SE4.2

FOREST GRAZING

QUEENSLAND CRA/RFA STEERING COMMITTEE

SE4.2

FOREST GRAZING

QUEENSLAND CRA/RFA STEERING COMMITTEE

For more information contact:

Regional Forest Assessments, Department of Natural Resources

Block C, 80 Meiers Road
INDOOROOPILLY QLD 4068

phone: 07 3896 9836
fax: 07 3896 9858

Forests Taskforce, Department of Prime Minister and Cabinet

3–5 National Circuit
BARTON ACT 2600

phone: 02 6271 5181
fax: 02 6271 5511

This project has been jointly funded by the Queensland and Commonwealth Governments. The work undertaken within this project has been managed by the joint Queensland / Commonwealth CRA RFA Steering Committee and overseen by the Social and Economic Technical Committee.

ACKNOWLEDGEMENTS

Groups whose contributions to this report are gratefully acknowledged are:

Representatives and members of the Cattlemen's Union and the United Graziers' Association who assisted in estimating carry capacities.

Qld Department of Primary Industries beef husbandry officers who assisted with the estimation of carry capacities.

CONTENTS

TABLES

SUMMARY

This report has been prepared for the joint Commonwealth/State Steering Committee which oversees the Comprehensive Regional Assessment (CRA) of forests in the South East Queensland (SEQ) Regional Forest Agreement (RFA) region. The CRA provides the scientific basis on which the State and Commonwealth governments will sign a RFA for the forests of the SEQ region. This agreement will determine the future of the region's forests, providing a balance between conservation and ecologically sustainable use of forest resources.

The forest grazing project was undertaken to describe the features of forest grazing, provide sufficient data to summarise its economic significance, and provide a basis for estimation of the opportunity cost of land use changes resulting from the RFA.

The project focused on the tenure types of State forests, timber reserves and State reserves in the SEQ RFA region. Cattle are currently grazed on 49 per cent of these tenure types in the SEQ RFA region, either under a Stock Grazing Permit (SGP) or a Term Lease. SGPs are issued by the Department of Primary Industries (DPI) Forestry on State forests for a period not exceeding seven years and provide greater management control than Term Leases. Term Leases are issued for up to 30 years by the Department of Natural Resources (DNR) over all types of Crown land, although the consent of DPI Forestry is required when the tenure involved is either State forest or timber reserve.

Graziers use their forest leases in a variety of ways, from fattening of steers in the best forest grazing country through to simply using it as a natural property boundary where lack of water restricts cattle access. The forest resource is an integral part of many beef cattle management systems in this region, providing a significant element of management flexibility. Graziers fear reduced viability without forest grazing leases or permits.

Stock number estimates for SEQ forests were not readily available which led to a method being developed to determine cattle carrying capacities in the forested land under consideration. Members of the Cattlemen's Union (CU) and the United Graziers' Association (UGA), in cooperation with DNR, settled on using three variables: rainfall; topography; and forest canopy density, to stratify SEQ into 48 classes, and ascribed each a carrying capacity. These carrying capacities ranged from a high of four hectares per head to 73 hectares per head, with some classes considered unsuitable for grazing. Paucity of data caused by a lack of relevant research made it necessary to use expert opinion in estimating forest grazing carrying capacities. The implications on the accuracy of the results of using such a subjective method have not been investigated.

Generally, higher canopy densities resulted in lower carrying capacities, regardless of rainfall or topography. The best grazing was found on creek flats, and on ridge tops, regardless of rainfall and canopy density. Forests in the medium rainfall belt (950 mm–1450 mm) were considered capable of carrying more cattle than either the higher or lower rainfall forests. The current situation was estimated by examining only current SGPs and Term Leases over State forests, timber reserves and State reserves. The current forest grazing herd was estimated at 43 000 head grazed over a total of 412 000 hectares of native forest.

To assess the contribution of forest grazing to the SEQ economy, the 14 graziers at the workshop were asked to complete a survey form that aimed to extract the costs and returns attributable to their operations on leased forest land. The average operating profit from forest grazing in SEQ was estimated to be $33 per head of cattle per annum (1996/97). The economic value of forest grazing in SEQ calculated at current permit and lease levels was $1.4 million for 1996/97. A net present

value of $16.5 million for forest grazing over the 20 year period of the SEQ RFA was calculated using a discount rate of six per cent.

1. INTRODUCTION

1.1 BACKGROUND

Forest grazing in the SEQ region has been encouraged from the earliest days of European settlement. It has been the management policy and philosophy of the Queensland Department of Primary Industries (DPI) that forest reserves be utilised for maximum benefit to the State. Forest grazing remains an important facet of this paradigm.

The forest is usually grazed in conjunction with pasture on freehold or other leasehold land, although it is generally much less productive than the latter. Perhaps as a consequence, the forest grazing sector has received very little attention from researchers. The dearth of independent studies made the commissioning of this section of project SE 4.2 essential to ascertain the contribution of the industry to society and its possible impact upon the natural environment.

1.2 FOREST GRAZING INDUSTRY PROJECT OBJECTIVE

The objective of this project is to describe the features of forest grazing, provide sufficient data to summarise its economic significance, and provide a basis for estimation of the opportunity cost of land use changes. This study will provide base data for the option development phase of the SEQ RFA.

1.3 PROJECT SPECIFICATIONS

The project specifications are contained in Appendix 1.1.

1.4 PROJECT DEFINITIONS

The Forest Grazing Industry
For the purpose of this report, the Department of Natural Resources (DNR) has chosen to only assess those grazing leases and permits in native forest on State forests, timber reserves and State reserves. This is because these tenures will be the focus of any comprehensive and adequate reserve system.

Forest
This project examines Crown native forests only and follows the definition of forest given in the National Forest Policy Statement (1992), where canopy density exceeds 30 per cent. However it was necessary to value all areas of State forests, timber reserves and State reserves regardless of canopy density, because land put forward for the reserve system may include areas with current

SGPs and Term Leases with a canopy density below 30 per cent. Therefore, this report includes valuation of areas that normally would not be considered as forest.

Stock Grazing Permits (SGPs)
Within the tenure types considered in this report, SGPs are issued only for cattle grazing on State forests. They are issued by DPI–Forestry for a period not exceeding seven years.

SGPs also exist over areas of some national parks, however, in accordance with the *Nature Conservation Act (1992)*, all of these are non-renewable. Most of these SGPs are over land recently acquired by national parks from private landholders or other State Government management agencies, for example, DPI–Forestry.

Term Lease
This is a tenure type introduced by the Land Act 1994 to replace leases with a term (other than perpetual). Term Leases are issued by DNR for a variety of purposes, including grazing, agriculture, pastoral, tourism, telecommunications, business and residential. Only those relevant to the forest grazing industry, as defined above, are considered herein.

Carrying Capacity
Defines the number of hectares required to support a single head of cattle, where one head of cattle is an adult equivalent. The carrying capacity of native forests is low relative to cleared pasture land in SEQ, with several hectares required to support one head of cattle.

Adult Equivalent (AE)
Cattle carrying capacities are calculated on the basis of adult equivalents. An adult equivalent is a 440 kg male or female beast.

Variable Costs
Costs that change as the level of production varies.

Fixed Costs
Costs that, within limits, do not change as the level of production varies.

Net Present Value
The present value of a cash flow.

Operating Profit
Income less variable and fixed costs, taken for the purposes of this report only from forest grazing section of the enterprise.

2.0 INDUSTRY DESCRIPTION

With the exception of management guidelines produced by various government bodies and applicable legislation, a literature search highlighted a lack of historical and current information on forest grazing enterprises in SEQ, hence limiting the scope of this chapter. Consequently, sections 2.2 and 2.3 drew on outcomes from a workshop with SEQ forest graziers (described in Chapter 4), while section 2.5 includes some anecdotal information and the results of spatial queries from a database produced by DNR. The process by which this spatial database was constructed is summarised in appendix 2.1.

2.1 HISTORICAL DEVELOPMENT OF THE FOREST GRAZING INDUSTRY

Beef cattle arrived in Queensland in the first half of the 19th century with the granting of pastoral runs. Forest grazing has historically been an important component of the grazing industry in Queensland, as much of the leased pastoral runs were forested and many remain in that condition. Today, large areas within the forested Crown estate of the SEQ RFA region are under some kind of grazing lease or permit. This land may be suitable for a range of undertakings, including breeding, growing and fattening, depending on the structure and quality of the vegetation.

2.2 PRODUCTS AND USES

Fattened cattle are the final product of grazing. However, forest grazing is mainly used for intermediate products including breeding, store cattle (cattle bought or bred for fattening) and dry cows.

In the majority of cases, final products cannot be exclusively attributed to forest grazing. This is because the forest is a low productivity component of many enterprises and it is unusual for cattle to be reared entirely within forest country. The forest resource is an integral part of many beef cattle management systems in this region, providing a significant element of management flexibility.

2.3 REGIONAL DEPENDENCE OF GRAZIERS UPON THE FOREST RESOURCE

Native forest grazing often takes place in conjunction with freehold and other leasehold land, with the two areas offering complementary grazing opportunities. Said's (1992) study of the land use changes in the Conondale Range exemplifies this point. He reported that SGP areas were used to run cows and calves, and also for winter grazing when poor growing conditions diminished the quality of improved pasture. SGPs may also be managed as independent operations, although this is

thought to be uncommon.

ACIL (1984) reports similar complementary use of the river red gum forests along the Murray River. The lower stocking rates on home properties that have access to forest grazing permits, facilitated increased farm production quantity and/or quality. All grazed forest areas described in ACIL (1984) increased farm sustainable carrying capacity.

While the productivity of grazing in forest is not comparable to that of improved pastures, graziers see forest grazing as an essential component of their grazing management. Information about this dependence on the forest is scant, however graziers are concerned that without forest access enterprise viability will be reduced. This issue will be further discussed in section 6.1.2 where information gained from consulting graziers who operate forest leases or permits is presented.

2.4 LEGISLATION AND LAND TENURE

2.4.1 Legislation for State Forests, Timber Reserves and State Reserves

The major legislation relating to the grazing industry in State forests, timber reserves and State reserves are the *Forestry Act 1959* and the *Land Act 1994*. The *Forestry Act 1959* provides for management of State forests with due regard to the benefits of permitting grazing in the area. Sections 35 and 36 of the *Forestry Act 1959* provide for SGPs to be granted on State forests for a fixed term not exceeding seven years and for Term Leases (formerly known as Special Leases) to be granted under the *Land Act 1994* within any State forest or timber reserve. The *Land Act 1994* provides for the issue of Term Leases, which generally do not exceed 30 years, over any crown land, including State reserves and any land reserved and set aside for public purposes.

DPI–Forestry staff are responsible for the administration and management of SGPs on State forests. Term Leases are issued by DNR over State forests, timber reserves and State reserves, although subject to DPI consent on the former two tenures.

2.4.2 Land Tenure

The SEQ RFA region is divided into the tenure classes summarised by Table 2.1. This report is concerned only with State forests, timber reserves and State reserves. These tenures comprise approximately 16 per cent (990 000 ha) of the total area of the SEQ RFA region. This reduces to 842 000 hectares, when plantations are excluded.

Table 2.1 Tenure Classes in SEQ RFA Region*

Tenure	Area (ha)	% of SEQ
Freehold	4 253 583	69.78
State forest	887 837	14.56
State reserve	78 597	1.29
Timber reserve	23 992	0.39
National park	322 672	5.29
National park (proposed)	86 067	1.41
Other Crown land	414 978	6.81
Unclassified	28 150	0.46
TOTAL SEQ	6 095 875	100.00

Source: Land tenure categories derived from the Digital Cadastral Database (1997)

Dedicated roads have been dissolved into the surrounding tenure classes of Table 2.1. This will overestimate tenure areas, especially freehold, which is likely to be overestimated by the greatest factor.

2.5 THE CURRENT STATUS OF FOREST GRAZING

While DPI–Forestry still collects *licensed* carrying capacity information on SGPs, there currently exists no data on the *actual* extent to which the forest is utilised for grazing. Both present and potential carrying capacity are utilised as the basis for determining unimproved value, hence rents for Term Leases. However, this information is not readily accessible. Conflicting anecdotal information ranges from under utilisation to unsuitably high overuse. Either extreme (and anything in between) may well be true for specific locations at any given time. However, grazing pressure on forested land varies throughout the year, so occasionally higher stock numbers than the licensed figure may be encountered for short periods, even if the actual yearly average stock numbers are below the licensed ones.

According to information available to DNR, around 49 per cent of State forests, timber reserves and State reserves (not including plantations) in SEQ are currently under SGPs or Term Leases likely to be used for cattle grazing (table 2.2).

Table 2.2 Grazing in Native Vegetation of SEQ on State Forests, Timber Reserves and State Reserves (1997)

Tenure	Total native vegetation by tenure type (ha)*	SGPs (ha)	Term Leases# (ha)	Total leased (ha)	% Leased
State forest	739 859	212 247	179 491	391 738	53.0
Timber reserve	23 992	–	18 370	18 370	76.6
State reserve	78 456	–	1 014	1 014	0.01
Total	**842 307**	**212 247**	**198 875**	**411 122**	**48.80**

Source: Tenure – Lease Type – Forest Cover Spatial layer. See Appendix 2.1.
*Native vegetation is assumed to be all land in these tenure classes that is not forest plantation.
Term Leases have been filtered to remove leases of less than 100 hectares.

2.5.1 Tenure and Lease – Spatial Mapping (Map 1)

Map 1 displays the locations of the current SGPs and Term Leases on State forests, timber reserves and State reserves in SEQ. To produce the map, Term Leases on State forests, timber reserves and

State reserves that were less than 100 hectares in size were filtered as they may be issued for purposes other than grazing.

Other Crown land (OCL) and national parks were included on the map to show all State owned land. Only OCL was filtered for forest canopy density. This filtering occurred to exclude areas of below 20 per cent canopy cover. The data sources and methods used in the generation of this map are explained fully in Appendix 2.1, with metadata in Appendix A.

3.0 FOREST MANAGEMENT PRACTICES AND ENVIRONMENTAL CONSIDERATIONS

The range of government management guidelines found during the literature search on forest grazing in SEQ, proved sufficient for the description of property rights allocation (section 3.1) and an outline of departmental and grazier management practices (section 3.2). The absence of environmental assessments of forest grazing in SEQ led to a broader literature search including studies from all over Australia. The results are presented in section 3.3.

3.1 ALLOCATION OF PROPERTY RIGHTS

3.1.1 Licensing Options – Selection and Renewal

Where an area of forest has been identified as suitable for grazing, the most appropriate grazing license must be determined by the State.

Stock Grazing Permits (SGPs)

DPI encourages grazing on State forest under SGPs in line with the objectives of multiple use management for maximum utilisation of the land resource (DPI 1994). It has generally been perceived that such use is to the joint benefit of the relevant land management department and the adjoining landholders. Forest grazing provides the department with a management tool (for example, some degree of fire protection) and the landholders a means to increase their income.

Under existing policy, areas of State forest most suitable for SGPs are those where DPI Forestry can exercise close management control. This enables forest staff to deal directly with the permittee and allows for stock numbers to be varied as forest management circumstances or objectives change. According to DPI (1994), SGPs are issued for a fixed term not exceeding seven years and include:

- areas which contain established plantations
- areas required for plantation establishment within the next 10 years
- coastal hardwood areas under intensive management

- State forests requiring flexibility with regards to grazing management.

In general, where a SGP has expired, a further permit will be offered non competitively to the former permittee. New SGP areas are auctioned competitively, unless there are strong management or legal reasons for not doing so. For example, lack of water or access points may restrict sales to adjoining landholders.

De-stocking and Cancellation Due to Overgrazing

If a forest officer discovers more stock in a forest than allowed under the permit conditions, the permittee shall, within a specified time period, remove all cattle in excess of the stipulated capacity. If, in the opinion of the forest officer, grazing on the permit area causes or is likely to cause damage to the forest environment, the SGP can be cancelled by notice in writing to the permittee. No compensation is payable as a result of such action (DPI 1994).

Term Leases

Term Leases constitute the major lease type issued on State forests, timber reserves and State reserves, and are subject to general conditions specific to the lease and rarely exceed 30 years in duration.

Section 214 of the *Land Act 1994* states if the Minister is of the opinion that the lessee is using the lease:

- beyond its capability for sustainable production
- in a way not fulfilling the lessee's responsibility for a duty of care of the land
- in a way likely to cause, or has caused permanent, or serious degradation to the land.

The Minister can recommend remedial action. If the lessee does not carry out action stated in the time specified, the lease may be cancelled.

Leases can be resumed (terminated) by order in council (s216). In this case, every person who has lawful interest in the resumed lease has right to claim compensation as prescribed by the *Acquisition of Land Act 1967*. The lessee has the right to appeal the order in council, which will be heard in Court (s222). If the appeal fails, the lessee is only entitled to compensation for costs and reasonable expenses incurred in relation to the resumption before it was revoked.

Some leases have a condition written into them that the Minister may resume them. In such cases, only compensation for installed improvements is payable.

Under Section 234 of the *Land Act 1994* a lease may be forfeited if the lessee:

- defaults in the payment of an amount payable to the State under this Act for the lease
- breaches a condition of the lease
- contravenes a provision of this Act in relation to the lease
- acquired the lease by fraud.

Where a Term Lease has expired, a further lease may be offered non competitively to the former lessee provided conditions of the lease have not been breached. Where greater management control is desired, DPI may not agree to the renewal of a Term Lease on State forests. In such cases a SGP may be offered in place of the original Term Lease. Prior to renewing a lease, the Minister must

consider a range of issues to ensure the land could not be better utilised. These issues are outlined further in Appendix 3.1

Leases and Permits on Other Crown Land

A variety of leases and permits are available on other classes of Crown land. Since this project is restricted to State forests, timber reserves and State reserves, these other types will not be described here. However, they are listed within Appendix 3.2 for reference.

Transfer of a Lease

The most common means of opting out of a lease is for the lessee to transfer SGPs or Term Leases to other parties. In this case, the lessee may set any value on transfer. DNR and DPI Forestry do not levy any transfer fees. A lessee may also choose to surrender a lease, or part there of, to the relevant organisation that manages the lease area. Under the *Land Act 1994*, the lease is subsequently offered to others under a priority system, or may be open to public offers at auction.

3.1.2 Determination of Stock Carrying Capacity

Stock Grazing Permits

The broad guidelines used by DPI to determine stock carrying capacity for SGPs on native forests are shown in Table 3.1. Stock carrying capacity is defined by DPI as the average number of beasts that an area can support in average seasonal conditions. A beast is defined as a cow of breeding age or its adult equivalent. These figures are only indicative and may be modified to suit local conditions based on advice from DPI Agriculture–Production section. Since the carrying capacity may vary due to changing area or quality of grazing, annual reassessments are conducted by DPI–Forestry officers. Plantation carrying capacities are distinct from those presented below.

Table 3.1 Guildelines for the Determination of Stock Carrying Capacity on SGPs in Queensland Native Forests.

Native forest areas	Carrying capacity (adult equivalent/ha/year)	
>750 mm p.a.	rainforest	1/25 ha plus
>750 mm p.a.	well grassed & open forest	1/5 ha to 1/10 ha
>750 mm p.a.	grassy open forest ridges & poorly grassed gullies	1/11 ha to 1/15 ha
500–750 mm	poor open forest	1/16 ha to 1/25 ha
<500 mm	very poor open forest	1/26 ha plus

Source: DPI (1994)

Term Leases

Term Leases have never had a licensed carrying capacity associated with them (Girdwood, D. 1998, pers. comm., 9 June)[1]. Stock numbers are restricted on term leases by the conditions of Section 214 of the *Land Act (1994)* (see 3.1.1 above). However, until the late 1980s, stock carrying capacities were explicitly assessed and documented for term leases when determining rents. The assessments were not necessarily an accurate reflection of the actual utilisation of the forest by the graziers, only the land valuer's estimate of the sustainable carrying capacity. The method for rental determination has since changed (see below), and carrying capacity estimates are no longer available.

[1] David Girdwood – DNR Valuations

3.1.3 Determination of Rental

Stock Grazing Permits

The condition under which the SGP was acquired determines its category for rental calculation. Those obtained non-competitively incur the base rental system. This is calculated on the basis of site productivity, employing a combination of permit area, stock carrying capacity and pasture quality in its derivation (DPI 1994). Two pasture types are recognised – improved and standard. Improved pasture areas are those which have been sown, for example with, couch grass or legumes (generally plantation sites), while standard sites are those areas which are not improved.

Conversely, rentals for competitive acquisitions are initially determined by the auction. The auction price is then the basis for annual rent, which is then indexed by the annual movements of the Cattle Market Index (CMI), in combination with any modification of stock carrying capacity.

Term Leases

The rental determination method used until the end of the 1980s, which was based on the carrying capacity estimates of land valuers, was superseded by the recommendations of Wolfe (1990). The adoption of a more market driven rental system was among these recommendations. Consequently, DNR has implemented a rental valuation method that is based on the unimproved value of the leased land. This value is related to proven productive capacity, and although this is a function of carrying capacity, the latter is no longer an explicit input into the rental determination (Girdwood, D. 1998, pers. comm. 9 June)[2].

The rent for new Term Leases is calculated at 0.8 per cent of the unimproved value of the lease area (Queensland Government 1997). The evaluations are undertaken by DNR and reviewed annually. Rentals for leases issued prior to 1/7/93 may vary between 1.1 per cent and 2 per cent of the unimproved value, with the exact percentage value determined by the Minister.

3.2 FOREST GRAZING MANAGEMENT PRACTICES

3.2.1 Stock Grazing Permits

Departmental Administration

The grazing of goats is not permitted and sheep are allowed only if the District Forester perceives their environmental impact to be within acceptable limits judged on the basis of sustainability. Any construction of improvements, cutting of timber, or burning within the permit area must be approved by the District Forester and DPI Forestry reserves the right to alter the carrying capacity of SGPs to meet other objectives. In addition, there are no restrictions on DPI Forestry operations, such as harvesting and burning, on land covered by SGPs (DPI 1994). DPI Forestry has the power to exclude grazing for timber management purposes, such as promoting regeneration.

Grazier Management

There are several techniques forest graziers can employ to improve the quantity and quality of cattle that can be run in the forest. Many of these techniques are subject to constraints that are written into

[2] David Girdwood – DNR Valuations

the terms of the SGP and aimed at ensuring compatibility with other forest uses and values. Some are outlined below.

Fences, Gates and Grids – These improvements can restrict access of cattle to sensitive environments and allow increased spatial management of the herd. They should be constructed and maintained by the permittee to meet all requirements laid down by the Local Government Authorities and be acceptable to DPI Forestry. They must be kept in a stock proof condition.

Tree Clearing – By allowing greater sunlight penetration and reducing competition for moisture and nutrients, tree clearing can increase pasture production and therefore carrying capacity. Clearing of trees for any purpose demands the consent of DPI Forestry. Clearing for fence line requirements must be kept to a minimum with a maximum width of four metres (DPI 1994).

This should not be confused with silvicultural treatments, such as thinning. In some leased country, DPI Forestry has collaborated with graziers to thin the forest of unmerchantable trees to enhance the growth of the higher quality stems.

Burning – Burning of the forest provides the cattle with "new pick" and, for a time, reduces competition between the palatable grass species and the woody shrubs of the forest. The permittee is obligated to seek permission from DPI Forestry before undertaking any burning operations.

Feral Animal Control – Graziers carry out feral animal control within the guidelines established by the relevant land management authority. DPI Forestry may stipulate laying of poison baits as a condition of the lease, although this is usually restricted to plantation areas.

Noxious Plants – The permittee is required to maintain the area free from infestation of noxious plants (DPI 1994). Graziers benefit because often these plants are non-palatable, or even poisonous.

3.2.2 Term Leases

Departmental Administration

DNR has the responsibility to ensure that the forest is properly and effectively managed by the lessee and that the community purpose of State reserves for which the land was dedicated, or the multiple use capacity of State forests and timber reserves is not diminished.

Grazier Management

Responsibilities of lessees are similar to SGP holders. A Term Lease does not give the holder the power to remove trees without a tree clearing permit. They must care for the land and protect, so far as reasonable, any improvements on the land. Like SGPs, noxious plants must be controlled by the lessee (Queensland Government 1995).

3.2.3 Grazing Code of Practice

Although it has not yet progressed beyond a discussion paper, the Grazing Code of Practice is expected to affect grazier management in the future. Indications are that graziers will have to abide by some new conditions, possibly including tighter restrictions on fire regimes and the stocking of forests that could provide refuge for endangered species. Until the Code is officially introduced, the North Coast District of DNR will be enforcing its own Draft Grazing Policy and Guidelines. There is no equivalent draft for the forests of SEQ.

3.3 IMPACTS OF FOREST GRAZING AND ASSOCIATED MANAGEMENT UPON THE NATIVE BIOTA

Against the backdrop of dynamic change that is characteristic of the subtropical forests of SEQ, monitoring the environmental impact of forest grazing is difficult, especially given the industry's long history. While there have been studies completed on the ecological impacts of grazing in other native environments, such as semi-arid rangelands (Hodgins and Rogers 1997; Leigh *et. al.* 1968 cited in Christensen 1995), impacts on forests have received little attention. Apparently, there have been no studies on the environmental impacts of cattle grazing in native forests within the SEQ region.

Most of the available Australian literature is from the southern states and this largely concerns sheep. Therefore, what follows should be read with the understanding that differences in species, climate, soils, topography and grazier management will preclude some conclusions of this research from being applicable to SEQ. Nevertheless, these papers are the best source of information given the absence of local research. The purpose of this section is merely to outline concerns and opportunities. More detailed analysis can be found in other documents of the SEQ RFA (see DNR *et. al.* 1998).

3.3.1 Possible Detrimental Impacts

While most of the forest area in SEQ is only lightly grazed compared to non-forested land, cattle tend to preferentially graze palatable species (selective species grazing) in areas with high concentrations of such species (selective area grazing). Therefore, serious impacts are likely around stock congregation points, such as water courses, even at conservative stocking rates (Hodgins and Rogers 1997). Anecdotal evidence from forest managers and research in other ecosystems suggest grazing by cattle may have a significant effect on the forest ecology of SEQ.

Forest grazing and associated management can impact upon the environment in the following ways:

- floristic composition and structure
- fire regime
- faunal species distribution and abundance
- soil physical and chemical properties.

Cattle grazing management may also affect the aquatic environment within forest ecosystems directly and indirectly. Where cattle grazing is seasonal, the impacts could be exacerbated, especially if forest grazing is concentrated during dry times, or stock numbers are high for short periods.

Floristic Composition and Structure

Grazier management can include thinning of vegetation, especially trees, to provide better herbage for their stock. On the land tenures assessed in this report, thinning is usually carried out in association with DPI Forestry such that growth of preferred species is enhanced. This has the effect of reducing species and structural diversity and may be detrimental to forest flora and fauna.

The cattle themselves may alter the floristic composition of the understorey, through selectively browsing the more palatable plants and reducing their regenerative capacity, resulting in their decline. This process, known as retrogressive succession, results in unpalatable species being

favoured at the expense of the more palatable species. Cattle can also damage flora by trampling or rubbing them.

Native species richness and diversity has been significantly reduced by grazing in southern Australia, albeit by sheep in the majority of cases (Pettit *et. al.* 1995; Skillen 1978). Research has shown that the successful regeneration of forest trees has been reduced, or prevented by cattle (Roberts undated) and sheep (Bryant 1971) grazing. Cattle have contributed to the decline of the sugarwood (*Myoporum platycarpum*) woodlands of north western Victoria through preventing regeneration of understorey and overstorey species, which has led to their replacement by exotic species (Westbrooke 1992).

Observations of Roberts (undated) in Queensland and Skillen (1978) in Western Australia, suggest that forests that have been grazed for long periods contain more exotic flora than ungrazed forests. It would appear that the presence of grazing can override edaphic, topographic, fire history and moisture availability factors in determining the diversity and abundance of exotic flora present (Pettit *et. al.* 1995; Prober and Thiele 1995).

Fire Regime

Grazing management practices, such as burning, can drastically alter the structure of the vegetation and have important implications for ecological functioning. Although fire has always been an integral part of the Australian forest, modification of the regime (frequency, intensity and season) by Europeans has been detrimental to some species and is complicated by the fact that fire effects each species in a different manner (Christensen 1995).

Grazing and fire are perhaps so interrelated that post fire succession cannot be properly studied without also considering grazing (Leigh and Holgate 1979). Once an area has been burnt, regrowth is often grazed back repeatedly by native and domestic animals, affecting floristic composition. Woody shrubs and tree saplings are often reduced to near ground level by fire, where domestic stock can feed on the succulent new shoots (Leigh and Holgate 1979). In this way, frequent low intensity fires may contribute to progressive floristic structural decline in forest ecosystems.

Catling and Burt (1995) found that the complexity of understorey forest flora in south eastern New South Wales was positively related to diversity of small native ground dwelling mammals, and negatively related to grazing and the abundance of introduced pest species, such as rabbits, cats and foxes. Predation of native fauna by foxes and cats has been shown to increase when the ground cover is disturbed by fire (Christensen 1995; Catling 1991).

Prescribed burning is often undertaken during spring in SEQ so that fire intensities are low and, according to Christensen (1995) for northern New South Wales, to prevent excessive structural damage to the forest. While this timing generally provides safe conditions for burning, it is also the driest season for the region and hence there is a greater likelihood for fire to be carried into areas that naturally would be encroached by fire very infrequently, for instance, gallery rainforest. Ironically, the observations of McKenzie and Belbin (1991; cited in Fensham 1996) suggest that cattle grazing contributed to fire damage in rainforest in the north of Western Australia.

Fire will expose soil and may consequently increase erosion, leading to greater turbidity and sediment loads in streams. The food supply of some fauna is reduced immediately after the fire's passing and the suitability of the forest patch may be low for certain species in the medium term because of understorey successional requirements.

Faunal Species Distribution and Abundance

The changes in floristic composition and fire regime can greatly influence forest fauna, not only by immediate and direct consequences, but also through the complexities of the food web (Roberts undated). Simplification of forest structure in south eastern New South Wales, through agents such as fire and forest grazing, was reported by Catling (1991) as being detrimental to several species of mammals, including some which are also present in SEQ.

The combination of cattle dependency on surface water and the higher palatability of stream zone plants, leads to high impact around watering points. As a result, forest grazing was cited as the factor most likely to cause the decline of frog habitat and populations in the Queanbeyan and Badja Management Areas of New South Wales (SFNSW 1995a). Skillen (1978) reported that cattle were responsible for the destruction of vegetation used by various species of water birds as nesting sites and for construction of their nests.

Soil Physical and Chemical Properties

Compaction and erosion, resulting in flow-on affects to water, flora and fauna, can alter the abiotic environment. Livestock tend to form pads (paths) where soil surface structural decline concentrates water runoff and increases water and wind erosion (Roberts undated). Manure can also affect the soil micro-environment, form a barrier to plant growth, assist the proliferation of exotic plant species, and contribute to water eutrophication (Roberts undated).

3.3.2 Complementarity of Forest Grazing with Other Uses and Values

Contrary to the above, Fensham (1996) concluded that cattle have no direct detrimental effect on dry rainforest in Queensland and, provided further clearance of this vegetation type can be halted, the conservation of dry rainforest would seem to be compatible with the cattle grazing industry. Similarly, Walker (1978) judged that grazing in the Jarrah-Wandoo forests of Western Australia has no long term detrimental effects on vegetation or soils, provided ‘sensible’ carrying capacities are adhered to. Christensen (1995) reasoned that the current evidence on the impact of grazing on several ground dwelling mammal species in the forests of northern New South Wales is inconclusive and may suggest a beneficial relationship for some.

3.3.3 Possible Beneficial Impacts

Forest graziers provide a presence in the forest which can potentially benefit the forest estate through assisting DPI Forestry in the detection and prevention of fire and unauthorised operations (vandalism, dumping of rubbish, removal of minor forest produce and access by unauthorised vehicles). In contrast to the extensive nature of DNR and DPI Forestry management, graziers traverse their leases regularly and usually have an intimate knowledge of them. For instance, if harvestable trees are blown over in a storm, graziers will frequently contact DPI Forestry so that salvaging operations can begin. The graziers also pay rent, which provides a source of revenue for DPI and DNR, while deriving some flexibility in their enterprise and supplementing farm income (described further in Chapter 6).

Although fire frequency may be increased, the potential for catastrophic blazes is diminished by the reduction of forest litter and the grass component of fine fuel (SFNSW 1995b). Some forest graziers at a workshop (described later) suggested that large bushfires, such as those seen in New South Wales in late 1997, are rare in Queensland because of their own frequent burning. The fire

regime, while detrimental to some native fauna and flora, does advantage others (Catling 1991; Christensen 1995). Additionally, graziers claim that weeds, such as lantana, are better contained while the land is under their management. Some flora and fauna may benefit from better feral animal management, by graziers keen to reduce stock losses.

3.3.4 Implications for Management

Forest grazing has become a topical issue in conservation of biological diversity. The deleterious impacts outlined above may be partially or wholly applicable on some Crown land in SEQ. Adding to the confusion is that the impact of forest grazing will vary spatially and temporally within a forest. The stocking rate, frequency of grazing (length of paddock rotations) use of tree clearing and fire to improve herbaceous growth, establishment of access trails throughout the forest, construction of fence lines, palatability of vegetation, sensitivity of fauna, the presence or absence of natural barriers to stock movement (topography and water) and other site specific features will each influence the extent and nature of grazing impacts. However, the lack of research into the impacts of forest grazing in SEQ makes estimating the effects quantitatively or qualitatively very difficult.

DPI Forestry maintains the right to exclude grazing from recently harvested areas, although graziers report that they are rarely asked to remove their cattle. DPI Forestry recognises some benefits from allowing the practice, such as slowing the rate of fuel accumulation, while acknowledging that it can potentially reduce future timber supplies. The impacts of forest grazing can be minimised by ensuring proper fencing is erected and by excluding cattle from sensitive areas, such as around wetlands and Scientific Areas. Native flora, fauna and DPI Forestry may benefit from removing cattle from these areas until regeneration is adequately established.

Christensen (1995) takes the view that given the length of time forests have been grazed (up to 150 years in Queensland), it is conceivable that some species may have been favoured, or at least be able to cope with this form of land use. SFNSW (1995b) surmises that any changes resulting from grazing in the Queanbeyan and Badja Management Areas would probably have already taken place with a new equilibrium already established. Before ceasing grazing, they would like to see evidence that the forest would return to its ‘natural’ state. It would seem that such evidence has been provided by Pettit et al. (1995) for Jarrah forests in Western Australia, where they have shown that native species richness increases and abundance of exotics declines with time since last grazing. Similar studies are required in SEQ to evaluate this.

The complexity of SEQ’s forest ecosystems demands a diverse range of management strategies. Most Australian native biota require fire at some stage of their lifecycle for regeneration, food, or habitat creation, however, since fire affects each species differently, no blanket prescription will ever suit them all. Further investigations are required to examine the effects of forest grazing and its related management.

Until more definitive information is available on the ecological impacts of cattle grazing, small modifications, such as the mosaic of grazing regimes proposed by Moore and Floyd (1994), coupled with complete exclusion from sensitive and recently burnt or harvested areas, could provide a short term conservative strategy. In the meantime, collection of experimental evidence throughout the forests of SEQ over the proceeding five to 10 years could provide the information necessary to begin formulation of sustainable forest grazing strategies.

4.0 METHODS

Three types of data were required to meet the project objectives. Firstly, stock numbers on forested Crown land had to be estimated. Secondly, the advantages of having access to forest grazing in management flexibility terms needed to be ascertained. Finally, costs and returns typical for the forest grazing sector had to be assessed to determine its contribution to the regional economy.

4.1 RESOURCE ASSESSMENT

No comprehensive database was available on stock numbers in native forests of the SEQ RFA region. As part of its management of SGPs, DPI Forestry determines and records carrying capacity information. However, for all other grazing leases carrying capacities were only collected until the late 1980s. As these are only available in the form of individual lease files, they are not readily accessible from a central database and consequently were not collected for this project.

While there is an abundance of information and many systems available for estimation of carrying capacities on pasture and open woodland, data on forested land is limited. The inapplicability of models developed for pastures once tree canopy density exceeds about 20 percent compounds this dearth of information. Therefore, the first stage of this project required the development of a method that could approximate the stock numbers on forested Crown land in the SEQ RFA region. Once this was available an economic appraisal of the forest grazing sector could proceed.

Problems and concerns with applying SGP data throughout SEQ (summarised in Appendix 4.1) led to the formulation of a land system classification approach to determine carrying capacities in the region.

4.2 LAND SYSTEM CLASSIFICATION APPROACH – DATA COLLECTION

4.2.1 Land System Classification by Expert Panel

A number of meetings with representatives from the Cattlemen's Union (CU), the United Graziers' Association (UGA) and DNR led to the construction of this method. Forest canopy density, topography and rainfall were judged to be the three most influential variables in determining carrying capacity. Soil type was also deemed to be important, however the digital coverage of this variable was inadequate and consequently it was not used. Personal experience of the group members was then utilised to delineate a number of classes within each variable to reflect intra-class variability in carrying capacity. The classification system developed was as follows:

Topographic position

- Class 1a – ridges with slopes less than 15 degrees
- Class 1b – side/mid slopes of greater than 40 degrees
- Class 1c – side/mid slopes of less than 40 degrees and greater than 15 degrees
- Class 1d – creek flats with slopes up to 15 degrees.*

Forest canopy density/land cover

- Class 2a - Projected forest canopy from 80 per cent to complete closure
- Class 2b - Projected forest canopy from 50 per cent to less than 80 per cent
- Class 2c - Projected forest canopy from 20 per cent and less than 50 per cent
- Class 2d - Projected forest canopy below 20 per cent

Rainfall

- Class 3a – rainfall less than 950 mm
- Class 3b – rainfall from 950 mm to less than 1450 mm
- Class 3c – rainfall of 1450 mm and over.

* Creek flats includes drainage zones and lower hills, i.e. any slope of less than 15 per cent that is not on a ridge.

Forest canopy density down to 20 per cent was used in place of the 30 per cent canopy density definition of forest in the National Forest Policy Statement (1992). The 20 per cent level was used because the spatial data (Murray Darling Basin Land Cover) available for the initial calculations was in four canopy density classes. These included the three mentioned above and a fourth class of < 20 per cent. A more accurate spatial data (SEQ Woody Boundary 1997) set was released in May 1998 and the final Geographic Information System (GIS) calculations were conducted using this later canopy density coverage.

4.2.2 Attribution of Carrying Capacities to the Land System Classes

A workshop was conducted on the 16th and 17th December 1997 in Brisbane, where a total of 14 members of UGA and the CU from the SEQ RFA region attributed carrying capacities to the classes outlined above. A list of attendees at this workshop is in Appendix 4.2. The graziers were divided into three groups according to the rainfall zone in which their property was located. Each of these groups were then asked to use their expert knowledge and negotiate amongst themselves to estimate a carrying capacity for every forest canopy density/topographic combination within their rainfall zone.

These data were then incorporated into a GIS to generate a spatial coverage of the current and potential extent of forest grazing. This is described in section 4.2.5.

4.2.3 Assumptions Underlying Data Collation by the Expert Panel

A set of underlying assumptions relating to the derived carrying capacities were outlined by participants at the workshop and are presented below.

1. Water availability is adequate to allow stock to use the full range of the area being considered.
2. Appropriate animal husbandry is maintained.

3. Subdivision/fencing is available.
4. No incidence of poisonous flora that would reduce the usefulness of all or part of the area under consideration.
5. Management regime is as follows:
   - thinning is not carried out
   - fire management is maintained
   - feral animal management is carried out.
6. Carrying capacities are for an AE weighing 440 kg being either male or female.
7. Security of tenure remains the same as the prevailing situation with leases expected to be over a period of 20–30 years. Workshop participants felt it was quite important to mention that with security of tenure come increases in productivity due to a greater willingness on the part of the producer to invest in infrastructure.
8. Graziers assumed that the length of any lease or permit was long enough to witness the spectrum of climatic variation within the region. That is, there would be some good, average and bad years. The length of the period of tenure was assumed to be in the vicinity of 20 to 30 years.
9. Carrying capacities are for the SEQ RFA region and will not necessarily reflect the carrying capacity of any individual property.

4.2.4 Extension of Land System Classification

Following the workshops conducted to determine carrying capacities it became apparent that included in the tenure types examined were areas of canopy density below 20 per cent. While the main concern of the SEQ RFA is native forests, it is possible that areas with a low canopy density will be considered for inclusion in the reserve system. This led to the need to determine carrying capacities for the below 20 per cent canopy density classes.

Requests for information on carrying capacities in the below 20 per cent canopy density classes were sent to several DPI officers within the SEQ RFA region. They were asked to use the three variables to determine the carrying capacities for the 12 new classes and were provided with the workshop results as a guide.

From the DPI officer's carrying capacities one set (12 classes) was collated and sent to the graziers present at the workshops for their comments. These comments were again collated into one set and sent to Bonny Banks (1998, pers. comm., 9 June)[3] for a final confirmation. This method was used due to limited time.

4.2.5 Land System Classification Approach – Carrying Capacities and Spatial Mapping (Map 2)

Source Data

1. A Digital Elevation Model (DEM) was built from 1:100000 digital contour and drainage data using ARC/INFO TOPOGRID.
2. An Average Annual Precipitation ArcInfo Grid was derived using long term climate records and surface interpolation techniques provided by ANUCLIM.
3. A Foliage Projected Coverage was created using Landsat TM imagery (1997), then the SEQ Woody Boundary was derived from this.

[3] Bonny Banks - Cattlemens' Union Representative

4. A coverage was derived from the Digital Cadastral Database (DCDB) by grouping broad tenure classes. This coverage for State forests and timber reserves was updated by DNR to show current gazettals and is referred to as the Tenure coverage.
5. The DCDB and the TAS (Tenure Administration System) database were joined by lot plan to produce a lease type coverage, allowing selection on Leased Land within State Reserves.
6. A forest plantation coverage was supplied by DPI Forestry. This coverage was updated by DNR to produce the final Forest Plantation coverage.
7. A Term Leases on State Forests and Timber Reserves coverage was generated by DNR. Leases are current to the 10th September 1997.
8. A Stock Grazing Permits on State Forests coverage was generated by DNR. Permits are current to the 10th September 1997.
9. Carrying capacities developed at grazier workshops and by DPI beef officers.

Method

The DEM was used to develop an index of topographic position (based on elevation difference for a specified neighbourhood), and slope. Topographic position was then classified into 4 classes:

- ridges with slope < 15 deg
- side-slopes with slopes > 40 deg
- side-slopes with slopes 15 – 40 deg
- creek flats with slopes < 15 deg.

Based on input from the expert panel of industry representatives the Average Annual Precipitation grid was classified into 3 classes:

- Rainfall >1450 mm
- Rainfall 950 – 1450 mm
- Rainfall <950 mm.

The SEQ Woody Boundary coverage was classified into four classes:

- >80% cover
- 50 – 80% cover
- 20 – 50% cover
- <20% cover.

Each of the three digital coverages (topographic position, rainfall and canopy density) were then combined to produce a single coverage with a total of 48 land system classes. Using information provided by the expert panel of industry representatives and DPI officers, each of the 48 land system classes was attributed with carry capacities based on adult equivalent (AE) carrying capacities. The resulting product represents a coverage of *Potential Carrying Capacity* over all native forest land in the SEQ RFA region.

Having developed a *Potential Carrying Capacity* coverage over native forest in the SEQ RFA region, tenure analysis was then performed to allow specification of potential stock numbers in different tenure classes. The Tenure coverage was simplified by re-grouping classes to produce a tenure coverage that displayed State forest, timber reserve and State reserves. An initial tenure classification involved clipping the potential carrying capacity coverage to the simplified Tenure coverage. Plantations were filtered out using the Forest Plantation coverage with additional changes

by DNR. This provided the data that was used for the potential carrying capacities presented in Table 5.1. The area for each class could then be estimated shown in Table 5.2, and the stock numbers per class shown in Table 5.3.

Since not all forested lands in these tenure classes are actually grazed, a further clip was performed that reduced the coverage to actual SGP and Term Leases using the Term Leases on State forests and timber reserves, Stock Grazing Permits on State forests and a Leased Land within State Reserves coverages. The Term Leases in this coverage were filtered to remove leases less than 100 hectares. These were filtered as areas under 100 hectares were considered unlikely to provide commercial grazing opportunities. This provided the data that was used for the areas and stock numbers per class currently grazed under SGPs and Term Leases in Tables 5.4 and 5.5.

Spatial Mapping

Map 2 was generated using the carrying capacities on current SGPs and Term Leases. Similar procedures to those above were used, with the difference being the filtering of State reserves of less than 100 hectares. The Forest Plantation coverage was used to display plantations on the map.

Metadata for the *Potential Carrying Capacity* can be seen in Appendix A.

4.2.6 The Limitations of Carrying Capacity Estimation

The small number of graziers present at the workshop (14) a limitation on the results and their applicability. Nevertheless, given the time and budget constraints, this method appeared the most efficient. Only one grazier was present from the highest rainfall belt. Clearly more would have been desirable, however this belt accounts for only three per cent of current leased forest area.

The method used to collate several DPI officer's and grazier's comments included some subjective decisions. However, these were necessary to allow logical consistency between these new carrying capacities and those developed in the workshops, i.e. having an equal or higher carrying capacity for the less than 20 per cent canopy density class than for the 20 – 50 per cent canopy density class in the same rainfall and topographic zone.

4.2.7 The Limitations of Spatial Mapping

Although class 1d of the Slope and Topographic Position factor is called creek flats, when the less than 15 degree slope category is applied in the GIS it actually captures some areas that are not strictly creek flats. The same is true for the ridges less than 15degree captured in class 1a. The limitations of GIS spatial analysis means these categories will include undulating country that would not usually be associated with such areas. For instance, a flat plain may be classified as either a creek flat, or a ridge, depending on the position of this terrain feature relative to the surrounding topography.

Potential Areas and Stock Numbers

Some native forest strips between plantation blocks and areas lacking in watering points or too isolated for a grazing enterprise were included. Given the small areas of native forest patches between plantation blocks and the margin for error that is implicit in such analyses, this was deemed to be insignificant. Isolated forests and forest lacking watering points have not been identified in this report.

4.3 ECONOMIC ASSESSMENT

4.3.1 Utilisation of the Native Forests by the Grazing Industry

At the December 1997 workshops information was gathered from the graziers on their use of Crown native forests in the SEQ region. The advantages of having access to the forests and the reduction in management flexibility and viability were issues raised and are reported in section 6.1.

An earlier meeting was held in Gympie on the 24 February 1997, with three local graziers, three beef specialists from DPI, two forest rangers from DNR, and three (CRA) team members to examine the value of forest grazing. A list of who attended this workshop is in appendix 4.3. Off property agistment was put forward as one of the possible alternatives available to the graziers. A brief summary of this alternative is provided in section 6.3.

4.3.2 Costs and Returns from Native Forest Grazing

The costs and returns of forest grazing were collected to assess the significance of the forest grazing industry to the SEQ RFA economy. Several members of the CU and the UGA present at the workshop on the 16th and 17th December 1997, completed a survey that aimed to extract the necessary information. Costs were separated into variable and fixed costs. Variable costs are costs that vary depending on the level of production, eg cost of parasite drenches. Fixed costs vary little until the level of production changes significantly, e.g. telephone costs. A copy of this survey form is provided in appendix 4.4.

The survey required graziers to estimate the costs and returns only attributable to their operations on permitted or leased forest land, assuming average seasonal conditions and commodity prices. The annual average live weight gain (kg) for cattle grazed in native forests was used along with the $/kg price received at sale, to estimate the returns from forest grazing. Using experience and their latest profit and loss statement it was anticipated they could provide information in the form of dollars per head per year.

With the estimated stock numbers from the resource assessment phase of this project, and the costs and returns of forest grazing, a current economic value of forest grazing (1996/97) could be calculated. However, the resource assessment phase had provided the potential number of cattle grazed over all State forests, timber reserves and State reserves in the SEQ RFA region dependent on the topography, canopy density and rainfall. This raised the issue of whether to determine the economic value of grazing in native forests at the potential level or the current use level. The resource assessment estimated the total number of cattle that can potentially be grazed on the three tenure types within the SEQ RFA region as 81 000. This figure is an overestimate, since the calculation does not allow for areas which are considered sensitive to grazing by DPI Forestry, are currently being logged, have poor access or lack suitable fencing or watering points. These issues have been highlighted in other sections of this report.

As permits and leases do not currently cover all potential forest grazing areas, explanations were sought as to why some areas were not currently accessed for grazing. Paul Bidwell (1998, pers comm., 6 May)[4] suggested that as SEQ has been settled for many years, the areas currently used for forest grazing are the only ones with any significant value. Difficulty with access, fencing and/or

[4] Paul Bidwell - United Grazier Association Representative

provision of sufficient water points may severely limit the value of the alternate potential forest grazing areas.

Bonny Banks (1998, pers. comm., 18 March)[5] agreed that only the currently permitted and leased areas be valued. However, he was concerned that loss of currently non utilised areas may prevent young graziers using forest grazing as a method for entering the grazing industry. While this was acknowledged as important, it was considered to only affect a limited number of areas, many of which may be completely unaffected by the reserve system. If a particular area that is not currently grazed is put forward for inclusion in the reserve system, and graziers can demonstrate that it has particular potential for grazing, (has access to water and can be fenced) an economic value could be assigned. This value can then be used in options development. It was decided to only assess the economic value of areas currently under permits or leases for forest grazing in the SEQ region.

Limitations of Survey Data

The surveys were sent to graziers who were targeted using the convenience sampling method. This is when surveys are sent to specific targets in the population, usually chosen for their interest, willingness and/or appropriateness to reply to the survey topic. The number of surveys distributed to and returned from graziers was not of sufficient size under scientific principles for the results to be extrapolated to the population being studied. The reader is encouraged to interpret the results in light of these limitations.

4.3.3 Net Present Value of Forest Grazing in Crown Native Forests in the SEQ RFA Region

When calculating a net present value (NPV), a discount rate and time horizon must be set. The application of a discount rate occurs due to the opportunity cost of capital, i.e. a dollar is worth more today than in a years time as a person could invest it for the year. Therefore, dollars received further into the future have a lower present value than those received today. As this calculation forms part of an economic assessment at the level of the whole of society, the discount rate used was a social discount rate. This differs from the rate a private investor would use in that it is lower due to society usually being considered to have a longer time horizon and lower risk allowance than an individual (Gittinger 1982). The average of the 1995/96 and 1996/97 10 year bond rate was 8.2 per cent (Reserve Bank of Australia Bulletin 1997) and the average underlying treasury rate of consumer price inflation (ABS 1997) over the same period was 2.6 per cent, resulting in a real rate of interest of 5.6 per cent. This compares with the rate of 6 per cent real recommended by Queensland Treasury (Queensland Treasury 1997), with a discount rate of six per cent real being used in this project.

The second variable that must be set is the time horizon. This involves several issues, one being the confidence with which future product prices, substitutes, technical advances etc can be predicted. Cattle prices although difficult to predict far into the future currently show no strong trends up or down. The second issue is that at the most commonly used discount rates, extending the time horizon of the analysis much past twenty five years, results in the present value of each ensuing year to be so small a value as to contribute little to the net present value, rendering it pointless (Gittinger 1982). For this report the net present value was calculated over twenty years, to fit with the period covered by the SEQ RFA. This meant the time horizon used fell within the generally accepted boundary of the number of years, given a 6 per cent discount rate.

[5] Bonny Banks - Cattlemens' Union Representative

The Australian Bureau of Agricultural and Resource Economics (ABARE) forecasts were examined to check if significant changes were expected in cattle prices over the next few years. ABARE forecasters expect strengthening Asian demand for beef following from the current economic upheavals, combined with falling US production until 2000, to lead to an increase in prices until 1999–2001. The expectation is that this will be followed by increasing production in the US, leading to a levelling of prices in 2001–02, then falling prices in 2002–03 (Bailey, Barrett, Rodriguez and Toyne1998).

It remains to be seen whether the Asian economic crisis is short term, allowing an increase in demand for beef in Asia. However, ABARE's forecasts do not give reason to assume a significant change in the trend in beef prices in the short term, particularly as beef prices are historically relatively volatile, the current price level was maintained for the 20 years of the NPV calculations. As the operating profit for forest grazing was collected from 1996/97 data, the NPV is in 1996/97 dollars.

FORUM, an economic model developed by ABARE, will be used to optimise the structure of the timber industry. In addition to providing data on the timber industry, the model has the capability of providing summary data on other industries when appropriate data is available. Economic data from this report will form the input for FORUM allowing calculation of summary data on yearly values and a net present value (NPV) for the 20 year period of the SEQ RFA. These outputs will be used in the options development process of the SEQ RFA.

5.0 RESOURCE RESULTS AND DISCUSSION

5.1 FOREST GRAZING WORKSHOP

5.1.1 Workshop Results

The matrix presented in Table 5.1 reports the carrying capacities, expressed in hectares per Adult Equivalent (AE) (440 kg male or female), attributed to each land system class by graziers and DPI officers.

Table 5.1 Estimated Carrying Capacities in the SEQ RFA region (subject to conditions in section 4.2.3)

Rainfall	Canopy density	Ridge slope < 15°	Side-slopes > 40°	Side-slopes 15°–40°	Creek flats slope < 15°
> 1450 mm	> 80%	–	–	–	40
	50–80%	40	–	40	28
	20–50%	10	–	10	7
	< 20%	8		8	6
1450 – 950 mm	> 80%	–	–	–	–
	50–80%	24	–	36	12
	20–50%	8	–	12	4
	< 20%	7		10	4
< 950 mm	> 80%	61	–	73	32
	50–80%	40	–	53	30
	20–50%	16	–	38	12
	< 20%	14		30	10

Source: DNR workshop with cattle graziers and DPI officers (Dec 1997 and June 1998).

The expert panel, consisting of 14 forest graziers, included only one representative from the greater than 1450 mm rainfall zone (see section 4.2.6). Four graziers were from the 1450 to 950 mm range, while the remaining nine were from the less than 950 mm class.

5.1.2 Discussion of Workshop Results

With their highly palatable plants and availability of water, creek flats and lower hills provide the best grazing, regardless of rainfall or forest canopy density. This is consistent with the literature on grazing impacts presented in 3.3. While the creek flats class provides the best grazing it also contains riparian zones that are sensitive to disturbance. While this report aims to assess the value of the forest grazing industry, this highlights a management issue that needs to be monitored. Ridge

top forest also provides good forest grazing conditions and was generally preferred over side slopes by cattle, because of a greater grass component in their understorey. It was agreed that the type of vegetation prevalent upon most slopes greater than 40 degrees and the difficulty cattle have traversing such country rendered these areas of negligible use for grazing. Hence, this topographic category has been attributed zero carrying capacity for all combinations of rainfall and canopy density.

Following tabulation of the carrying capacity figures from the workshop, the analysis highlighted an interesting trend. The greatest carrying capacity was found to be within the 950–1450 mm rainfall belt. The graziers suggested that in the low rainfall country the unreliability of rainfall events was a major contributing factor to this result, with the grass not having the chance to recover between successive grazing periods. Poor nutrient value and lower palatability of much of the dry country was also identified as a contributing factor. The high rainfall forest grazed within the SEQ RFA region is comprised largely of wallum[6]. Although the grass grows quickly when it rains, it has very little nutritional value and provides a haven for parasites. The graziers also cite excessively leached soils for the low carrying capacity. Some high rainfall forest grazing country is on the better soils in the Great Dividing Range, however, here the forest is generally too dense to permit much grazing.

One other reason for the higher carrying capacity in the middle rainfall classes, is that in collaboration with DPI Forestry, some graziers have thinned their leased forest country. This has the dual advantage of increasing carrying capacity and improving the quality of the final crop of trees on the land.

Within each rainfall class there is a tendency for carrying capacity to increase as forest canopy density decreases. This is likely to be a result of a more palatable understorey component, as sunlight becomes less of a restriction. With the exception of the less than 950 mm zone, a canopy density of greater than 80 per cent (closed forest) reduces the productivity of grazing to negligible levels. The graziers explained that this anomaly is due to the availability of palatable vegetation in the dry closed forests, unlike the wetter types, which may be bare of ground cover and have an unpalatable shrub stratum. The wetter closed forests tend to have a well developed shrub stratum that intercepts any light penetrating the forest canopy, thus preventing a herbaceous understorey from developing. In contrast, the dry closed forest has a less developed shrub stratum, which allows some herbage to establish on the forest floor.

5.2 POTENTIAL CARRYING CAPACITY

5.2.1 Potential Forest Grazing Results

The potential area statements and the stock numbers are presented in Tables 5.2 and 5.3 respectively. This represents the results of incorporating the carrying capacities of Table 5.1 with rainfall, topography, forest canopy density and tenure, as described in section 4.2.5. The tables display the information in terms of the land system categories defined by the expert panel. Within each category, the area and stock numbers in State forests, timber reserves and State reserves that could potentially be utilised by forest graziers have been presented.

[6] Wallum country refers to the coastal flats between Brisbane and Coolum where infertile and poorly drained soils have provided ideal conditions for tea tree heath and swamp. This region is also notable as the favoured site for exotic pine plantations in SEQ.

Table 5.2 Areas Available in Land System Classes for State Forest, Timber Reserves and State Reserves in the SEQ RFA Region

Rainfall	Canopy density %	Ridge slope < 15°	Side-slopes > 40°	Side-slopes 15°–40°	Creek flats slope < 15°	Total
	> 80	154	16	308	218	**696**
> 1450 mm	50–80	20 270	37	15 530	17 450	**53 287**
	20–50	2 369	5	1 028	3 155	**6 557**
	< 20	2 129	6	523	3 836	**6 494**
	> 80	1 076	48	4 436	1 426	**6 986**
1450 – 950 mm	50–80	81 896	241	79 188	93 368	**254 693**
	20–50	94 326	82	29 204	113 214	**236 826**
	< 20	18 446	20	4 120	25 362	**47 948**
	> 80	207	10	1 018	392	**1 627**
< 950 mm	50–80	30 363	37	19 671	33 402	**83 473**
	20–50	43 048	28	21 588	61 257	**125 921**
	< 20	6 475	7	3 054	13 044	**22 580**
Total		**300 759**	**537**	**179 668**	**366 124**	**847 088**

Table 5.3 Estimated Potential Cattle Numbers in Land System Classes for State Forests, Timber Reserves and State Reserves in the SEQ RFA Region

Rainfall	Canopy density %	Ridge slope < 15°	Side-slopes > 40°	Side-slopes 15°–40°	Creek flats slope < 15°	Total
	> 80	–	–	–	5	**5**
> 1450 mm	50–80	507	–	388	623	**1 518**
	20–50	237	–	103	451	**790**
	< 20	266	–	65	639	**971**
	> 80	–	–	–	–	**0**
1450 – 950 mm	50–80	3 412	–	2 200	7 781	**13 393**
	20–50	11 791	–	2434	28 304	**42 528**
	< 20	2 635	–	412	6 341	**9 388**
	> 80	3	–	14	12	**30**
< 950 mm	50–80	759	–	371	1 113	**2 244**
	20–50	2 691	–	568	5 105	**8 363**
	< 20	463	–	102	1 304	**1 869**
Total		**22 763**	**0**	**6 657**	**51 678**	**81 098**

5.2.2 Potential Forest Grazing Discussion

The figures presented in Table 5.2 indicates that the potential available area of native forest for grazing in State reserves, timber reserves and State reserves amounts to 847 000 hectares. From Table 5.3 the average potential carrying capacity of forests in SEQ can be calculated and is about one head per ten hectares (calculated only on land areas that have a positive carrying capacity, 841 000 hectares), which amounts to around 81 000 head.

The 950 to 1450 mm rainfall zone with 50 to 80 per cent canopy density forest type accounted for 30 per cent of the land under consideration and could support 17 per cent (14 000 head) of the potential total herd of 81 000. However, for the same rainfall zone and a canopy density of 20 to 50 per cent, the percentage of land area while slightly lower at 28 per cent, is estimated to support 52 per cent of the potential herd. The high rainfall zone accounted for 67 000 hectares (eight per cent) of the land and only four per cent of the potential herd. Although comprising 28 per cent of the potential land base, the low rainfall zone could only support about 12 500 head, or 15 per cent of the

total potential herd. Grazing on the creek flats contributes 64 per cent of the cattle on only 43 per cent of the potential land base.

5.3 CURRENT CARRYING CAPACITY

5.3.1 Current Forest Grazing Results

Tables 5.4 and 5.5 were constructed in a manner similar to Tables 5.2 and 5.3, except that data presented within each land systems category was restricted to current Term Leases and SGPs on State forests, timber reserves and State reserves (also described in section 4.2.5). Term Leases of less than 100 hectares were filtered out, due to their unlikely use for commercial grazing.

Table 5.4 Estimated Area Currently Used for Forest Grazing in the SEQ RFA Region

Rainfall	Canopy density %	Ridge slope < 15°	Side-slopes > 40°	Side-slopes 15°–40°	Creek flats slope < 15°	Total
> 1450 mm	> 80	22	0	15	9	**46**
	50–80	4 216	5	4 089	2 560	**10 870**
	20–50	161	1	248	153	**563**
	< 20	45	2	156	95	**298**
1450 – 950 mm	> 80	519	24	2 740	734	**4 017**
	50–80	41 748	163	29 698	45 970	**117 579**
	20–50	64 681	54	18 481	76 763	**159 979**
	< 20	2 722	7	2 060	3 988	**8 777**
< 950 mm	> 80	99	9	766	264	**1 138**
	50–80	12 450	18	8 548	15 433	**36 449**
	20–50	21 033	24	13 080	31 431	**65 568**
	< 20	1 251	6	2 152	3 522	**6 931**
Total		**148 947**	**313**	**82 033**	**180 922**	**412 215**

Table 5.5 Estimated Current Cattle Numbers in the SEQ RFA Region

Rainfall	Canopy density %	Ridge slope < 15°	Side-slopes > 40°	Side-slopes 15°–40°	Creek flats slope < 15°	Total
> 1450 mm	> 80	–	–	–	0	**0**
	50–80	105	–	102	91	**299**
	20–50	16	–	25	22	**63**
	< 20	6	–	20	16	**41**
1450 – 950 mm	> 80	–	–	–	–	**0**
	50–80	1 740	–	825	3 831	**6 395**
	20–50	8 085	–	1 540	19 191	**28 816**
	< 20	389	–	206	997	**1 592**
< 950 mm	> 80	2	–	10	8	**20**
	50–80	311	–	161	514	**987**
	20–50	1 315	–	344	2 619	**4 278**
	< 20	89	–	72	352	**513**
Total		**12 057**	**0**	**3 305**	**27 642**	**43 005**

5.3.2 Current Forest Grazing Discussion

The data presented in Table 5.4 indicate that currently around 412 000 hectares of native forest in

State forests, timber reserves and State reserves is under Term Lease or SGP and suitable for grazing. Forest with little grazing value falls within graziers' leases, such as closed canopy, wet forest. The current average carrying capacity of forests in SEQ is one head per 10 hectares, which amounts to a total herd of around 43 000 head in the native forests of SEQ. That is, approximately 53 per cent of the potential (see section 5.2.2). The small number of leases that cover the classes considered unsuitable for grazing, shows a correlation between the graziers estimated carrying capacities at the workshop and their commercial decision to acquire a lease or permit.

The forest type with the greatest spatial extent is the 950 to 1450 mm rainfall zone, in the 20 to 50 per cent canopy density classes with 160 00 hectares (39 per cent of total area covered by SGPs and Term Leases). These classes also have some of the highest carrying capacities and account for 67 per cent of the total herd or 29 000 head. The high rainfall zone only accounted for 12 000 hectares (3 per cent) of the currently leased land and one per cent of the total herd. Although comprising 27 per cent of the currently utilised land base, the low rainfall zone could only support about 6000 head, or 14 per cent of the total herd.

The table demonstrates the significance of grazing on the creek flats with 64 per cent of the cattle grazing on 44 per cent of the current land base. Ridge tops account for 36 per cent of the currently utilised land base, while only carrying 28 per cent of the current herd.

6.0 ECONOMIC RESULTS AND DISCUSSION

6.1 REGIONAL DEPENDENCE UPON THE FOREST RESOURCE

This section presents information contributed by UGA and CU members at the workshop in Brisbane on the 16th and 17th December 1997 regarding their management of native forest and the importance of access to the resource.

6.1.1 Utilisation of the Native Forests by the Grazing Industry

The forests are used in a variety of ways by beef cattle enterprises. The following list outlines those identified by the UGA and CU members.

1. Fattening steers.
2. Breeder maintenance from joining through to calving (100 per cent of the time). An additional note is that the forests are not useful for this purpose during dry seasons.
3. Generally used in conjunction with a freehold or other leasehold block as a grow-out paddock for young cattle and for breeders
4. Used only in winter for dry cows.
5. Used for dry cows and for growing young steers and heifers.
6. Used as a surplus block.
7. Used as a natural boundary, cattle cannot go through them because there is no water.
8. Used entirely on an opportunistic basis.
9. Used as a hobby farm.
10. Forests may be useful as a low cost entry into the beef industry. The forest land is relatively inexpensive.
11. Forests are often utilised for their value as shade.
12. Forests often provide a buffer zone for unwanted flora and fauna

6.1.2 Impacts of Losing Access to the Native Forest Resource

Graziers identified the reduction in flexibility of their enterprise as a major consequence of any resource loss. Typically this would take the form of tighter restrictions on the types of cattle reared and on their paddock rotation within the farm. Enterprises would be forced to reduce herd size and endure a consequent contraction in farm income through loss of breeders. The graziers expressed concern that the viability of some enterprises may be threatened, in some cases to the point of having to leave the land. Additionally, any reduction in Crown forest grazing would put greater pressure upon the grazier's freehold and other leasehold land.

Landcare issues, such as feral animal control, weed control and wildfire hazards, may become more significant on bordering freehold land if grazier management of Crown forests is reduced. Another dimension of forest grazing is its use as a risk reduction device, e.g. for drought fodder. Reduction of grazier's risk reserves can result in heavier use of remaining land, resulting in increased environmental problems. In addition there is the possibility of increased vulnerability of businesses to climatic variation or calamities. A simple deterministic analysis of costs is not sufficient to quantify this, but CRA resources were insufficient for more detailed analysis.

6.1.3 Offsetting the Loss of Access to the Native Forest Resource

The graziers viewed four options available to counterbalance the loss of the low cost native forest resource. The first of these was to purchase additional land. This is an expensive option and usually beyond the means of cattle graziers without financial assistance. The second option involved investigating off farm income sources, although they are likely to be detrimental to farm management. The third option would require a shift in current management practices for most graziers. It involves buying in young cattle to fatten on the existing freehold land. This is seen as an undesirable option for most farmers, because herd quality may be reduced through loss of producer control over the breeding of cattle. There are also issues of beef accreditation, concerns with spreading of disease and the possibility that purchased cattle may carry seeds of unwanted weeds. The final option was to agist cattle, which could result in reduced management flexibility.

6.2 AVERAGE ANNUAL OPERATING PROFIT FROM FOREST GRAZING IN CROWN NATIVE FORESTS IN THE SEQ RFA REGION

The costs and returns for forest grazing were collected from survey forms distributed at the 16 and 17 December 1997 workshop. Seven returned surveys were used to calculate averages of variable and fixed annual costs and incomes. The small sample size precludes use or interpretation of these results as anything more than indicative. These averages are presented in Table 6.1 below.

Table 6.1 Average Annual Operating Profit Per Head From Forest Grazing in the SEQ RFA Region (1996/97)

	$/head/yr
Income	130.44
Variable costs	61.05
Fixed costs	35.95
Total costs	97.00
Operating profit	**33.44**

6.3 COST OF AN ALTERNATIVE TO FOREST GRAZING

The agistment alternative to forest grazing was raised during the meeting at Gympie on 24 February 1997. The annual cost of agisting 100 head of cattle on land that was the equivalent to 1600 ha of an average quality forest, was estimated to be $3500 annually or $35/head/annum. This includes rates paid on agisted land, but does not cover the costs of transport between properties. Properties offering agistment are rare, hence agistment charges are unlikely to be closely related to the expected productivity of the pasture.

The annual costs for SGPs are presented in Table 6.2. The average carrying capacity calculated in section 5.2.2 was 10 ha/head, which has an annual permit cost of $6.60/head. As this is no longer a cost when access to forest grazing is lost, this cost needs to be deducted from the cost of $35 per head for agistment. This results in a direct cost to the industry through losing access to forest grazing of $28.40/head. This conclusion was based on the assumption that management costs on non-forested land are the same as on forested land, which is accepted as unlikely to be an exact representation. This approximation was considered sufficient for use as an example of one alternative to grazing and will not be used in any further calculations. When the value of $28.40/head was added to costs in section 6.2, this reduced operating profit to $5.04/head. The option of agisting cattle on freehold land is an unlikely economical alternative to forest grazing.

Table 6.2 Annual Fees (non competitive) for Stock Grazing Permits Under the Standard Grazing Category

Carry capacity (ha/adult equivalent)	$/head/year
4 or less	9.55
5–10	6.60
11–15	3.67
16–25	2.93
26 or greater	2.13

Source: DPI–Forestry (1997)

6.4 ANNUAL ECONOMIC VALUE OF FOREST GRAZING IN CROWN NATIVE FORESTS IN THE SEQ RFA REGION FOR 1996/97

The annual economic value of forest grazing at current permit and lease levels for 1996/97 was calculated over the tenure types of State forest, timber reserve and State reserve. The 43 000 cattle grazed over these tenures was multiplied by the income and costs taken from Table 6.1. The current annual gross income and operating profit of forest grazing in SEQ RFA region for 1996/97 is approximately $5.6 million and $1.4 million respectively, as shown in Table 6.3 below.

TABLE 6.3 Gross Economic Value of Forest Grazing at Current Permit and Lease Levels in Native Forests in the SEQ RFA Region in State Forests, Timber Reserves and State Reserves (1996/97)

	$
Income	5 609 572
Variable costs	2 625 455
Fixed costs	1 546 030
Total costs	4 171 485
Operating profit	**1 438 087**

6.5 NET PRESENT VALUE OF FOREST GRAZING IN CROWN NATIVE FORESTS IN THE SEQ RFA REGION

The net present value of grazing at current levels in SEQ region is $16.5 million when calculated for the next 20 years at a real discount rate of six per cent. The net present value calculated here is for the purpose of this report only. The information from the grazier's costs and returns surveys will be input into the FORUM Economic Model, with the outputs from FORUM used in the SEQ RFA options development process. The calculation of the net present value is shown in Appendix 6.1.

7.0 RECOMMENDATIONS FOR FURTHER WORK

DNR is intending to draft a Grazing Code of Practice. This Code must address issues of lessee management responsibilities under Ecologically Sustainable Forest Management (ESFM). However, to achieve these aims, work needs to be carried out on what EFSM principles are as regards grazing. The effects of cattle grazing in the native forests of SEQ have only been researched in a very limited way. Currently there are no clear guidelines for the graziers to follow so conclusions cannot be drawn on their ability to meet them. There also needs to be research directed toward formulation of optimal compliance checking procedures for government regulatory bodies.

Graziers need assistance in the form of information on how to manage the native forests in which they graze cattle. For this information to be available, further research must be undertaken, especially on carrying capacities that allow for sustainable native forest grazing. Nevertheless, current forest grazing management by DPI Forestry and DNR aims to protect the natural values of the forests.

The assessment of carrying capacity within this report was calculated using three variables rainfall, topography and canopy density. The graziers when consulted at the workshop indicated a preference for soil type as another variable. Soil type, through its differing nutrient values and soil depth, affects the level of pasture growth. Access to high quality spatial soil type data would enable finer tuning of carrying capacity estimation.

Pasture cutting trials would enable the calculation of dry matter production levels over the seasons and between different species. Sites would need to be defined by such variables as forest type, rainfall, and canopy density. Such data, along with nutritional information on pasture species (some of which may already exist), would enable determination of expected growth rates from cattle grazed on these pastures. Another option would be development of a similar model to the one developed for 'Objective safe' grazing capacities for South-West Queensland Australia: Development of a model for individual properties' (Johnston, McKeon and Day 1996). This model is based on 'safe' levels of utilisation (15–20 per cent) by domestic livestock of average annual forage grown for each land system.

Development of an economic model based on inputs and outputs for forest grazing enterprises would enable far greater accuracy in calculation of the economic value of forest grazing. In this report, the separation between the costs and income attributable to the forest grazing side of the enterprise and the freehold pasture was left to the grazier. Extensive monitoring and surveying of forest grazing management would lead to a clearer understanding of the economic interconnections between the forest grazing and freehold pasture sections of an enterprise.

8.0 CONCLUSIONS

Historically, forest grazing has been an important component of the grazing industry in Queensland as much of the leased pastoral runs were forested and many remain in that condition. Forest grazing has continued into modern times through the management policy and philosophy of DPI–Forestry, that forest reserves be utilised for maximum benefit to the State.

Today, large areas within the forested Crown estate of the SEQ RFA region are under some kind of grazing lease or permit. This land may be suitable for a range of undertakings, including breeding, growing and fattening, depending on the structure and quality of the vegetation. The forest is usually grazed in conjunction with pasture on freehold or other leasehold land, although it is generally much less productive than the latter. The forest resource is an integral part to many beef cattle management systems in this region, providing a significant element of management flexibility.

The effects of forest grazing on the ecology of the forest were highlighted where information was available. However, a dearth of information relevant to the SEQ region, restricted the drawing of firm conclusions. There needs to be long term research into the effect that grazing cattle have on the flora and fauna species of the SEQ RFA region.

The carrying capacities of native forests throughout the SEQ region were estimated using the variables of rainfall, topography and canopy density. This method allowed cattle numbers to be determined for the areas currently covered by permits and leases on native forest in SEQ region. A total of 43 000 cattle were estimated to be currently grazed on native forests in the SEQ region on 412 000 hectares. If confirmation is required that the carrying capacities estimated using expert opinion are the most appropriate for the various native forests within the SEQ RFA region, follow up research would be needed.

An average operating profit of $33 per head was calculated from grazier surveys, which when extended to cover the 43 000 head of cattle resulted in an annual gross economic value for 1996/97 of $1.4 million. When the value of the native forest grazing industry in SEQ was valued over the 20 year period of the RFA at a discount rate of six per cent, a net present value of $16.5 million was calculated. However, the reader should interpret these figures in light of the limitations experienced during data collection.

A more accurate assessment of the economic value attributable to native forest grazing in the SEQ RFA region would require research trials on live weight gain for cattle grazed within the forest. This could then be used to estimate the revenue from grazing. Also the costs attributable to the forest grazing side of an enterprise would need to be closely monitored, to allow accurate separation of these costs from the costs of grazing on the adjoining freehold land.

This report has successfully collated the necessary data needed to input into the FORUM Economic Model (ABARE), enabling the integration of the values of forest grazing that can be directly quantified in dollar terms. The output from FORUM will, in turn, be applied during the SEQ RFA options development process.

APPENDICES

Appendix 1.1

CRA/RFA PROJECT SPECIFICATIONS

PROJECT NAME:	**Forest grazing, apiculture, and other products description and assessments**
PROJECT IDENTIFIER:	**SE 4.2**
LOCATION/EXTENT:	**SEQ**
ORGANISATION/S:	**CRA Unit, DNR** **DPI–Forestry** **BRS**
CONTACT OFFICERS:	**George Antony: Resource Economist (J.R. Peter Hardman)** **Pauline Stewart: Forest Resources Officer** **Malcolm Taylor: Senior Planning Officer** **Dan Sun: Senior Research Scientist**
POSTAL ADDRESS:	**GA/PH: CRA Unit, 80 Meiers Rd, Indooroopilly, Qld 4068** **PS: CRA Unit, 80 Meiers Rd, Indooroopilly, Qld 4068** **MT: Forestry House, 160 Mary St, Brisbane, Qld 4000** **DS: John Curtain House, PO Box E11 Queen Victoria Terrace, Parkes ACT 2600**
TELEPHONE:	**GA/PH: (07) 3896 9448 FACSIMILE: (07) 3896 9858** **PS: (07) 3896 9841 (07) 3896 9858** **MT: (07) 3234 0136 (07) 3234 1200** **DS: (06) 2725 694 (06) 2723 882**
E-MAIL ADDRESS:	**GA/PH: antonyg@indcrm002.prose.dpi.qld.gov.au** **PS: stewartp@dpi.qld.gov.au** **MT: taylorm@dpi.qld.gov.au** **DS: dsun@mailpc.brs.gov.au**
LINKAGES/DEPENDENCIES:	SE 4.4 Incorporation of Other Industries into FORUM development (highly dependent on SE 4.2 for base data sets) PI 5.3 Broad Economic Assessments (linkages from SE 4.4) SE 5.2 Regional Social Profile Analysis (limited linkages) SE 5.3 Social Case Study Area (limited linkages)
TYPE OF STUDY:	**Resource/Economic**

---

1. OBJECTIVES OF THE PROJECT

To describe the features of the forest grazing, apiculture and other minor forest product industries relevant to CRA, and to provide sufficient quantitative data (product volumes and financial) to allow the economic significance of the industries and to be described and impacts of land use changes estimated.

2. BACKGROUND

Native forests in SEQ (SEQ) are a major source of nectar and pollen for the apiculture industry in Queensland. Department of Primary Industries (DPI) maintain records of paid apiary sites and are currently compiling an extensive database of the industry in Queensland. These will form the basis of the apiculture assessment.

Forest grazing has historically been an important sector of the grazing industry in Queensland, with most available forest areas grazed. Databases derived from DPI SGP and DNR grazing lease information have been compiled and these will form the basis of the forest grazing assessment.

The public forest resource in SEQ is a major source of other wood products for the wood & wood products industry in the region. DPI maintain the sales database of all products sold by DPI on state forests and plantations and this in consultation with DPI–Forestry personnel will form the basis of the assessment of other wood products.

A detailed assessment of the resource with respect to the aforementioned industries will provide base data for the economic analysis and the option development process.

Estimated land use capacity will to the greatest extent possible be based on the principles of ecologically sustainable forest management.

3. SCOPE OF THE PROJECT

Project will detail the nature of the industries, the current situation and any trends in the industries as well as providing data required for analytical purposes.

4. METHODS

- Available data sources on the relevant industries to be evaluated and collated.
- Compile databases of SGPs and forested Term Leases.
- For forest grazing, available data on stock carrying capacities to be modelled to generate complete coverage of forest grazing potential.
- Compile database and Arcview coverage of paid apiary permits.
- Compilation of other wood products sales data and derivation of rule of thumb for these products.
- Discussion with industry and government experts to identify key features of the industries.
- Economic value of industries to be identified on the basis of secondary data from various sources and expert groups.
- Analysis of forest types and structure in relation to its significance to the apiary industry.
- Inputs include:
    - Stock Grazing Permit, Term Lease and Apiary Site data from DPI and DNR
    - Survey of apiary industry conducted by DPI.
    - Industry description, production features (including current levels, potential and limits) and economic information from peak industry bodies, industry experts and government specialists.
    - Financial data for industries from range of sources; such as literature, industry bodies, ABS, DPI etc.

5. CRITICAL PATH

Outcomes/Outputs

- Spatially related databases suitable for input into FORUM and decision-support system for the forest grazing and apiculture industries, detailing:
    - existing use patterns
    - production potential across the forest estate

- Report on forest components of the industries detailing:
  - brief description of industries
  - estimate of current and potential use of forested areas for those industries
  - regional dependence on the forest estate
  - contribution of various land tenures
  - where possible, value of broad forest types to each industry
  - cost of production and gross margin data for major producers
  - the economic contribution of these industries to SEQ
  - limitations of methodology

Reporting

Draft project report (grazing & apiculture) to be prepared by end of September 1997.
Progress reports to be prepared monthly.

Milestones and Timetable

Task description	Duration (w,d)	Earliest / actual start	Actual finish	Task dependencies diagram	Who	Link to payment yes/no amount
Databases of SGP and forested term leases compiled			11–1996		Pauline Stewart	
Cattle numbers on OCL estimated			11–1996		Pauline Stewart	
Compiled database and Arcview coverage of paid apiary permits			11–1996		Pauline Stewart	
Analysis of partly completed Apiary database compiled by DPI			11–1996		Pauline Stewart	
Ist draft of apiculture and grazing current status reports			2–1997		Pauline Stewart	
Compilation of other wood products & derivation of rule of thumb for these products	2,0	3–1997			Pauline Stewart	
Draft report on other products	1,0	4–1997			Pauline Stewart	
Draft reports refined based on consultation with industry groups	8,0	3–1997			Pauline Stewart	

6. BUDGET DETAILS

Commonwealth cash	
Commonwealth (in kind)	$5,000
Queensland cash	
Queensland (in kind)	$60,000
TOTAL BUDGET	**$65,000**

7. PERFORMANCE INDICATORS

- the project outcomes are useable
- improvement in the extent and quality of existing information
- the industries are satisfied with their representation in the assessment reports

- completion of the project in a timely manner
- funds are properly acquitted
- information able to be easily incorporated into the economic analysis

8. QUALITY CONTROL

- Regular project reporting to Project Manager, CRA Queensland
- Submit draft reports to industry for comment
- Regular review of data and methodologies by SE Technical Committee

Appendix 2.1

Tenure and Lease – Spatial Mapping (Map 1)

Brief Methods

Source Data

- A Tenure coverage was derived from the Digital Cadastral Database (DCDB) by grouping broad tenure classes.
- The DCDB and the TAS (Tenure Administration System) database were joined by lot plan to produce a lease type coverage. Appliciable grazing leases where then extracted and simplified to produce the Grazing Leases on State Reserves coverage.
- A Term Leases on State Forests and Timber Reserves coverage was generated by DNR. Leases are current to the 10th September 1997.
- A Stock Grazing Permits on State Forests coverage was generated by DNR. Permits are current to the 10th September 1997.
- A forest plantation coverage was supplied by DPI Forestry. This coverage was updated and further simplified by DNR to produce the final Forest Plantation coverage.
- A forest cover was provided by the Department of Environment (DoE). This coverage was then simplified by grouping classes to produce a final Forest Cover.

Method

The Tenure coverage was further simplified by re-grouping classes to produce the final Tenure coverage. This coverage displays State forest, timber reserve, State reserve and OCL. State Reserves and OCL lots less than 100 hectares were not considered to be of commercial size for cattle grazing purposes and were eliminated at this stage.

The Grazing Leases on State reserves coverage was grouped into: (a) leases that are for grazing purposes only (GL); and (b) leases that are for grazing and other purposes (GLO). GLO leases less than 100 hectares were removed as these leases may be issued for purposes other than grazing. All GL were retained as they are issued only for grazing purposes. After filtering, Term Leases are the only grazing lease type to occur within State Reserves. These are shown on the map as 'Term Leases on SR'.

Term leases on the Term Leases on State forests and timber reserves coverage were filtered for lease areas less than 100 hectares, as they may be issued for purposes other than grazing. As Stock Grazing Permits are issued only for grazing, they were retained regardless of their size. SGPs may occur within plantations and hence the Forest Plantation coverage was used to remove SGP on plantation areas, as the focus of this assessment is on native forest grazing. Similarly Term Leases (on SF & TR) were filtered to remove overlap with plantations. The two coverages were then joined to produce the *Term Leases and Stock Grazing Permits on State Forest and Timber Reserves* coverage. Where overlaps of SGPs and TL occurred (as a result of errors in the data), SGPs were assigned precedence.

Then the, final Tenure coverage, Grazing Leases on State Reserves coverage and the *Term Leases and Stock Grazing Permits on State Forest and Timber Reserves* were all joined. Anomalies that became apparent after this join were dealt with (resulting from spatial miss match between overlayed data sets). The result was the *Tenure-Lease Type* layer.

To isolate only the forested leases on OCL, the Forest Cover layer was overlayed with the *Tenure-*

Lease Type coverage. The canopy density classes available meant that the forest/non forest distinction had to be made at 20 per cent canopy density, rather than the National Forest Policy Statement (1992) definition of 30 per cent. This generated the *Tenure-Lease Type-Forest Cover* layer and is shown as Map 1.

Appendix 3.1

Issues the Minister Must Consider Prior to Renewing a Lease (s159 Land Act 1994)

The Minister must consider the following issues before making a decision to offer to renew a lease:

a) the interest of the lessee
b) whether part of the lease should be set appart and declared as State Forest under the Forestry Act 1959
c) whether the public interest could be adversely affected, other than for an issue metioned in paragraph (b), if the lease was renewed
d) whether part of the lease is needed for environmental or nature conservation purposes
e) whether the lease is at serious risk from land degradation
f) whether a substantial part of the lease suffers from serious land degradation
g) whether the lessee has complied with, or to what extent the lessee has complied with the conditions of the lease
h) whether part of the lease has a more approprioate use from a land planning perspective
i) whether part of the lease is on an island or its location, topography, geology, accessibility, heritage importance, aesthetic appeal or like issues make it special
j) whether part of the lease is needed for public purpose
k) whether part of the lease is needed for property build-up purposes of other properties without reducing the remaining land to less than a living area
l) whether the lease could be subdivided without reducing the remaining land to less than a living area.

Appendix 3.2

Listing of Grazing Leases Common on Other Crown Land

- Agricultural Farm (AF)
- Grazing Homestead Freeholding Lease (GHFL)
- Grazing Homestead Perpetual Lease (GHPL)
- Occupational Licence (OL)
- Pastoral Development Holding (PDH)
- Pastoral Holding (PH)
- Perpetual Lease Selection (PLS)
- Permit to Occupy (PO)
- Preferential Pastoral Holding (PPH)
- Stud Holding (SH)
- Term Leases (TL) (formerly known as Special Lease (SL))

Appendix 4.1

Resource Assessment – SGP Data Approach

Initially it was proposed that all forested Crown lands within the SEQ RFA region would be assessed for their importance and contribution to the grazing industry. An extensive database on this industry was compiled and included the following:

- A Stock Grazing Permits and Term Leases spatial coverage created from data collected from DPI Forest Districts in 1996. Contains carrying capacity and stock rates for all permits.

- *A term lease database for State Forests and Timber Reserves within SEQ*. Includes: forest district; reserve number; parish area; and rental. (incomplete).

- *The Tenure Administration System (TAS) managed by Department of Natural Resources (DNR).* Contains information on leases that are managed under the Lands Act 1994. Grazing leases and their details have been extracted and include: tenure type (*ie.* lease name); lease type; lot on plan references; and primary parish. Carrying capacities are not included. A spatial coverage of these leases has been produced.

- *"Agstats", an Australian Bureau of Statistics product*. This is a small area agricultural commodity database from which cattle numbers by statistical local areas or shires can be derived.

Later, the analysis was reduced to only those leases on State Forests, Timber Reserves and State Reserves. This effectively excluded all grazing leases and permits except:
- Stock grazing permits
- Term Lease (formerly known as Special Leases)

The carrying capacities specified on Stock Grazing Permits are reviewed annually and consequently were believed to be close to long term sustainable carrying capacities. Stock numbers on SGPs could be determined from the permit data and the SGP spatial coverage.

It was proposed to use an estimated stock carrying capacity derived from the SGP carrying capacities to acquire stock numbers on State Forests, Timber Reserves, and State Reserves. This demanded the determination of a relationship between the vegetation type (Regional Ecosystems, REs) and the carrying capacity information available on the SGP coverage. It was anticipated that such a relationship could be easily applied to other land tenure classes to derive reasonable approximations of carrying capacity on them.

However, calculated carrying capacities showed very little variation between REs and significant variation within the REs, indicating that forest type was a poor predictor of carrying capacity. Nevertheless, an average carrying of 0.054 head per hectare (ie. 1 adult equivalent per 18.5ha) was calculated for all forests.

Issues raised about the proposed methodology

A number of concerns regarding this methodology were raised by representatives from the Cattlemen's Union (CU) and the United Graziers' Association (UGA) during two workshops conducted in Rockhampton on the 20th of October and Brisbane on the 22nd of October 1997. These

are outlined below.

1. *Applicability of the SGP carrying capacities, particularly with the wide variability throughout each RE.*

2. *Inaccuracies of the estimated stock numbers on other forested areas from the use of the derived average stock carrying capacity.* Even if the estimates are applicable in terms of REs, alternative management objectives on Term Leases may preclude an acceptable estimate from being calculated. Unlike the SGPs, the leased areas may not be contiguous areas of forest, rather, they are often in conjunction with pasture. It was thought that the estimation of stock numbers using the average carrying capacity would not yield the full value of the forest areas to the enterprise.

3. *The use of the derived estimates of stock numbers in the future*. In cases where the lease carrying capacity is lower than the calculated average of 1 head per 18.5 hectares, the use of this average will lead to the overestimation of stock numbers on a lease. It was felt that this could be scrutinised by conservation groups.

Subsequently, it was agreed that a new approach was necessary and it is described in 4.1.1.

Appendix 4.2

Attendees of the Grazing Workshop on the 16 and 17 December 1997

Name	Region
Graziers	
Mr Bonny Banks	Injune
Mr Chas Hartwig	Eidsvold
Mr Col Seiler	Killara
Mr Ian Briggs	Mt. Perry
Mr Ian Wells	Mt. Mee
Mr James Sinclair	Monto
Mr John Bowes	Gin Gin
Mr John Windley	
Mr Kevin Lawson	Howard
Mr Morgan Simon	Dingo
Mr Owen Thompson	Maryborough
Mr Robert Piltsch	Inglewood
Mr Tex Burnam	Eidsvold
Ms Teresa Allen	Alice Creek
DNR	
Mr Chris Turvey	
Mr Tyron Venn	
Miss Pauline Stewart	
Mr Alf Said	

Appendix 4.3

Attendees at the Gympie meeting held on 24 February 1997

Gordon McGill	Grazier
Ian Fitzgerald	Grazier
Percy Bishop	Grazier
Russell Tyler	DPI
Graeme Elphinstone	DPI
Bruce Cook	DPI
Peter Leeson	DNR
Ted Nicholls	DNR

Appendix 4.4

COSTS AND RETURNS SURVEY FOR BEEF CATTLE PRODUCTION IN SOUTH EAST QUEENSLAND FORESTS (>30 per cent canopy density)

This survey is designed to be completed using your latest Profit and Loss Statement (P&L)in combination with your experience in the industry, to derive the Average Annual Net Return from production of beef cattle in forests. It is intended that you work on an assumption of **average seasonal conditions**. The **price** you use is also intended to be an **average** figure, possibly the average of the last ten years. If there are costs you think should be included then simply put them in the blank spaces provided. Some of the costs included on the form may not be applicable to your business, simply ignore these. You will notice you are asked to determine the Fixed Costs on a per head basis. These include such items as rates, insurance, etc. You may like to simply add all the Fixed Costs related to your farm business (you will find these in your P&L) and divide by the approximate number of cattle you normally carry, to determine this figure.

There is no need for you to put your name on this survey. When you have completed it simply place it in the envelope provided and post it.

Thankyou for taking the time to help us with this project and we look forward to receiving your response. If you have any questions regarding this survey please call Chris Turvey on (07) 3896 9451.

INCOME

LWG (KG/HEAD/YR)_____X PRICE ($/KG)_____=_____($/HEAD/YR)

It may be useful to estimate live weight (LWG) gain on a per day basis and then multiply by 365 to derive an annual figure e.g. ½ kg/hd/day X 365 days = 182 ½ kg/hd/year

EXPENSES

Variable

Mustering	_____($/head/yr)
Dips	_____($/head/yr)
Drench	_____($/head/yr)
Fodder	_____($/head/yr)
Supplements	_____($/head/yr)
Freight	_____($/head/yr)
Wages	_____($/head/yr)
Veterinary	_____($/head/yr)
Husbandry (branding, ear tagging etc.)	_____($/head/yr)
Saddlery	_____($/head/yr)
Marketing	_____($/head/yr)
Levies	_____($/head/yr)
Other	_____($/head/yr)
	_____($/head/yr)

Total Variable Costs **_____($/head/yr)**

Fixed Costs (rates, insurance, accountancy, repairs & maintenance, depreciation, etc.) **_____($/head/yr)**

TOTAL EXPENSES **_____($/HEAD/YR)**

Appendix 6.1

NET PRESENT VALUE OF GRAZING ON CURRENT PERMIT AND LEASE SITES IN NATIVE FORESTS IN THE SEQ RFA REGION
(DISCOUNT RATE = 0.06)

	Year	Income $/head	Cattle numbers	Total revenue $	Costs $/head	Total costs $	Gross profit $	Net present value $
1	1998/99	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	1356686.04
2	1999/00	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	1279892.49
3	2000/01	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	1207445.74
4	2001/02	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	1139099.76
5	2002/03	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	1074622.41
6	2003/04	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	1013794.73
7	2004/05	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	956410.12
8	2005/06	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	902273.70
9	2006/07	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	851201.60
10	2007/08	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	803020.38
11	2008/09	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	757566.40
12	2009/10	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	714685.28
13	2010/11	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	674231.40
14	2011/12	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	636067.36
15	2012/13	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	600063.54
16	2013/14	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	566097.68
17	2014/15	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	534054.42
18	2015/16	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	503824.92
19	2016/17	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	475306.53
20	2017/18	130.44	43005	5609572.20	97.00	4171485.00	1438087.20	448402.39
Total								**$ 16,494,746.89**

Appendix A

Metadata

```
---------------------------------------------------------------------
Dataset
      Title:
            Forest Grazing on State Forest, Timber Reserve, State Reserve &
Other Crown Land
      Custodian:
            Department of Natural Resources
      Jurisdiction:
            Queensland
Contact
      Contact Organisation Name:
            Department of Natural Resources
      Contact Organisation Jurisdiction:
            Queensland
      Contact Position:
            Project Officer – Graphics Coordinator
      Mail Address 1:
            Block C, Resource Sciences Centre
      Mail Address 2:
            80 Meiers Road
      Suburb or Place or Locality:
            Indooroopilly
      State or Locality 2:
            QLD
      Country:
            Australia
      Postcode:
            4068
      Telephone:
            07 3896 9882
      Facsimile:
            07 3896 9882
      Electronic Mail Address:
            Geoff.Gibson@dnr.qld.gov.au
Description
      Abstract:
            Forest Grazing Leases on State Forests (SF) , Timber Reserves (TR),
State Reserves (SR), and Other Crown Land (OCL) within South East Queensland
Regional Forest Agreement region.
      Search Words:
            FORESTS
            LAND Use
      Geographic Extent:
            Coordinates:
                  Extent: x–min 148.985 deg ; Y–min. –28.317 deg; x–max. 153.551
deg y–max. –23.485 deg
Data Currency
      Beginning Date:
            01/07/1997
      Ending Date:
            Current
Dataset Status
      Progress:
            In Progress
      Maintenance & Update Frequency:
            As required
Access
      Stored Data Format:
            DIGITAL Arc/Info v7.1.2 under Solaris v2.6 – Vector Data
      Available Format Types:
            DIGITAL Arc/Info export file
```

Access Constraints:
Internal Use – Regional Forest Agreement (available to RFA stakeholders - no charge)
Data Quality
Lineage:
Source Data:
1. Tenure Classes (derived from Digital Cadastral Data Base (DCDB) & Tenure Attribute System (TAS) data) refer cover: TENCLASS & associated metadata.
2. Grazing Leases (State Res. & Other Crown Land) - DCDB (July 1997) and TAS (Oct 1997)
3. Term leases & Stock Grazing Permits (SGPs) on State Forests & Timber Reserves - Dept of Natural Resources datasets.
4.Plantation (Forestry) - DPI Forestry with additions by DNR.
5. Forest Cover (GPVEG) - Dept of Environment.
Method:
1.(a) Tenure classes from source dataset (TENCLASS) were further regrouped as follows:
State Forest (SF); Timber Res. (TR); State Res. (SR); Other Crown Land (OCL) within new item: GRAZ_TEN
(b) Polygons of less than 100ha were eliminated from OCL & SR classes.
2.(a) Specified Lease Types from DCDB (TAS join) were selected & grouped as either 'GL' (Grazing Lease) or 'GLO' (Grazing Lease or other land use) within item:LEASE_TYPE. The underlying lease type was retained in item:TENCODE.
(b) Leases of less than 100ha (total area) were eliminated (from 'GLO' only).
3.(a) Current SGP's selected from primary dataset
(b) Union with Plantation data determained SGP area not covered by plantation.
4.(a) Term Leases (on SF& TR) were appended to SGP cover (3). (Overlaps were assigned SGP code)
5.(a) Resulting layers - GRAZ_TEN, LEASE_TYPE & TL/SGP were combined. Any anomolies in attributes were identified and delt with at this stage.
(b) Cover was dissolved to preserve the following items: GRAZ_TEN, TENCODE, LEASE_TYPE & FOR_TEN
6.Resulting cover was unioned with the forest cover (DoE) to attribute leases as forested /dry-forest/ non-forest /nodata (item: LEASE_VEG).
7. Final cover has NOT been processed to remove any small (sliver) polygons resulting from overlaying of datasets.
8. A late decision was to filter Term leases (on SF & TR) to exclude plantation (same as SGP's) - required back unioning final grazing cover with the modified DPI Plantation cover to identify overlap.
Positional Accuracy:
Positional accuracy varies (refer source data)
Attribute Accuracy:
Refer source data
Logical Consistency:

Completeness:
Cover should be considered complete at date of metadata creation, however may be subject to alterations /additions. Note that Term Lease & Stock Grazing Permit data over State Forests & Timber Reserves has been revised since completion date of this data-set, but does not significently effect on this data.
Metadata Date
8/07/98
Additional Metadata
Refer to file: README.GRAZING for attribute details (supplied with dataset).
Page 1 Information
Projection:

Scale:
0
MapNo:

Page 2 Attribute Details
Path Name:
G:\ANZLIC\FOREST\ATTRIB\GRAZING
Polygon Attribute Table (PAT):

```
      GRAZING_V4.PAT
Arc Attribute Table (AAT):

Node Attribute Table (NAT):

Frequency Table (FT):
      GRAZING_V4.FRE
Lookup Table (LUT):

Region Table (RT):

Tolerance Table (TOL):

Value Attribute Table (VAT):

Readme File (READ):
      README.GRAZING
Other :
```

Dataset
Title:
Costs and Revenue of Grazing in Native Forests in South East Queensland 1997
Custodian:
Department of Natural Resources
Jurisdiction:
Queensland
Contact
Contact Organisation Name:
Department of Natural Resources
Contact Organisation Jurisdiction:
Queensland
Contact Position:
Project Officer - Economist
Mail Address 1:
Block C, Resource Sciences Centre
Mail Address 2:
80 Meiers Rd
Suburb or Place or Locality:
Indooroopilly
State or Locality 2:
QLD
Country:
Australia
Postcode:
4068
Telephone:
07 3896 9451
Facsimile:
07 3896 9858
Electronic Mail Address:
Fiona.Anderson@dnr.qld.gov.au
Description
Abstract:
Survey data on costs and revenue from grazing cattle in native forests in the South East Queensland Biogeographic Region, collected in 1997.
Search Words:
AGRICULTURE Livestock Surveys
FORESTS Natural
Geographic Extent:
Data Currency
Beginning Date:
16/12/1998
Ending Date:
Current
Dataset Status
Progress:
Complete
Maintenance & Update Frequency:
As required
Access
Stored Data Format:
DIGITAL Excel spreadsheet
Available Format Types:
DIGITAL Excel
DIGITAL Printouts
Access Constraints:
Charges apply
Data Quality
Lineage:
Survey forms were distributed at a grazing workshop on 16/17 December 1997. Seven (7) usable survey forms were returned, one was an extreme outlier so was not included in the calculation of the average cost and revenue figures.
Positional Accuracy:
Not applicable

Attribute Accuracy:
Not applicable
Logical Consistency:
Convenience sampling was used and sample size was too small to project these figures to SEQ native forest grazing. Used in this case as it was the best data available given the time and resources.
Completeness:
Not a truely representative sample of the native forest grazing industry in SEQ.
Metadata Date
22/06/98
Additional Metadata
Checked ALG 11/6/98
g:\u_rc&t\forestecoass&plan\cra\personal\tyron\1997-98\forest_grazing\workshop_results\costs and returns results
Page 1 Information
Projection:

Scale:
0
MapNo:

Page 2 Attribute Details
Path Name:
G:\ANZLIC\FOREST\ATTRIB\
Polygon Attribute Table (PAT):

Arc Attribute Table (AAT):

Node Attribute Table (NAT):

Frequency Table (FT):

Lookup Table (LUT):

Region Table (RT):

Tolerance Table (TOL):

Value Attribute Table (VAT):

Readme File (READ):

Other :

Dataset
Title:
South East Queensland Forest Grazing Potential
Custodian:
Department of Natural Resources
Jurisdiction:
Queensland
Contact
Contact Organisation Name:
Department of Natural Resources
Contact Organisation Jurisdiction:
Queensland
Contact Position:
Resource Analyst
Mail Address 1:
Block C, Resource Sciences Centre
Mail Address 2:
80 Meiers Road
Suburb or Place or Locality:
Indooroopilly
State or Locality 2:
QLD
Country:
Australia
Postcode:
4068
Telephone:
07 3896 9809
Facsimile:
07 3896 9858
Electronic Mail Address:
Doug.Ward@dnr.qld.gov.au
Contact Organisation Name:
Department of Natural Resources
Contact Organisation Jurisdiction:
Queensland
Contact Position:
GIS Officer
Mail Address 1:
Block C, Resource Sciences Centre
Mail Address 2:
80 Meiers Road
Suburb or Place or Locality:
Indooroopilly
State or Locality 2:
QLD
Country:
Australia
Postcode:
4068
Telephone:
3896 9820
Facsimile:
3896 9858
Electronic Mail Address:
Braden.Pierson@dnr.qld.gov.au
Description
Abstract:
Coverages of topographic position (4 classes), annual average precipitation (3 classes) and forest canopy density (4 classes) were combined to produce a land system type classification with elements relevant to forest grazing. Using information derived from an expert panel of grazing industry representatives and DPI officers, each of the classes of the combined coverage was attribued with a carrying capacity to produce a coverage of potential carrying capacity on forested land in the SEQ Biogeographic region.
Search Words:

AGRICULTURE Livestock
FORESTS
Geographic Extent:
Coordinates:
UTM Zone 56
Coordinates:
280000,6850000,550000,7400000
Data Currency
Beginning Date:
02/01/1998
Ending Date:
Current
Dataset Status
Progress:
Complete
Maintenance & Update Frequency:
Not Planned
Access
Stored Data Format:
DIGITAL Arc/Info Grid
Available Format Types:
DIGITAL ARC/INFO Grid 100m resolution
Access Constraints:
Charges and conditions of use apply.
Data Quality
Lineage:
Grazing potential was derived by attributing classes resulting from combining annual rainfall (3 classes), topographic position and canopy density. Topographic position was derived from a Digital Terrain Model (see metadata for DTM for SEQ). See climate metadata for information and annual rainfall. See metadata on 1997 South East Queensland Woody Boundary for information on SEQ canopy density.
Positional Accuracy:
100m
Attribute Accuracy:
Attribute accuracy is dependent on the level of accuracy the expert panel on grazing could give to carrying capacities for each land class.
Logical Consistency:

Completeness:
Complete
Metadata Date
11/06/98
Additional Metadata
For additional information refer to the "Digital Terrain Model for South East Queensland" metadata record
Page 1 Information
Projection:

Scale:
0
MapNo:

Page 2 Attribute Details
Path Name:
G:\ANZLIC\FOREST\ATTRIB\
Polygon Attribute Table (PAT):

Arc Attribute Table (AAT):

Node Attribute Table (NAT):

Frequency Table (FT):

Lookup Table (LUT):

Region Table (RT):

Tolerance Table (TOL):

Value Attribute Table (VAT):

Readme File (READ):

Other :

REFERENCES

ABS (1997). *Consumer Price Index*. Cat. No. 6401.0 September Quarter 1997, AGPS, Canberra.

ACIL (1984). *A Study of Forest Grazing in the Murray Valley.* ACIL Australia PTY LTD, Collingwood.

Bailey, G., Barrett, D., Rodriguez, A. and Toyne, C. (1998). 'Outlook for Meat'. In *Outlook 98 Agriculture*. ABARE, vol. 2, p. 235–248.

Bryant, W.G. (1971). *Grazing , Burning and Regeneration of Tree Seedlings in Eucalyptus pauciflora Woodlands*. Soil Conservation Service Of NSW, Vol 27.

Catling, P.C. (1991). Ecological effects of prescribed burning practices on the mammals of southeastern Australia. In *Conservation of Australia's Forest Fauna*. Lunney, D. (Ed.).Royal Zoological Society of NSW, Mossman.

Catling, P.C. and Burt, R.J. (1995). Studies of the ground-dwelling mammals of eucalypt forests in south eastern New South Wales: the effect of habitat variables on distribution and abundance. *Wildlife Research* . **22**: 271–88.

Christensen, P. (1995). *Grazing Burning and CWR Species in Northern New South Wales*. Unpublished report for State Forests of New South Wales.

Commonwealth of Australia (1992) *National Forest Policy Statement*. Australian Government Publishing Service, Canberra.

DCDB (1997). Digital Cadastral Database. Queensland Department of Natural Resources, Geographic Data Services, Wollongabba, Oct 1997.

Department of Natural Resources, Department of Environment and Environment Australia. (1998). *Towards Reserve Options for Forest Taxa in SEQ: Taxa at Risk, Threats, Conservation Requirements and Recovery Planning.*

Gittinger, J.P. (1982). *Economic analysis of agricultural projects*, 2nd ed, John Hopkins Press, Baltimore.

Hodgins, I.W. and Rogers, R.W. (1997). Correlations of stocking with cryptogamic soil crust of a semi-arid rangeland in southwest Queensland. *Australian Journal of Ecology*. **22**: 425–31.

Johnston, P.W., McKeon, G.M. and Day, K.A.(1996). Objective 'safe' grazing capacities for South-West Queensland Australia: Development of a model for individual properties. *Rangelands Journal*. **18**: 244–58.

Leigh, J.H. and Holgate, M.D. (1979). The response of the understorey of forests and woodlands of the Southern Tablelands to grazing and burning. *Australian Journal of Ecology*. **4**: 25–45.

McKenzie, N. L. and Belbin, L. (1991). 'Kimberley Rainforest Communities: Reserve Recommendations and Management Considerations'. In *Kimberley Rainforests of Australia,* ed. N.L. McKenzie, R. B. Jonston & P.G. Kendrick. Surrey Beattty and Sons, Chipping Norton. Cited in Fensham, R.J. (1996). Land clearance and conservation of inland dry rainforest in north Queensland, Australia. *Biological Conservation*. **75**: 289–98.

Moore, D.M. and Floyd, A.G. (1994). Grafton–Casino Management Area EIS Supporting Document NO. 2. *A Description of the Flora and an Assessment of Impacts of the Proposed Forestry Operations in the Grafton Management Area.* Austeco Pty/Ltd., Environmental Consultants; Armidale.

Pettit, N.E., Froend, R.H. and Ladd, P.G. (1995). Grazing in remnant woodland vegetation: changes in species composition and life form groups. *Journal of Vegetation Science*. **6**: 121–130.

Prober, S.M. and Thiele, K.R. (1995). Conservation of the grassy White Box woodlands: relative contributions of size and disturbance to floristic composition and diversity of remnants. *Australian Journal of Botany*. **43**: 349–66.

Queensland Department of Primary Industries. (1994). *Stock Grazing Permits*. DPI.

Queensland Department of Primary Industries (1995). *Term Leases*. DPI.

Queensland Department of Primary Industries – Forestry (1997). *Stock Grazing Permits*. Price up

dates through file ref. 380.05.
Queensland Government (1995). *Land Act 1994*. Government Printer.
Queensland Government (1997). *Land Regulations Attachment to the Land Act 1994.* Government Printer.
Queensland Treasury (1997). *Project Evaluation Guidelines*. Brisbane.
Reserve Bank of Australia (1997). *RBA Bulletin*. December 1997.
Roberts, B.R. (undated). "Guide to the Grazing of State Reserves." Unpublished working draft, DNR.
Said, A.M. (1992). *Social Opportunity Cost of Land Use Changes in the Conondale Range, South East Queensland*. Master of Natural Resources Thesis, University of New England.
Skillen, J. (1978). 'Grazing in the Ludlow Tuart Forest'. In Howes, K.M.W. and Rummery, R.A. (eds.). Integrating Agriculture and Forestry. CSIRO, Perth. pp176–177.
Smith, H. (1997). *South East Queensland Old Growth Forest Project DRAFT*. Forest Ecosystem Assessment and Planning Section, QDNR.
State Forests of New South Wales (1995a*). Queanbeyan and Badja Management Areas – Fauna Impact Statement*. State Forests of New South Wales, Sydney.
State Forests of New South Wales (1995b). *Queanbeyan and Badja Management Areas – Environmental Impact Statement, Main Report.* State Forests of New South Wales, Sydney.
Walker, A.W. (1978). 'Grazing in Jarrah/Wandoo Forest'. In Howes, K.M.W. and Rummery, R.A. (eds.). Integrating Agriculture and Forestry. CSIRO, Perth. pp233–36.
Westbrooke, M. (1992). Effects of grazing on semi-arid woodlands in south-east Australia. *Australian Ranger*. **Autumn 1992**: 20–21.
Wolfe, P. (1990). *A Review of Land Policy and Administration in Queensland.* Out of print. Government Printer.

ABBREVIATIONS AND ACRONYMS

(Q)**DPI**	(Queensland) Department of Primary Industries
(Q)**DNR**	(Queensland) Department of Natural Resources
SF	State forest
TR	Timber reserve
SR	State reserve
SGP	Stock Grazing Permit
TL	Term Lease
OCL	Other Crown Land