

**A BASELINE OF ADOPTION OF PASTURE
MANAGEMENT PRACTICES
- CORANGAMITE REGION**

August 2001

CENTRE FOR LAND PROTECTION RESEARCH

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Abbreviations

ABS Australian Bureau of Statistics
LMU Land Management Units

Agriculture Victoria - CLPR

SUMMARY

The aim of this report is to document baseline information about the state of adoption of pasture establishment and management practices in the Corangamite Region of Victoria and to evaluate the tools for continued monitoring of the adoption of these practices.

Based upon available data, the progress towards adoption of pasture management practices in the Corangamite Region can be summarised as follows:

- There is only one comprehensive measure of the rate of perennial pasture establishment in the Corangamite Region. The ABS farm survey for 1993/94 provides a measure of the rate of all perennial pasture sowing in the region of 1.2 percent per annum, with 1.1 percent to phalaris based pastures and another 0.1 percent to lucerne. The total area resown increased to 4 percent in 1997 with perennial pasture being sown or resown on 3.8 percent of the total pasture area.
- There is no available independent study which can be used to calibrate the ABS pasture sowing question. It would be necessary to obtain more information on pasture resowing and improved pasture management practices in the region through farm surveys.
- Previous farm censuses did not differentiate annual from perennial pasture. However, it can be deduced from these surveys that the rate of pasture sowing peaked in 1986/87 during a short period of high wool prices, fell in the latter part of the 1980s and appears to have continued to fall since.
- The low rate of perennial pasture sowing is unlikely to bring about a significant increase in the area of active perennial pasture in the catchment. At this rate it is unlikely to maintain the existing area of perennial pasture, as there is evidence that the lack of maintenance of perennial pastures is likely to reduce the persistence of pastures. ABS census data showed the low adoption of improved pasture management systems such as top dressing in the region.
- In 1994/95 approximately 32 percent of pastures were top-dressed. This increased to 49 percent by 1997. There is no other data available in the region which can be used to calibrate the ABS fertiliser question. Comparisons, however, between ABS data and data from farm surveys in other regions have shown that ABS fertiliser question provides a reliable measure of the maintenance of improved perennial pastures.
- There is no ABS or any other data which can be used to monitor the use of grazing rotation practices. Further information is needed to comment on pasture management practices adopted on resown perennial pastures in the region.
- Several studies in the neighbouring Glenelg Region have identified different groups of graziers according to their commitment to pasture renovation. These same groups are used as the best guide to understanding graziers in the Corangamite Region.
- Only a minority of intensive graziers (motivated by increasing productivity and production) are adopting the total package of improved pasture management practices. This group is willing to undertake challenges and try out new techniques on their farms.
- The majority of graziers had a conservative approach to pasture management on small areas of improved pastures. They did not use high rates of fertiliser or stock on their resown pastures, and did not intend to do so in future. The cost of pasture establishment was their major concern. These farmers were risk averse and generally lacked an adequate understanding of their farming system.
- An intermediate group adopting part of the pasture improvement package was also identified.

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1 THE CORANGAMITE REGION

1.1 Sustainability in the Corangamite Region

The Corangamite Region covers about 1.3 million hectares in south-western Victoria. The region experiences a temperate Mediterranean climate with hot dry summers and cool wet winters. Annual rainfall varies from less than 500 mm in the rain shadow areas to a high of 2000 mm in the Otway Ranges.

The regional landscape is dominated by the basalt plains in the centre of the region, with sheep grazing and broadacre cropping as the main agricultural activities. Both the central highlands to the north of the plain, and the Otway Ranges to the south consist of large forest areas used for the timber industry, and cleared agricultural land for grazing sheep and cattle with some horticulture and dairying (Landcare plan for the Corangamite region 1993). The major land management units (LMUs) dominating the Corangamite Region are Volcanic Plains and Sedimentary Rises (Figure 1).

The major land degradation forms in the region are dryland salinity, degradation of water quality, soil and water erosion, soil acidity, soil structure decline and pest plants and animals. Land management methods such as excessive grazing, overcultivation, and replacement of woodlands and native perennial grasslands with introduced annual pasture species have largely contributed to these problems. More than 16 200 ha of land is affected by salt, with an estimated 5300 ha of primary salting and another 10 900 ha of secondary salting in the region. The annual loss of agricultural production due to salinity is estimated to be \$1.3 million. If no action is taken to prevent this, it is expected to rise to \$1.7 million by the year 2000 and \$3.2 million in the year 2021 (Corangamite salinity Forum 1992; Corangamite Regional Catchment Strategy 1997). In addition, salinity in urban water supplies cost the community more than \$770 000 over a year, which is expected to rise to \$1.7 and \$3.6 million in 10 and 25 years respectively.

Establishment and improved management of perennial pastures, strategic tree planting, and fencing and revegetation of affected areas, along with a series of other sustainable soil management techniques, are promoted in the area as solutions to these problems.

The benefit of sowing perennial pastures in overcoming soil degradation lies with the potential to reduce recharge by extracting water from a greater volume of soil (than annual pastures) using their deep root system. Perennial pastures also have the capacity to trap leached nitrates thus reducing the rate of soil acidification by 50 kg lime/ha/year compared to annuals (Ridley *et al.* 1990). However, appropriate pasture management practices such as the use of fertiliser, pest and disease control methods, and more importantly, stock management systems such as rotational grazing, largely affect the maximum water use by perennial pastures.

1.2 Indicator practices

The following practices have been selected as indicators of the extent of adoption of sustainable pasture management practices by graziers in the Corangamite Region.

- Perennial pasture sowing rate

The Corangamite Salinity Management Plan recommends sowing perennial pastures and lucerne pastures on identified 'hot spots' (areas with severe salinity problems) as a salinity control measure in the region. The plan sets targets to be achieved after four, 10 and 30 years in each sub-region. It recommends a total of 38 500 ha of perennial pasture from years 1-10 and 135 000 ha from years 1-30. The proposed target of resown perennial pastures in hot spot areas for 1993/94 was 2318 ha (Corangamite Salinity Forum 1993). Given that perennial pastures need to be maintained by a resowing program, a measure of the rate of resowing is used as an acceptable proxy for the area of perennial pasture.

- Top dressing of perennial pastures

Annual top dressing of newly sown pastures is an important factor in maintaining a dense, vigorous growth. This will have a greater impact on the watertable and also improve productivity through increased gross margins. Unfertilised pastures will decline to annual pastures and eventually to an annual and native pasture mix.

- Stock management methods used: rotational grazing systems

Heavy grazing needs to be introduced through increased stocking rates to utilise newly sown pastures in order to achieve maximum profitability. Heavy grazing is often the best way to deal with weeds to ensure optimum pasture growth. From the salinity control point of view it is also necessary to introduce rotational grazing systems which enable the pastures to increase leaf area, plant growth and root development in order to maximise the water use of perennial pastures.

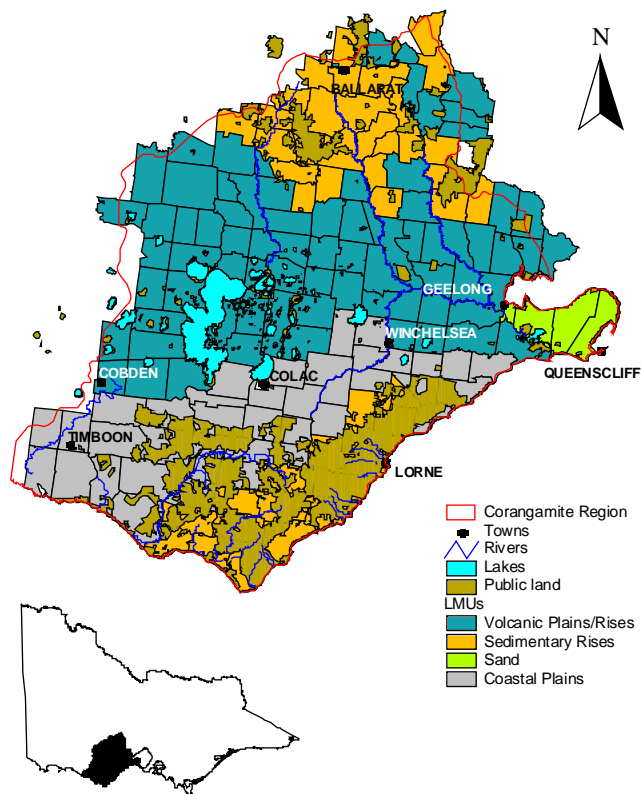


Figure 1 Land management units in the Corangamite Region

2 DATA SOURCES AVAILABLE

2.1 Australian Bureau of Statistics

The Australian Bureau of Statistics (ABS) farm census is distributed annually to all Australian farming businesses which meet a minimum gross income criterion. There is a legislative requirement that all farm business operators complete and return the farm census. In the last decade the ABS farm census has intermittently included questions covering use of fallow, grain legumes, soil ameliorants, fertiliser use and pastures. In recent years questions have covered the total area and resown area of perennial pastures and lucerne pasture. Data from the ABS farm census is normally available in aggregated form at state or local government area. As part of this project, data was purchased disaggregated at parish levels. As parishes are significantly smaller than local government areas, the ABS data was reaggregated according to catchment and soil type boundaries.

2.2 Corangamite salinity implementation survey (Amirtharajah 1997)

The Corangamite Region Salinity Strategy - 'Restoring the Balance' (Corangamite Salinity Forum 1993) identified seven on-farm land management techniques required to be adopted by land-holders if salinity was to be controlled. Establishment and improved management of perennial pastures are among these practices. These practices have set targets to be achieved. Measuring the progress in adoption of these practices and farmer attitudes towards them provides a measure of the success of the salinity strategy in the region. Hence, a farm survey was carried out in the area to measure the current adoption of these management practices and this can be used as baseline data in monitoring the future adoption rates of these practices. A stratified random sample of 154 farmers, based on shires in the region was selected for this survey. The Corangamite Shire (old Hampden and Heytesbury shires) was not included in this study as it was surveyed in the Glenelg Salinity Implementation Survey (Karunaratne & Barr 2001).

3 MEASURING PERENNIAL PASTURE ESTABLISHMENT AND MANAGEMENT

3.1 Pasture resown rates

3.1.1 Australian Bureau of Statistics

The questions on the ABS census from 1984 to 1990 asked the farmers for total pasture areas and areas sown or resown with pastures during the survey year (see Appendix 1). While these surveys could be used to compare the rates of pasture resowing, the survey questions do not distinguish between perennial and annual pastures. However, local knowledge suggests that the absolute rate of pasture resowing may be a reasonable indicator of measuring adoption of perennial pastures. Research in NSW and Victoria shows there is tremendous variation in the quality of pastures described as 'perennial' by farmers.

Pasture questions in 1991 to 1993 related only to the total pasture area, and did not measure the pasture resown area, making the information useless for measuring the adoption rates.

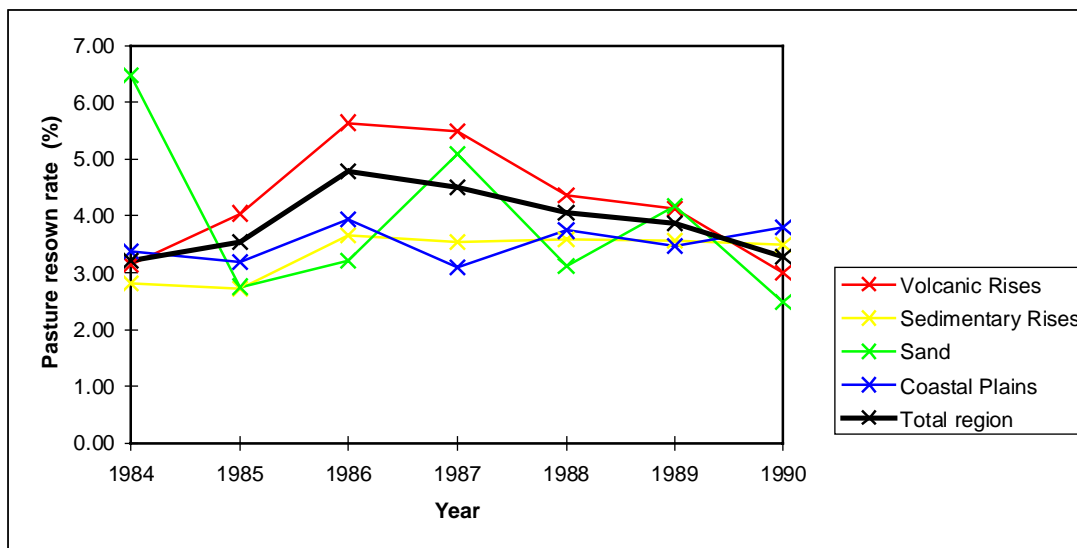
The ABS questions included in the 1993/94 survey provides the most valuable information on perennial pasture resown rates. This survey question distinguishes between the total area of pasture and the total pasture resown during that year. This allows the rate of pastures resown to be calculated. Another major advantage of this set of questions is that it separates lucerne, other perennial pasture and annual pastures in pasture mixtures.

The question in the 1994/95 census asked only for the amount of pastures sown or resown during that year and did not include the total pasture area. This difference between the two sets of questions during 1993/94 and 1994/95 has led to unreliable responses to 1994/95 question (many farmers filled in the total area of pasture rather than sown area). Hence, these results are not included in this report.

This inconsistency in the pasture questions in the ABS census during the last decade limits its role in determining a trend in perennial pasture and lucerne adoption rates.

A pasture question similar to the 1993/94 format was repeated in the 1995/96 and 1996/97 census questionnaires and the data therefore can be used as a measure of change in lucerne and perennial pasture adoption rates. The pasture questions utilised in different census years are shown in Appendix 1.

Total pasture resowing rates from 1984 to 1990 on different land management units are shown in Figure 2. Figures for the total region show a relationship between wool prices and pasture resowing rates. An increase in pasture resowing rates in the mid 1980s was associated with high wool prices, and a slight drop in the latter part of the 1980s was associated with a drop in wool prices. The trend towards increased resowing rates in 1986 was shown on all land management units. The Sand LMU covers only a relatively small area of the region and has a high incidence of wind erosion. This area deviated from the normal trend and had high resowing rates in 1987 and 1989. The Volcanic Plains LMU covers about one-third of the region and had the highest resowing rates during this period. As suggested earlier, this measure does not distinguish between the perennial and annual pastures, although it is still an indicator of changes in the resowing rate for perennial pastures.



Source: Australian Bureau of Statistics (1984-1990)

Figure 2 Pasture resown rate on different land management units in the Corangamite Region (1984-1990)

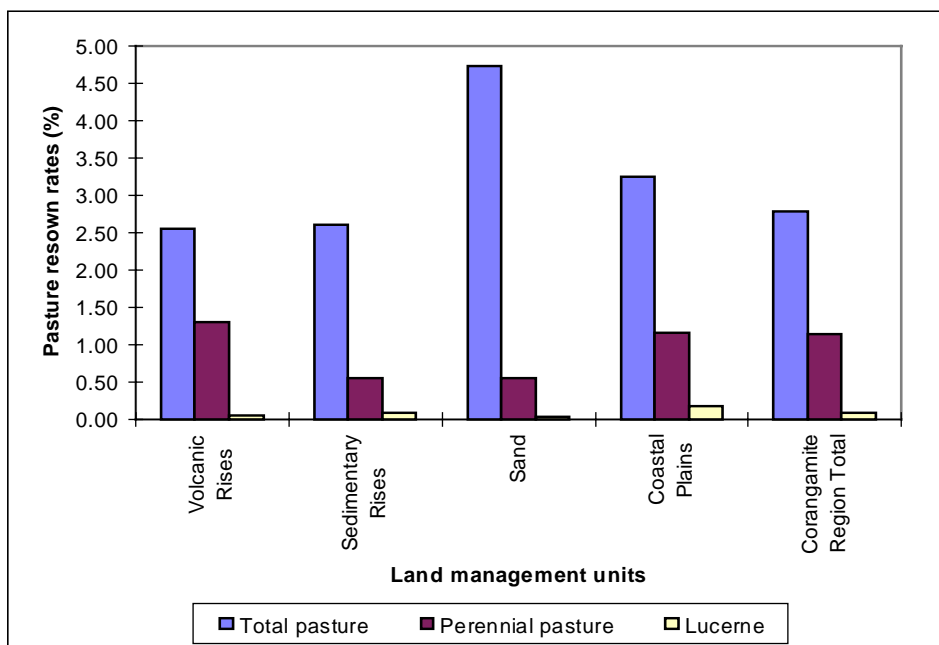
The 1993/94 ABS farm census data shows that 27 percent of the existing pasture was described as perennial pastures while another 4.6 percent was under lucerne pastures. However, field surveys suggest the quality of much of this existing perennial pasture may be low (Quigley & Morgan 1990).

For 1993/94, lucerne resowing rates were calculated considering pure lucerne resown during the season, together with a mixture of lucerne and other pasture species, as a percentage of total pasture area. Similarly the perennial pasture resowing rates included a category for use of a mixture of perennial grasses and legumes excluding lucerne. Only 1.1 percent of the total pasture area in the region was sown or resown with perennial pastures during the season, while only 0.10 percent was resown to lucerne. The Volcanic and Coastal Plains LMUs (where most of the hot spot areas were identified) dominated in both perennial pasture and lucerne resown rates. The Volcanic Plains LMU had the largest area of resown perennial pasture while the Coastal Plains LMU had the highest rate of resown lucerne (Table 1 and Figure 3). Perennial pasture and lucerne pasture resowing rates in 1993/94 at parish level in the Corangamite Region are shown in Figure 4. High resowing rates were concentrated in the north-west and south of the region.

Table 1 Pasture resown area (ha) in Corangamite Region according to LMUs (1993/94).

LMU	Lucerne	Perennial pasture resown	Total pasture area
Volcanic	224	4916	375677
Sedimentary	97	591	106027
Sand	4	57	10346
Coastal Plains	301	2055	177252
Corangamite Region Totals	626	7619	669302

Source: Australian Bureau of Statistics 1993/94

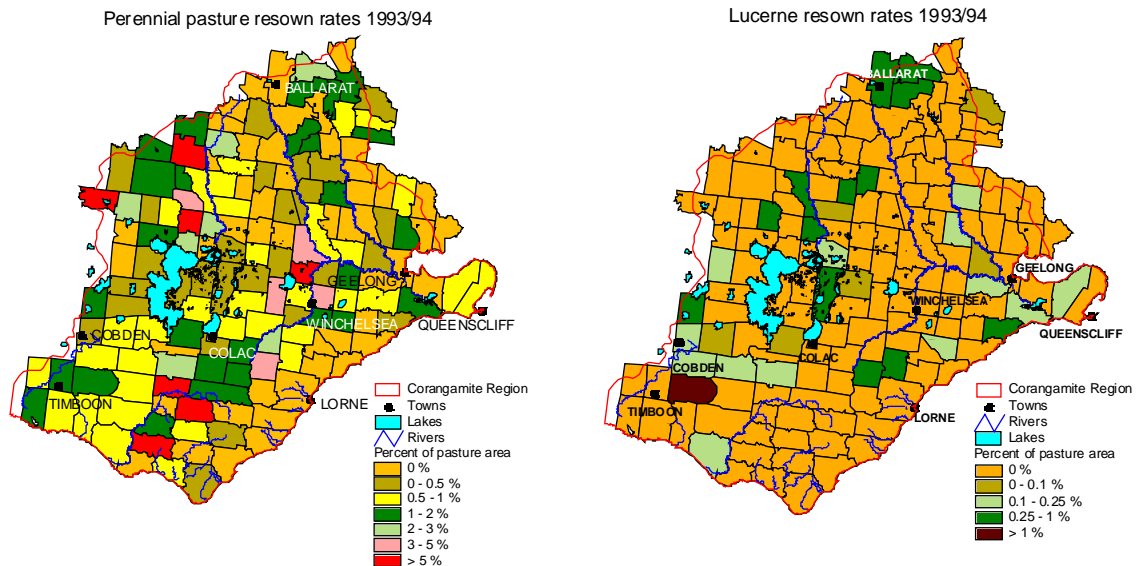


Source: Australian Bureau of Statistics 1993/94

Figure 3 Pasture resowing rates in the Corangamite Region (1993/94)

The 1995/96 farm census data shows that the percentage of existing pasture reported as perennial pastures had largely increased during the two years from 1994 to 1996, while the area of lucerne had significantly dropped within the same period (Table 2). However, there was an increase in both lucerne and perennial pasture resown rates, with 0.26 percent and 2.8 percent of total pasture area in the region being sown or resown with lucerne and perennial pastures respectively (Table 2). This trend was consistent in all land management units. The Coastal Plains and Volcanic Plains LMUs continued to be dominant in both perennial pasture and lucerne resown areas (Table 3). Perennial pasture and lucerne pasture resown rates in 1995/96 in the Corangamite Region are mapped in Figure 5.

There is a further increase in the reported perennial pasture area during the following year. Half the existing pasture was described as perennial pastures in 1996/97. The trend in perennial pasture resown rates continued to increase, while the measures for adoption of lucerne dropped during 1996/97. However, the lucerne resown rate for 1997 was still higher than the reported rate for 1994 (Table 2). Perennial pasture and lucerne pasture resown rates in 1996/97 in the Corangamite Region are mapped in Figure 6.



Source: Australian Bureau of Statistics 1993/94

Figure 4 Pasture resowing rates in the Corangamite Region (1993/94)

Table 2 Pasture resown areas in the Corangamite Region (1993/94-1996/97).

Measure	1993/94	1995/96	1996/97
Total pasture area (ha)	669302	484743	482394
Total pasture resown area (ha)	18605	25508	30772
Total perennial pasture area (ha)	180157	215478	244789
Total lucerne area (ha)	30847	8394	5518
Perennial pasture resown area (ha)	7619	13703	18364
Lucerne resown area (ha)	626	1261	959
Percent of perennial pasture (%)	27	44.5	50.7
Percent of lucerne pasture (%)	4.6	1.7	1.14
Perennial pasture resown rate (%)	1.14	2.8	3.8
Lucerne resown rate (%)	0.1	0.26	0.20

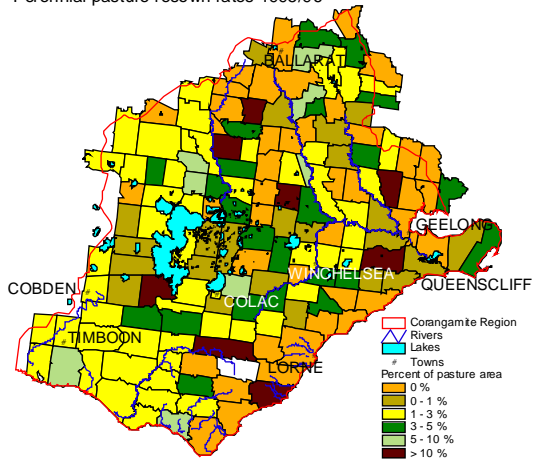
Source: Australian Bureau of Statistics (1993/94, 1995/96)

Table 3 Pasture resown area (ha) in the Corangamite Region according to LMUs (1995/96, 1996/97).

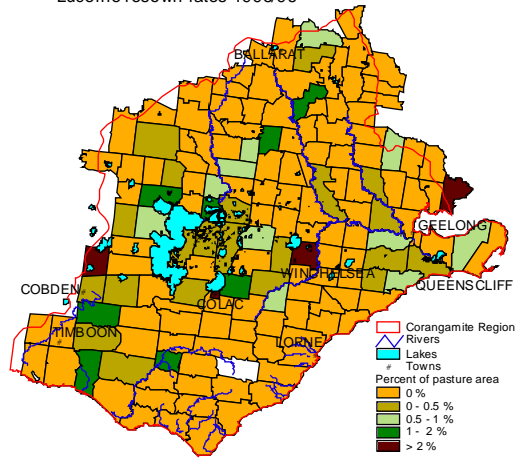
LMU	1995/96			1996/97		
	Lucerne	Perennial pasture	Total pasture area	Lucerne	Perennial pasture	Total pasture area
Volcanic Rises	523	8003	260945	326	9389	269216
Sedimentary Rises	118	1737	70242	164	3424	69638
Sand	24	104	6637	10	558	7799
Coastal Plains	596	3859	146919	459	4993	135742
Corangamite Region Total	1261	13703	484743	959	18364	482395

Source: Australian Bureau of Statistics (1995/96-1996/97)

Perennial pasture resown rates 1995/96



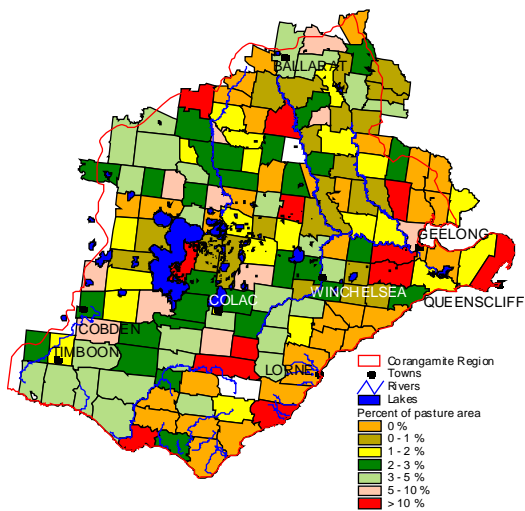
Lucerne resown rates 1995/96



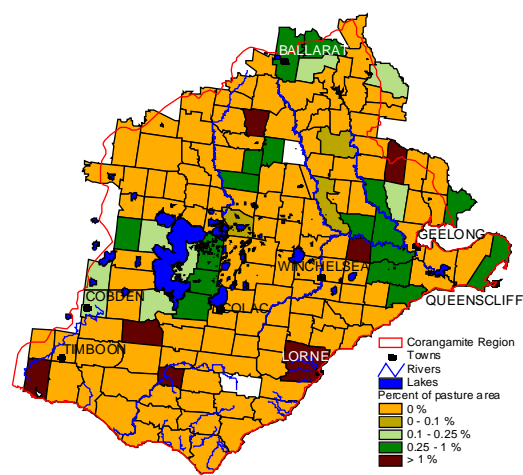
Source: Australian Bureau of Statistics (1995/96)

Figure 5 Pasture resown rates in the Corangamite Region (1995/96)

Perennial pasture resown rates 1996/97



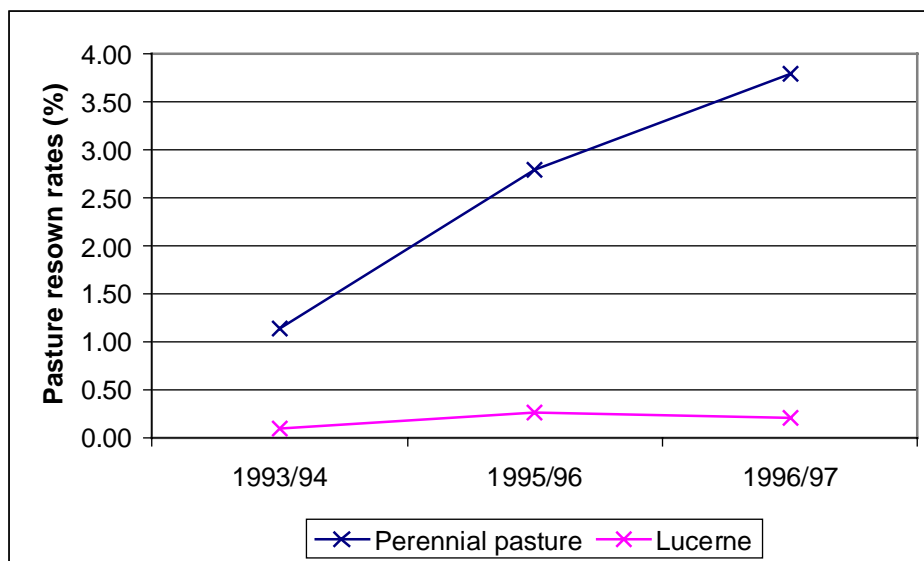
Lucerne resown rates 1996/97



Source: Australian Bureau of Statistics (1996/97)

Figure 6 Pasture resown rates in the Corangamite Region (1996/97)

Figure 7 shows the overall trend in pasture resowing rates in the Corangamite Region from 1993/94 to 1996/97. Perennial pasture resown rates have shown a significant shift over the period of four years, while the increase in lucerne resown rates was minimal.



Source: Australian Bureau of Statistics (1993/94-1996/97)

Figure 7 Trends in pasture resown rates in the Corangamite Region (1993/94-1996/97)

3.1.2 Corangamite salinity implementation survey (Amirtharajah 1997)

This study measured the existing pasture areas and not the pasture resowing rates in the region. Only 10 percent of the respondents had lucerne as a part of their farming system, covering only 0.4 percent of the total area surveyed in 1995/96. Fifteen percent of farmers intended to sow lucerne in 1996/97. The study also revealed that 22 percent of farmers in the surveyed area had grown lucerne in the past but no longer do so.

Eighty-six percent of farmers in the study area had perennial grass pastures on their farms in 1995/96 season, covering 55 percent of the total surveyed area. Fifty-five percent of respondents intended to sow perennial pastures in 1996/97.

3.2 Fertiliser applications on pastures

Fertiliser rates and frequencies of application play an important role in maintaining a stable perennial pasture growth free of weeds and inferior grasses. Poorly managed perennial pastures will have no greater impact on watertable control than will annual pastures. Hence, application of fertiliser on pastures is used as a proxy for measuring the level of pasture management undertaken by farmers in the region.

3.2.1 Australian Bureau of Statistics

In the 1987/88 agricultural census, farmers were asked the areas of pure lucerne, other pastures and crops fertilised, and the type and quantity of fertiliser applied. The 1988/89 and 1989/90 censuses collected the same information for total pasture areas but the questions did not separate pure lucerne from other pastures. A similar question was asked again in 1994/95 season. The 1995/96 census asked for the total pasture areas top-dressed or fertilised and did not collect information on types of fertilisers used. These sets of questions are shown in Appendix 2.

Forty-seven percent of the pasture area was fertilised by 62 percent of the farmers in 1987/88. Both the area fertilised and the number of farmers using fertiliser increased the next year, followed by a marked reduction in both these measures in 1990 (Table 4). The area fertilised in 1990 dropped significantly while the number of farmers using fertiliser remained almost the same, indicating a lower average area fertilised per farm. A further large drop in both area fertilised and farmers applying fertiliser was reported between 1990 and 1995, clearly a result of a prolonged period of poor wool prices. A pasture area similar to that of 1995 was again fertilised in 1996. The increase in the percentage of pasture area fertilised during this year was mainly a result of a large reduction in the total pasture area reported for 1996. The reduction in use of fertiliser is clearly related to the prolonged period of poor wool prices. However, the census data for 1996/97 reported a slight increase in both the number of farmers using fertiliser and the area of pastures fertilised in the Corangamite Region.

The rate of application of superphosphate as kilograms per hectare over the pasture area fertilised and the entire pasture area is shown in Table 5. There was a trend towards decreasing fertiliser rates during the period from 1988 to 1990 and a remarkable drop during the five years from 1990 to 1995 (Table 5). These rates were higher on the Volcanic Plains and lower on the Sedimentary Rises and Coastal Plains LMUs (Table 6). These measures were not available for the 1996 and 1997 seasons.

Table 4 Measure of fertiliser application on pastures in the Corangamite Region (1988-1997)

Measure	1988	1989	1990	1995	1996	1997
Pasture area fertilised, as a proportion of total farm area (%)	37.4	43.5	40.0	26.3	26.3	28.6
Proportion of pasture area fertilised (%)	46.5	53.7	48.5	32.4	44.4	48.6
Average area fertilised per farm (ha)	159.0	172.4	160.0	156.8	172.6	183.6
Percentage of farmers using fertiliser on pastures (%)	61.6	68.0	65.0	40.3	36.6	37.8
Percentage of lucerne area fertilised (%)	67.7	*	*	*	*	*
Percentage of farmers using fertiliser on lucerne (%).	58.2	*	*	*	*	*

Source: Australian Bureau of Statistics (1988-1997)

* Information for lucerne was not collected during these seasons

Table 5 Rate of application of superphosphate (kg/ha)

Measure	1988	1989	1990	1995
Rate per area fertilised	94.1	91.0	89.8	75.6
Rate per entire pasture area	43.8	48.9	43.6	24.5
Rate on lucerne pastures	130.0	*	*	*

Source: Australian Bureau of Statistics (1988-1995)

* Information for lucerne was not collected during these seasons

Table 6 Rate of application of superphosphate on different LMUs (kg/ha)

LMU	1988		1989	1990	1995
	Perennial pastures	Lucerne	Perennial pastures		
Volcanic Rises	105.2	138.5	98.0	97.6	96.8
Sedimentary Rises	75.6	124	73.1	82.8	73.9
Sand	86.9	170	93.2	93.8	114.8
Coastal Plains	92.2	84.0	91.0	84.5	55.4

Source: Australian Bureau of Statistics (1988-1995)

3.2.2 Corangamite Salinity Implementation Survey (Amirtharajah 1997)

The Corangamite salinity implementation survey collected information on top dressing of pastures (annual, perennial and lucerne based pastures) and reported 60 percent of land-holders top-dressed some of their pastures in 1995/96. Single superphosphate was the most commonly used fertiliser being applied at an average rate of 134 kg/ha. According to the study 74 percent of the respondents intended to top-dress their pastures in 1996/97. Future intentions are notoriously optimistic predictors of behaviour. Unfortunately, this does not give an indication of the proportion of pasture area fertilised, making it difficult to arrive at firm conclusions. Many farmers may be using fertiliser but only on small areas of their pasture.

4 UNDERSTANDING LOW RATES OF ADOPTION

In promoting the adoption of perennial pastures and improved pasture management practices, it is important to understand the factors influencing and/or limiting the use of these practices. These factors have not been researched in detail in the Corangamite Region. Several studies in the neighbouring Glenelg Region have identified these factors and have grouped graziers according to their commitment to pasture establishment and management. These same groups are used in this report as the best guide to understand the graziers in Corangamite Region.

4.1 Corangamite salinity implementation survey (Amirtharajah 1997)

This study looked at farmer attitudes towards various salinity management practices.

The majority of land-holders (75 percent) considered lucerne to be a high quality feed, but only 6 percent saw the importance of lucerne in lowering watertable and reducing soil salinity. Sixteen percent did not see any advantages in using lucerne, while almost one-fifth of the land-holders did not perceive any disadvantages in growing lucerne on their properties. Establishment and management difficulties were the two most common barriers identified by the rest of the farmers. The need to practise rotational grazing to obtain maximum advantage from lucerne was seen as a barrier by 10 percent of land-holders.

More farmers saw perennial pasture as a means to increase production rather than as a measure to reduce watertable and salinity. The ability to increase stocking rates and long-term profit were seen as advantages by 84 and 81 percent respectively. Lowering the watertable and reducing soil salinity were seen as important advantages by 19 percent and 21 percent of the respondents respectively. Only a minority of graziers did not see any advantages from growing perennial pastures, while sixty-one percent of land-holders reported no disadvantages. Difficulty in establishing the pastures was the main barrier mentioned by farmers. Weeds were also considered a major problem, while cost was not seen as a major disadvantage associated with including a perennial pasture in the system.

Achieving high pasture productivity, improving feed quality and increasing profits were the main reasons for top dressing pastures for almost all the farmers in the survey. One-third of respondents did not perceive any problems in top dressing, while 65 percent were concerned about the high cost involved in it. The need to increase stocking rates was also a concern to some farmers.

4.2 Summary of groups in the Glenelg Region as best guide for Corangamite Region

Most farmers have overcome the technical problems and constraints to pasture establishment. A lack of understanding of the new technologies and the driving forces for profit in farming systems prevented many farmers from utilising improved pasture management practices. Financial and labour constraints, concerns about loss of production and pasture availability for stock when land is out of production, as well as risk aversion, also contributed to this decision. Difficulty in seeing the benefits of new technology in the grazing industry at early stages is also a contributing factor to low adoption rates.

Studies in the Glenelg Region have identified different groups of graziers according to their commitment to pasture renovation. These groups have some similar characteristics across the different studies.

Only a minority of intensive graziers motivated by increasing productivity and production are adopting the total package of improved pasture management practices. These farmers have a good understanding of their production system and the driving forces for system's profitability. This group is willing to undertake challenges and try out new techniques on their farms.

The majority of graziers had a conservative approach to pasture management on their small areas of improved pastures. They believe it is not economic to resow or fertilise pasture while wool prices are low. Hence, they did not use high rates of fertiliser or stocks on their resown pastures and did not intend to do so in future. The cost of pasture establishment was their major concern. These farmers were risk averse and generally lacked an understanding of their farming system and key influences on profitability.

An intermediate group adopting part of the pasture improvement package was also identified. Farmers in this group were conscious of the risks associated with changes in management practices.

Another group with significant areas of perennial pastures were largely older farmers who were generally not interested in resowing or improved pasture management practices, even if the risk of these practices were minimised. These farmers were also risk averse.

5 RECOMMENDATIONS

The aim of this report is to provide baseline information and establish trends in adoption of pasture management practices in the Corangamite Region. The information in this report is based only on ABS census data and provides reasonable trends in adoption of these practices in the region. One of the limitations to using ABS data in determining the adoption trends is the changing formats of the question each year. The consistency of the format of questions is important in obtaining reliable information to measure trends in adoption rates. The adoption rates estimated from 1993/94 ABS data provides reliable information and can be used as a baseline to monitor future adoption of these practices. A question similar to the 1993/94 format was repeated in 1995/96 and in 1996/97 and provides suitable continuity in data. Hence, the same format can be used in future to estimate the adoption of perennial pastures.

The 1994/95 fertiliser question provides valid data to measure the use of selected fertilisers on established pastures. This does not provide information on other important maintenance practices in pasture management. The 1995/96 ABS census included a question on maintenance and management of established pastures which can be used in future to monitor the adoption of pasture management practices.

The format of this question is as follows:

ABS Pasture maintenance question in 1995/96

Maintenance and management of established pastures between 1 April 1995 and 31 March 1996	
Area of established pasture over which the following maintenance or management operations were carried out:	
	Hectares
<i>Top dressing of fertiliser</i>	<input type="text"/>
<i>Weed control or spraying</i>	
<i>Pest and disease control or spraying</i>	
<i>Slashing or burning (other than prior to sowing the paddock).....</i>	

To determine the adoption of improved grazing management techniques, and to identify and understand the factors influencing the use of the pasture management practices it will be necessary to collect more data on these issues by conducting surveys of graziers in the region.

6 REFERENCES AND DATA SOURCES

- Australian Bureau of Statistics (1994-1997) Parish aggregated farm census data supplied to Agriculture Victoria.
- Amirtharajah, M. (1997) Corangamite Salinity Implementation Survey: A Survey of Landholder Attitudes, Practices and Intentions for Salinity Control in the Corangamite Region. Department of Natural Resources and Environment, Hamilton, Victoria.
- Corangamite Community Working Group (1993) Landcare Plan for the Corangamite Region, Landcare Victoria.
- Corangamite Regional Catchment and Land Protection Board (1997) Corangamite Regional Catchment Strategy.
- Corangamite Salinity Forum (1993) Restoring the Balance - A Strategy for Managing Salinity in the Corangamite Salinity Region, Annual Report.
- Karunaratne, K. & Barr, N.F. (2001) A Baseline of Adoption of Pasture Management Practices in Glenelg Region, Department of Natural Resources and Environment, Bendigo.
- Quigley, P.E. & Morgan, T. (1990) Survey of Pastures in Victoria. Research Review 1989-90. Pastoral Research Institute, Department of Agriculture, Hamilton.
- Ridley, A.M., Slattery, W.J., Helyar, K.R. & Cowling, A. (1990) Acidification Under Grazed Annual and Perennial Grass Based Pastures. *Australian Journal of Experimental Agriculture* 30: 539-44.

7 APPENDICES AUSTRALIAN BUREAU OF STATISTICS FARM CENSUS QUESTIONS

Appendix 1 ABS pasture questions

ABS pasture question 1984-1990

Pastures (including lucerne, clovers and grasses) for all purposes		PASTURE AREA AT 31 MARCH 1985	PASTURE SOWN OR RESOWN 1984-85
<p><i>Exclude</i></p> <ul style="list-style-type: none"> Crops (e.g. oats) grazed or cut. <i>Include</i> these with crops in section 5 below 			
<p><i>Include</i></p> <ul style="list-style-type: none"> Areas oversown into native pasture or crops 	Pure Lucerne		
	Other pasture legumes only		
<p><i>Include</i></p> <ul style="list-style-type: none"> Lucerne sown with grasses 	-Clovers and/or medics		
	-Other pasture legumes		
	Sown grasses only		
	Mixture of grasses, legumes, etc		
	Native pasture		

ABS pasture question from 1991-1993

Pastures for all purposes at 31 March 1993		Total area of pastures at 31 March 1993 Hectares
<p><i>Exclude</i></p> <p>Crops (e.g. oats) grazed or cut. <i>Include</i> these with crops in Section 6 below</p>		
<p><i>Include</i></p> <ul style="list-style-type: none"> Areas oversown into native pasture or crops 	Pure lucerne	<div style="border: 1px solid black; width: 100%; height: 100%;"></div>
	Other pasture legumes	
	Sown grasses only	
	Mixture of grasses, legumes etc.	
	Other pastures (native and naturalised)	

ABS pasture question 1993/94

Pastures for all purposes at 31 March 1994		Total area of pasture at 31 March 1994 Hectares	Pasture sown or resown during year ended 31 March 1994 Hectares
<p><i>Exclude</i></p> <ul style="list-style-type: none"> Crops (e.g. oats) grazed or cut. Include these with crops in Part 1c below 			
	Pure lucerne		
	Other pasture legumes		
	Sown grasses only		
	Mixture of lucerne and other pasture species.....		
	Mixture of perennial grasses and legumes excluding lucerne		
	Mixture of annual grasses and legumes excluding lucerne		
	Other pastures (native and naturalised)		
<p><i>Include</i></p> <ul style="list-style-type: none"> Areas oversown into native pasture or crops <p>Perennial grasses include phalaris, cocksfoot and perennial ryegrass</p>			

ABS pasture question 1994/95-1996/97

Pastures sown or resown for all purposes during year ended 31 March 1997		Total area of pasture at 31 March 1997 Hectares	Pasture sown or resown during year ended 31 March 1997 Hectares
<p><i>Include</i></p> <ul style="list-style-type: none"> Areas oversown into native pasture or crops 			
	<p>Sowings including lucerne:</p> <p>Pure lucerne</p> <p>Mixture of lucerne and other pasture species</p>		
	<p>Sowings excluding lucerne:</p> <p>Pasture legumes only</p> <p>Mixture of perennial grasses and legumes</p> <p>Mixture of annual grasses and legumes</p> <p>Sown grasses only</p>		
<p>Perennial grasses include phalaris, cocksfoot and perennial ryegrass.</p> <p>Legumes include clovers, medics and vetch.</p> <p>Annual grasses include Wimmera rye grass.</p>			

Appendix 2 ABS fertiliser questions

ABS fertiliser question in 1987/88

**Artificial fertiliser used (whether applied by you, by contractors, or others)
Season 1987-88**

Exclude lime, gypsum and dolomite
Enter double and triple strength superphosphate as single strength equivalent,

Pastures and Crops Fertilised

Area Fertilised	Quantity and Type of Fertiliser Used				
	Super-phosphate (including super with trace elements)	Straight nitrogenous types (e.g. urea, sulphate of ammonia)	Straight Potash	Mixtures of super, and potash	Other artificial fertilisers including complex mixtures and mixtures containing nitrogen
Hectares	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes
Pure lucerne					
Other pastures (sown or native)					
Wheat					
Oats					
Barley					
Field peas					
Other cereals					
Oilseeds					
Vegetables for human consumption					
Fruit (including nuts)					
Grape vines					
Other (please specify)					

ABS fertiliser question in 1988/89 and 1989/90

Artificial fertiliser used (whether applied by you, by contractors, or others) Season 1988-89

Exclude lime, gypsum and dolomite

Enter double and triple strength superphosphate as single strength equivalent,

Pastures and Crops Fertilised

Area Fertilised	Quantity and Type of Fertiliser Used				
	Super-phosphate (including super with trace elements)	Straight nitrogenous types (eg. urea, sulphate of ammonia)	Straight Potash	Mixtures of super, and potash	Other artificial fertilisers including complex mixtures and mixtures containing nitrogen
Hectares	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes

Pastures sown or native

Wheat

All other crops

ABS fertiliser question in 1994/95

Use of selected fertilisers on established pastures (whether applied by you, by contractors or by others) - Season 1994-95

Exclude

- Pastures sown during the 1994-95 season

Area of existing pasture top-dressed with fertilisers specified below

Hectares

Note

- Use total fertiliser weight not weight of active constituents.

Single superphosphate used for top dressing existing pastures

Tonnes

High analysis fertilisers used for top dressing existing pastures

Super-potash blends used for top dressing existing pastures

Include

- Double and triple super-phosphate, MAP or DAP