administration

The Vickery Report justified replacing the South Australian Pastoral Board with an Arid Lands Authority because it was felt that the Board had been 'captured' by its grazier clients, its charter was too restrictive and its staff resources insufficient to monitor rangeland condition.

The Vickery report emphasised the need to retain a quorum of two members for decision making in its proposed Authority on the grounds of its past effectiveness and minimal administrative costs. (Vickery et al. 1981, p. 125).
(c) New South Wales land administration

The most comprehensive examination of land administration was provided by the WDSC, which recommended replacing the Western Lands Commission with a Western Lands Management Authority on the basis that the Commission was failing to achieve its land management objectives (WDSC 1984a, p. 36). This failure was found to be due to:

(a) 'capture' of the Commissioner by grazier clients;
(b) a rigid pyramidal structure and staff not technically qualified to monitor land condition;
(c) the wide ranging powers of the Western Lands Commissioner;
(d) lack of definition of administrative priorities, and
(e) lack of coordination and reference to other government agencies.

To overcome these perceived shortcomings the WDSC proposed that all the professional staff should have "...appropriate tertiary qualifications and experience if possible" (ibid p. 48). Although the proposed Authority was still to be pyramidal in structure, the Director would be constrained by a Western Lands Advisory Council and by not being able to be appointed for a second consecutive seven year term.

The Western Lands Advisory Council, which would meet at least four times a year in various locations in the Western Division, was proposed to be a massive seventeen member committee dominated by senior public servants. This Council was to "...coordinate activities between government agencies in land matters in the Division". (WDSC 1984a, p. 52). In case the Authority Director, also a member of the Council, was in dispute with the Council the latter had direct access to the Minister.
(d) Discussion

Although the Jennings, Vickery and WDSC Reports were all concerned with improving the efficiency of their respective pastoral land administrations, it is noteworthy that none attempted to cost their proposals. The substantial increases in staff suggested as necessary to handle problems of pastoral land degradation would result in large increases in administrative costs. Table 3.4 indicates that there are wide variations in efficiency among the various state land administrations. It would appear that the most efficient pastoral land agency is the Western Australian Pastoral Board, with the lowest levels of staffing per lease.

While all three reports supported the need for greater emphasis on pastoral land management, two quite different approaches were proposed. The Jennings and Vickery Reports emphasized the role of grazier peer group pressure in curbing land degradation and the direct, permanent representation of graziers in the policy making structure. The WDSC by contrast stressed the Crown's "...role as a land manager" (WDSC 1984a, p.11), almost eliminating grazier involvement in the policy structure and placing a series of bureaucratic controls on land management (ibid, pp. 18-18).

Three different explanations were offered for the persistence of land degradation. The Jennings Report implied that a general lack of pastoralist awareness of the extent of the problem and its long term consequences was to blame for recent degradation or lack of regeneration. There was not suggestion of failure on the part of Pastoral Appraisement Board or Department of Agriculture staff.

The Vickery Report concluded that the failure of the Pastoral Board "...to prevent land degradation and conserve the land resource was...clearly a result of its lack of adequately trained staff, and its excessive allegiance to the pastoral industry" (Vickery et al. 1981, p.12.4). The WDSC similarly blamed staff qualifications and client capture for degradation in the Western Division, though it concluded that there were two principal failings in statutory controls. The first
was the reluctance of public officials and Ministers to enforce those controls and, secondly, that the sole penalty of forfeiture was too draconian to invoke.

3.6.4 Recommendations concerning pastoral land tenure

Only the Martin and Vickery Reports contained recommendations on pastoral lease tenure. After a thorough examination of the issue the Martin Report recommended that "...perpetual leasehold is the most appropriate form of tenure for developed pastoral land", but that the granting of perpetual lease should be conditional on the adequate development of the property, the payment of all debts to the Crown, and after genuine efforts have been made to eradicate the diseases tuberculosis and brucellois. The Vickery Report recommended the continuance of the existing 42 year lease pending a review. A three member majority of the inquiry recommended the granting of a form of continuous lease that could revert to a term lease if lease covenants had not been fulfilled.

The Martin, Vickery and WDSC Reports all considered and rejected the proposal to grant freehold title to pastoral lessees. The most common argument put forward by graziers for freeholding was that "...better security of tenure would increase their borrowing powers," (Martin, Wells and Lanhupuy 1980, p.44). The WDSC noted that the high level of debt carried by many Western Division graziers indicated that leasehold tenure had not inhibited their ability to borrow.

Recent experience in Queensland suggests that many graziers with a choice of freehold or perpetual lease title may also prefer perpetual lease for pastoral land. There are, however, certain tax advantages associated with perpetual leases and many graziers consider perpetual lease to offer as much security of tenure as freehold (Robertson, unpublished data).

Since 1982 the Queensland government has been encouraging graziers to convert their term pastoral leases into perpetual leases (GHPL), and then freeholding leases (GHPL). Freeholding leases run for 40 years after which the lessee is automatically granted a restricted freehold title to the property. Table 3.5 indicates the rapid rate at which graziers have been converting their term leases.
The most interesting feature of the movement to more secure tenure is that many graziers are not exercising the option to convert their GHPL to GHFL. The basic reason appears to be that the GHPL "...provides security without expensive cadastral survey" (Land Administration Commission, 1983 p. 2) and that the rents on pastoral leases are tax deductible while the 40 annual payments associated with the GHFL are not. Many Queensland graziers would appear to perceive a perpetual lease as offering the same security of tenure as restricted freehold title.

Perpetual lease with periodic covenant review could be regarded as being the most appropriate form of tenure for pastoral lands because:

(a) it offers graziers security of title to their lease while leaving the Crown with the power to periodically reappraise standards of land condition and management.

(b) provided there are no requirements to survey property boundaries, a relatively inexpensive way in which the Crown can meet grazier wishes for security of tenure.

Conversion to freehold title involves the Crown and grazier in considerable expense. The grazier would have to pay survey costs and the unimproved capital value of the land. The government would be obliged to incorporate many pastoral areas into Shires, requiring extra expenditure on local government from consolidated revenue. Given the considerable fluctuations in the value of pastoral properties there is no guarantee that a grazier would capture these extra costs on the sale of the property.

Further, the diversion of grazier resources into land transfers rather than property buildup or maintenance would be undesirable given the declining terms of trade and the adjustment problems currently facing the industry, and
(c) leasehold title gives government flexibility in dealing with the present (small) property size problem existing in the pastoral industry. When land is under leasehold title government has wide powers of intervention, such as the power to allocate vacant Crown land for property buildup, an action which is not possible for freeholdings.

3.7 Commonwealth Government influence on pastoral land use

The Commonwealth Government has limited constitutional powers in relation to pastoral land use or tenure. Through its fiscal policies, however, the Commonwealth has a considerable impact on pastoral land use. Indeed Mills (1982a p. 95) suggests that "...the planning of sound policy for pastoral lands depends...on...policies and decisions...of the Commonwealth".

With the benefit of hindsight, commonwealth taxing policies, in particular are suggested to have been a significant source of land degradation. Commonwealth sponsorship of closer settlement and land development schemes, drought assistance programmes and even taxation measures aimed at increasing soil conservation activities may have contributed to degradation.

Many of the above policies, particularly taxation, have their basis in considerations of equity and maximising community welfare. For instance, Commonwealth estate duties were originally intended to discourage large land holdings (Campbell 1982, p. 226).

The first Commonwealth policy to have an impact on pastoral lands was introduced in 1910, when a tax was imposed on the unimproved capital value of land worth more than five thousand pounds. Aimed particularly at absentee landowners this tax accounted for six per cent of Commonwealth revenue in 1910. The tax was also aimed at promoting the closer settlement of families on rural land, thus complementing the existing State land settlement policy.
The Commonwealth was an essential partner in the implementation of closer settlement schemes. In particular its financial support was required when large numbers of soldiers were settled in the pastoral zone after both World Wars. Young (1980) considers that the forced resumption of pastoral leases in New South Wales in the 1930's and 1940's to be a direct cause of some of the worst degradation in that State.

Commonwealth cereal grain policies have had at least two dramatic impacts on the New South Wales pastoral zone. First the introduction of minimum guaranteed prices, in the 1930's encouraged the expansion of wheat farming into the zone. Secondly, taxation concessions on land clearing and the lifting of wheat quotas in the 1970's saw the area of dry land cropping in New South Wales expand fivefold to 228,000 hectares by 1980, (WDSC 1984b, p.39). Most of these new wheat lands were located on fragile soils in regions where crops fail about twice in every five years.

Drought assistance schemes are thought to inhibit sound pastoral land management (WDSC, 1983 p.118), to sustain the least efficient enterprises, and to inhibit property buildup (Harrington et al. 1984, p.203).

Wilson and Harrington (1984 p.73) maintain that the crux of the range management problem is "...the variability of rainfall and the relatively fixed nature of flocks and herds*. Drought assistance schemes, as currently administered, are ad hoc and not aimed at efficient land use (Blyth and Kirby 1984). They encourage the retention of stock on properties at the beginning of droughts and the early restocking of land at the break of the same (WDSC 1983 p.119), both practices significantly increasing the risk of land degradation.

Wills (1985) suggests that soil conservation programmes, some of which are part-financed by the Commonwealth at concessional interest rates, may provide incentives for land degradation. Blyth and Kirby (1984) concur, noting that the 100% tax deductibility allowed for property level soil conservation programmes, only applies to soil
conservation works such as contour banking, and not changes in land management such as reductions in stocking rates. Reducing stocking rates may mean a lower income and less tax but the concession offered is only the marginal tax rate and not a full 100% rebate. As noted in the first chapter, about half the present pastoral land degradation could be repaired by changes in management practices only.

Other Commonwealth policies that may lead to pastoral land degradation include legislation on aboriginal land rights and the acquisition of land for defence purposes. These policies create uncertainty about the future distribution of land. Even though private land and pastoral leases may not be resumed in their entirety for these purposes, the passage of this complex legislation has created doubt in the pastoral industry about the way it will be administered in the future.

The positive role of the Commonwealth is most evident in its funding of research and inquiry. The survey work of the 1976 joint Commonwealth-State Soil Conservation Study, have identified some of the causes, and estimated the extent of land degradation in the pastoral zone.

Some commentators still see the Commonwealth role in reducing land degradation in terms of subsidies (WDSC 1984b, p.39). A more efficient role for the Commonwealth might be to encourage research into improved land management practices and more careful consideration for the environmental consequences of taxation and natural disaster policies.

3.8 Restatement of the problem

It is proposed that the current pastoral land degradation problem in Australia can be redefined into broad issues. The first concerns the land condition/property size legacy of closer settlement policy while the second is the definition of future desirable land management standards.
Within the pastoral zone, there exist a significant number of properties with both land degradation and property size problems that were induced many decades ago. The property size problem is considered to be both an important source of current degradation problems and a constraint to regeneration.

The second major issue is the impact of new administrative expectations of land management, on graziers. The new policy emphasis on land management rather than closer settlement and development is placing greater emphasis on the improvement of standards of land management by individual graziers.

The long term productivity of many rangelands in Australia is unknown and some recommendations for improved management can impose severe penalties on graziers. For instance, the WDSC found that, if the Soil Conservation Services "safe carrying capacities" were adopted, 20% of the Western Division livestock would have had to be sold, resulting in adverse social consequences (WDSC 1984a, p. 44).

The new thrust of land policy is into an area of most uncertain knowledge, where a diminishing number of graziers will come under increasing pressure, from a growing band of officials for continual improvement in land condition. Initially these pressures will probably result in graziers foregoing income as stocking rates are reduced. While, in most cases the long term productivity and incomes of graziers may increase, how long the transition will take in a highly variable climatic and economic environment is not clear.

The challenge for government in this new policy phase, is to ensure that its implementation does not result in land management costs that threaten the viability of the pastoral industry or result in more land degradation.
Table 3.4
State Lands Administration Staff Resources and Costs (1983/84)

<table>
<thead>
<tr>
<th>STATE</th>
<th>LAND ADMINISTRATION STAFF</th>
<th>COST</th>
<th>PASTORAL LEASES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crown Lands</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Registrar General</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surveyor General</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Valuer General</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specialist Pastoral Land Agencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Net Annual Revenue ($)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area of State (km²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area of Pastoral Leases (km²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number Pastoral Leases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rent From Pastoral Leases ($M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.A.</td>
<td>129</td>
<td>222</td>
<td>291</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
<td>898</td>
</tr>
<tr>
<td></td>
<td>-14m</td>
<td>984,000</td>
<td>422,000</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1982/83)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.S.W.</td>
<td>529</td>
<td>873</td>
<td>467</td>
</tr>
<tr>
<td></td>
<td>Separate Lands</td>
<td>49</td>
<td>2086</td>
</tr>
<tr>
<td></td>
<td>Western Lands Commission</td>
<td></td>
<td>+11m</td>
</tr>
<tr>
<td></td>
<td>802,000</td>
<td>304,000</td>
<td>7,637</td>
</tr>
<tr>
<td>QLD.</td>
<td>511</td>
<td>500+</td>
<td>307</td>
</tr>
<tr>
<td></td>
<td>Separate Department</td>
<td>40</td>
<td>1318+</td>
</tr>
<tr>
<td></td>
<td>Field Inspection(b)</td>
<td></td>
<td>-16m</td>
</tr>
<tr>
<td></td>
<td>Services</td>
<td></td>
<td>1,727,000</td>
</tr>
<tr>
<td></td>
<td>846,000(c)</td>
<td>1,778</td>
<td>1.3</td>
</tr>
<tr>
<td>W.A.</td>
<td>179</td>
<td>230(d)</td>
<td>458</td>
</tr>
<tr>
<td></td>
<td>Separate Department</td>
<td>16</td>
<td>1123+</td>
</tr>
<tr>
<td></td>
<td>Pastoral Board</td>
<td></td>
<td>-19m</td>
</tr>
<tr>
<td></td>
<td>2,526,000</td>
<td>953,000</td>
<td>617</td>
</tr>
<tr>
<td></td>
<td>(1982/83)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) The Department of Mapping and Surveying administers a number of special trust funds and the total net costs are estimated after extraction of trust fund management.
(b) Estimated pastoral staff in total field inspection service staff of 115.
(c) Not including grazing homestead perpetual leases (GHPL) of which there were 3,363 of total area 209,000 km². The GHPL is not officially classified as a pastoral lease though most are located in the pastoral zone of Queensland.
(d) Estimated (staff not given in annual report).
(e) All crown leases in western division.
(f) Absorbed into Department of Crown Lands and Surveys in 1984.

Data Sources: Annual Reports of the relevant Government Departments: 1982/83, 1983/84.
Chapter 4

METHODOLOGY

4.1 An Expert Systems Approach

The nature of this research project required that the methodology was simple to implement, could use uncertain knowledge and that the models developed could be readily validated by a range of experts in the field of pastoral production.

Research resources were very limited. The remote location of the study sites restricted the interaction time of researchers and experts. The only available quantitative research tool was a simple, computer based, pastoral property simulation model. Very limited knowledge about the linkages between the social and biological elements of pastoral production required that many complex phenomena were reduced to a few simple measures.

The methodology adopted in this study could be termed an expert systems approach. Experts include experienced graziers and research staff of the Pastoral Laboratory at Charleville. These experts were not able to specify the functional form of the relationships that link property management and land condition. On the basis of their experience these experts were able to criticise objectively models that attempt to simulate these relationships.

In this study the findings of expert enquiries into pastoral land tenure and administration were used to draw up an inventory of land tenure and administrative scenarios that may have an important effect on land condition. From that inventory a list of the most important scenarios were extracted for examination.
Using financial and animal production data supplied by the ABS and BAE a series of models were constructed to simulate the impact of property size and various management strategies on property performance.

The model was validated by experts who criticized the operating rules that made up the property models, the secondary data used and the results generated by the simulation. The models were modified till all the experts were satisfied with the simulations. The experts then suggested the land condition consequences of the various strategies studied. The estimations provided were taken as providing the best available knowledge about property management and land condition.

Management strategies and property sizes tested in the simulations were then compared with current land tenure and administrative regulations in order to test the hypothesis that present legal and administrative arrangements were a significant cause of land degradation.

The methodology was found to be an effective means of using experts and existing data sources to examine complex and uncertain relationships.

4.2 The Simulation Model

The simulation model used is a simple farm budgeting programme developed by the BAE to study the financial and physical performance of cattle stations in arid rangelands (Reeves et al, 1974) and extensively modified by staff of the CSIRO Division of Wildlife and Rangelands Research.

The model is wholly deterministic and hence the usefulness of the results are critically dependent on the relevance of the inbuilt management rules and the accuracy of the data supplied, especially seasonal conditions.
The model has been constructed assuming that:

(i) the property runs only one type of livestock, either sheep or cattle;
(ii) costs and prices are constant for all years;
(iii) land area is fixed;
(iv) the only factor causing variations in animal production and prices is seasonal condition;
(v) the property experiences only three types of season; good, average and drought;
(vi) property management can be fully described by the rules contained in the model and is constant;
(vii) the lessee has full initial equity in the property;
(viii) the property is run as a business partnership of husband and wife; and
(ix) property income is derived from livestock production and interest on readily redeemable cash investments.

It is suggested that the above assumptions are compatible with reality, except for the first two mentioned.

The Model runs only one type of livestock. Holmes (1985, pers.comm.) has pointed out the critical role that grazing sheep and cattle, together, has on higher productivity in the Charleville area of Queensland. Most pastoral properties run sheep and cattle.

Constant costs and prices. A critical reason for the continued survival of the pastoral industry is its ability to reduce costs, especially labour. Prices are still highly variable for the pastoral industry, despite the wool price support scheme.

Unfortunately the complexity of a mixed grazing enterprise could not be built into the model, and there is no real basis for predicting the movements of costs and prices for a long term production model. The most important driving force of livestock productivity, rainfall, is captured in the model.

The full list of input data required to run the model is given in Appendix E.
The model output consists of four statements. They are:

(a) herd composition and animal production,
(b) economic summary,
(c) frequency of survival, and
(d) main economic indicators.

The herd composition and animal production statement produces annual details of production for each of the age/sex classes of livestock and a calculation of net farm income. The economic summary produces an annual summary of livestock numbers, income, tax, cash balance, debt and equity. At the end of each simulation, the economic summary also provides average and discounted values for a range of animal production and economic variables.

The frequency statement lists the numbers of years the property survived as a pastoral business enterprise.

The main economic indicator statement provides a summary of

(a) average family income;
(b) average net farm income;
(c) the minimum number of livestock carried during each simulation;
(d) the total number of years of equity stress;
(e) the largest loan taken out by the property business; and
(f) the discounted net worth of the property business.

In this study the family (or operator of the property business) is paid an annual living allowance of $4,000 and 50% of any positive cash pool. In years when the property business is in debt, the family receives only $4,000. In years of zero debt and high profit the family income can be quite large. Average family income is the average income received over the total period simulated.

Net farm income is the sum of income from livestock operations, interest on cash investments less fixed and variable costs, depreciation and any interest on loans. Average net farm income is the average of net farm income received over the total period of simulation.
Equity stress, is defined as occurring when grazier equity in the property business falls below 80%. Mills (1982b, p.5.34) found that the threshold for financial stress among south-west Queensland graziers was a level of equity below 80%. BAE data for the pastoral zone in all states indicates that almost all pastoral property equity levels are above 80% in all but the worst drought years.

Discounted net worth is that proportion of total assets wholly owned by the family partnership discounted at a (real) rate of three per cent.

4.3 The Criteria of Survival and Viability

The study assumes that continuing land degradation is incompatable with very long term survival of a pastoral enterprise, and that persistent low standards of living are correlated with the adoption of exploitative land management practices.

Survival is defined as the continuous operation of the property business model for 100 years. Bankruptcy before a century of operations is associated with exploitative management, the fewer the years of operation, the more exploitative the management strategy.

A viable property business is able to provide a family with at least a reasonable standard of living. Standards of living increase with income, property business value and freedom from debt. The lower the standard of living the more likely that property management strategies will be exploitative.

In this study the criteria of survival and viability are considered together. Optimum land management is only associated with survival and at least a reasonable standard of living.

The two criteria have been constant themes in studies of grazier management objectives. For instance Childs (1977) reported that even the most pessimistic of south-west Queensland graziers "...anticipating the future". Holmes (1980) found that graziers from the same area gave the highest priority in management to securing future income.
In this study the time frame of 100 years was considered to represent an unequivocal test of a management strategy because:

(i) it captures all the rare episodic natural events such as extreme drought which provide a severe test of management strategies.

(ii) Howlett and Wonder (1975) assumed 20 years to be a "...reasonable period for the 'management life' of a property". Many pastoral properties, however have been held by families for much longer than 20 years. The long working life of many pastoral improvements means that investments such as waters and fencing can predetermine the limits to management for many decades.

4.4 Scenarios for Investigation

The major variables affecting property survival, viability and land condition were identified as:

(a) land tenure,
(b) restrictions on property size,
(c) stocking rates,
(d) pastoral lease rents,
(e) vermin control,
(f) land administration,
(g) public access,
(h) types of ownership,
(i) land dealings,
(j) development investment, and
(k) compensation for lease resumption.
The four variables which could be readily tested in the simulation model and on which there existed an array of supporting secondary data were:

(i) property size,
(ii) stocking rate,
(iii) types of ownership, and
(iv) drought assistance schemes.

Many of the variables which could not be tested using the simulation model could have their impact inferred from analysis of the model output. For instance rents and vermin control could be considered as components of fixed costs. Other important variables such as land tenure have been examined in Chapter 3.

4.4.1 Property size

Property size is a central element in the closer settlement thrust of current legislation, and a critical determinant of pastoral property viability. Property size is also at the heart of any debate on the 'fairness' of land distribution.

In this study the three property sizes considered are 5,000, 10,000 and 15,000 sheep equivalents, in most years. Justification for the three property sizes follows;

5,000 sheep

A pastoral property carrying 5,000 sheep approximates the average size of pastoral properties and the number of sheep that is managed by a resident family without employing permanent labour in the pastoral zone (Table 4.1).
10,000 sheep

In WA new pastoral lessees are discouraged from holding less than 10,000 sheep as the Government considers this number essential for long term viability. Hassall and Associates (1982, p. 20) showed that economics of scale still existed in Western NSW at a flock size of 7-9,000 sheep.

15,000 sheep

Johnson (1985) claims there is a consensus among Australian pastoral land administrators and land users that a viable living area in the pastoral zone is now about 15,000 sheep units.

The above three property sizes not only cover a range of estimates of viability but they also range over the limits to property size enforced, until recently in Queensland and New South Wales.
Table 4.1

Average Property Size and Labour input in the Australian Pastoral Zone (1980/81)

<table>
<thead>
<tr>
<th>Item</th>
<th>New South Wales</th>
<th>Queensland</th>
<th>South Australia</th>
<th>Western Australia</th>
<th>Total Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Livestock held (30/6/81)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep flock</td>
<td>4200('n)</td>
<td>6100</td>
<td>5300</td>
<td>6300</td>
<td>5300</td>
</tr>
<tr>
<td>Cattle herd</td>
<td>87</td>
<td>444</td>
<td>42</td>
<td>155</td>
<td>229</td>
</tr>
<tr>
<td>b) Total farm labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(work weeks)</td>
<td>127</td>
<td>131</td>
<td>130</td>
<td>142</td>
<td>130</td>
</tr>
<tr>
<td>Hired labour</td>
<td>19('b)</td>
<td>52</td>
<td>52('b)</td>
<td>47</td>
<td>39</td>
</tr>
<tr>
<td>Operator, partner and family labour</td>
<td>99</td>
<td>78</td>
<td>75</td>
<td>95</td>
<td>87</td>
</tr>
</tbody>
</table>

Note (a) Hassall and Associates (1982, p. 9) found that median property size in the Western Division was 3,500 sheep, while 68% of all properties carried less than 5,000 sheep.
(b) Evidence from the NSW and SA Pastoral Inspector study (1985) unpublished, and from Holmes (1985) pers. comm., suggests that most owner operators can efficiently managed about 6,000 sheep by themselves with minimal seasonal labour input.

4.4.2 Stocking Rates

Exploitative management occurs when the distribution and numbers of stock begin to accelerate losses in long term carrying capacity. This acceleration of naturally occurring periodic losses in productivity is the essence of land degradation.

Conservation management is the ability to manipulate grazing pressure so that long term carrying capacity is maintained or increased.

Conservative management is associated with frequent adjustments to stock numbers through sales, especially at the beginning of drought, and relatively low stocking rates. Consistently high average productivity per sheep can only be achieved under conservative management, which is also generally associated with better long term economic performance of pastoral properties.

Conservative and exploitative management strategies are simulated in this study through manipulation of;

1. drought grazing capacities;
2. the increases in stock numbers allowed in good years;
3. the wool cuts and lambing percentages; and
4. stock mortality rates.

4.4.3 Corporate versus Family Ownership

In this study the type of ownership of a property is simulated as two flow rates of dividends from the business. Corporations are assumed to expect a constant and real return on capital invested while the family is more willing to accept variations of return.

In the model the family is given a living allowance of $4,000 per year and 50 per cent of any positive cash pool, while the corporation is given a constant return on capital.
The living allowance of $4,000 per year has been suggested by Holmes (1985 pers. comm.) as the minimum cash living allowance for a grazier family in the Charleville area. With only $4,000 of disposable income the family would rarely travel off the property and would not purchase any consumer durables.

4.4.4. **Drought Assistance Schemes**

The Commonwealth and State Governments administer various schemes aimed at alleviating the hardship experienced in droughts and to enable a low-cost industry to hold resources necessary for its long term development (WDSC, 1984 c p. 117).

While these schemes reduce variable costs and help maintain income levels, some evidence suggests that they also encourage overstocking. The present administration of drought assistance schemes "...encourage the poor managers and disadvantages the good managers". (ibid, p. 121)

By varying the drought variable costs in the model it is proposed to test the hypothesis that "...The complete removal of government drought assistance would facilitate the process of property enlargement as small producers were forced out by market forces". (ibid)

4.5 **Sources of Data**

4.5.1 **Secondary Data**

The principal sources of secondary data for the simulation model were the BAE Agriculture and Grazing Industry Surveys ABS publications derived from the annual agricultural census, and the Hassall Report, (Hassall and Associates, 1982).
4.5.2. **Primary Data**

The only primary data used in the study was obtained from field staff of the Queensland Department of Primary Industries, Charleville.

This data consisted of estimates of the production parameters associated with land condition, the impacts of various regeneration strategies on land condition, and descriptions of common management practices.

4.6 **Study Sites**

The study sites initially chosen for research were the Charleville, Broken Hill and Bourke districts, shown on Figure 4.1.

All three districts are;

(a) found within those portions of the Pastoral Zone which have been closely researched with respect to both biological and socio-economic parameters, so that the data base would be as large as possible.

(b) cover the major vegetation types and rainfall patterns of the Zone. Charleville is located in the predominantly summer rainfall mulga country, Bourke in the arid, uniform mulga country and Broken Hill in the arid, uniform rainfall saltbush bluebush country.

(c) within a reasonable distance of the University of New England.

It was important that sites be serviced by expert and available pastoral research staff. Only Charleville had a large and very experienced expert resource base.

Time constraints resulted in the research team visiting only the Charleville study site. Simulation models were developed for Broken Hill but not validated. The Bourke simulations were not completed.
Figure 4.1 The study area.

- Broken Hill 23°S