

## Victorian agriculture 1904-2000: land use change or transition?

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### Abstract

The area of land used for agriculture in Victoria has probably declined by 15–22% from a peak in the 1940s. There appears to have been two distinct periods of time where the area of land used for agriculture has fallen: the late 1940s, and the 1970s–1980s. The significance of these declines in terms for land use policy is at least twofold. First, they could signal that a transition in land use is occurring that could facilitate revegetation, and potentially also biodiversity conservation. Second, the change could signal that there is a growing area of land held by landowners who are not the traditional targets of natural resource management policy initiatives. This is particularly relevant if the land is in an area where there are critical land management or biodiversity conservation issues. The South West Goulburn subcatchment of the Goulburn–Broken catchment is suggested as a possible example of this type of situation.

### Keywords

agriculture, biodiversity conservation, land management, land use

### Land use: snap shot of today

Explaining land use in Victoria might appear to be a simple matter. A broad and somewhat simplified representation of land use in Victoria is shown in Table 1.

**Table 1** General land uses in Victoria (ABS Agricultural Census, DPI data).

Land use	Area (ha)
Extensive livestock grazing	7 282 000
Extensive cropping	5 916 000
Irrigated agriculture	546 000
Forestry (on public land)	3 500 000
National State and regional Parks and reserves	3 750 000
Other Public land	608 000
Water bodies	479 000
Urban	306 000
<b>Total area of Victoria</b>	<b>22 755 000</b>

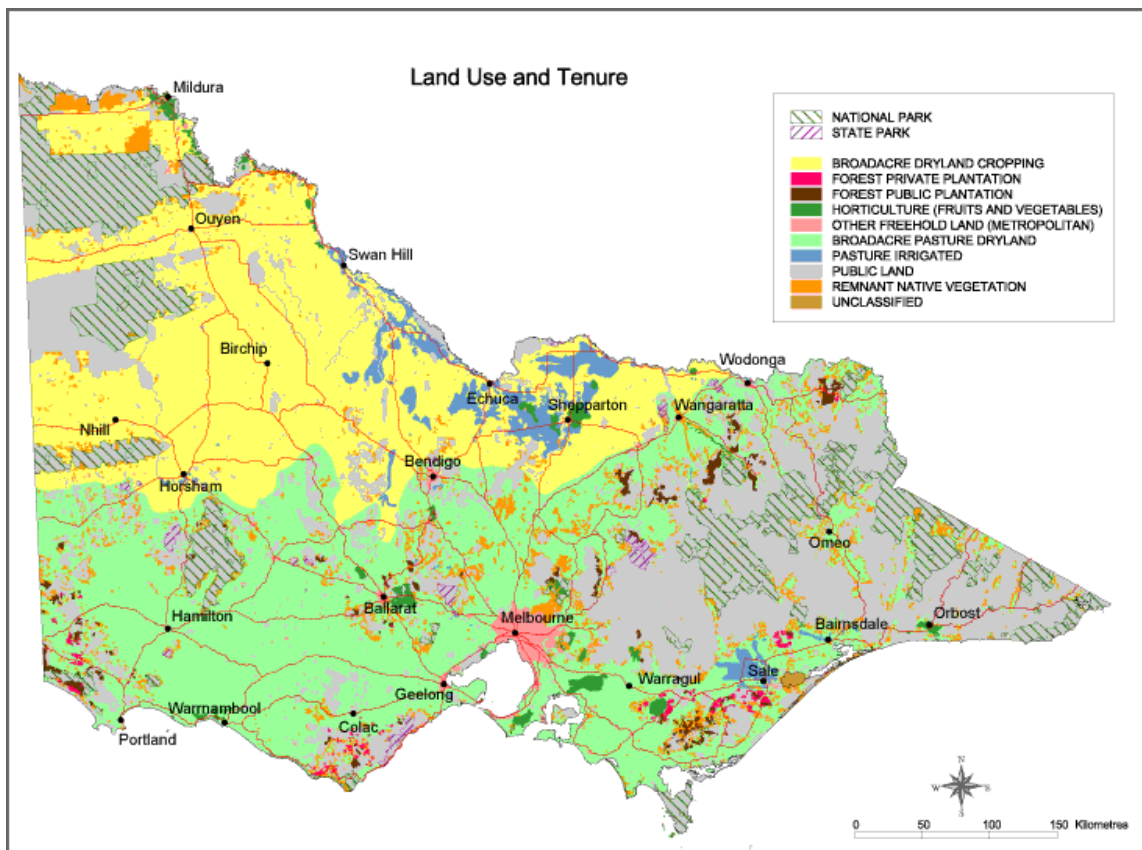
However, descriptions of land use are very much influenced by perspective. An example of these perspectives on land use can be seen in some general land use maps of Victoria shown in Figures 1, 2 and 3. Agricultural land use maps divide the state into classes such as irrigation, extensive dryland grazing, and cropping and other intensive uses (Figure 1). From a natural resource manager's point of view, the state is divided into catchments, where land use may be categorised into classes such as annual or perennial agriculture and native vegetation. From a flora and fauna perspective the State comprises a range of habitats, such as the ecological vegetation classes (EVCs) shown in Figure 2, or bioregions. From a mining industry point of view the state consists of geological structures that contain various deposits of minerals and petroleum (Figure 3).

It is perhaps illustrative to consider what is not classified in each of these cases. The agricultural land use map (Figure 1) colours all public land as one class, generally a solid grey,

implying no interests lie there. The map of the state's mineral and petroleum deposits also colour most public land as a single solid colour, but they are sometimes more explicit, labelling these as 'no-go areas' or similar. Those with a flora and fauna focus use maps that show everything in between the native vegetation (the EVCs) as white, implying that these areas hold nothing of value for them. These diverse views of the landscape each represent critical interests, each of which are accommodated in the diverse landscapes of Victoria. There appears to be no comprehensive view of land: each has their 'other'.

In addition to this, these perspectives are prone to change over time. Figure 4 shows a map of land use in Victoria in 1944 (reproduced from a report on the regionalisation of Victoria). The map shows the perspective of the day, with what is now the Alpine National Park and associated Crown lands classified as summer and range grazing.

Looking at biodiversity and land use change is a significant challenge, not least because it requires a unified view of land use in Victoria. At any one point in the landscape there are many simultaneous uses, and different stakeholders can view the same use very differently. A comprehensive view of land use is anything but a simple exercise.



**Figure 1** Agricultural land use in Victoria, 2000 (Victorian Resources On-line, [www.dse.vic.gov.au/vro](http://www.dse.vic.gov.au/vro)).

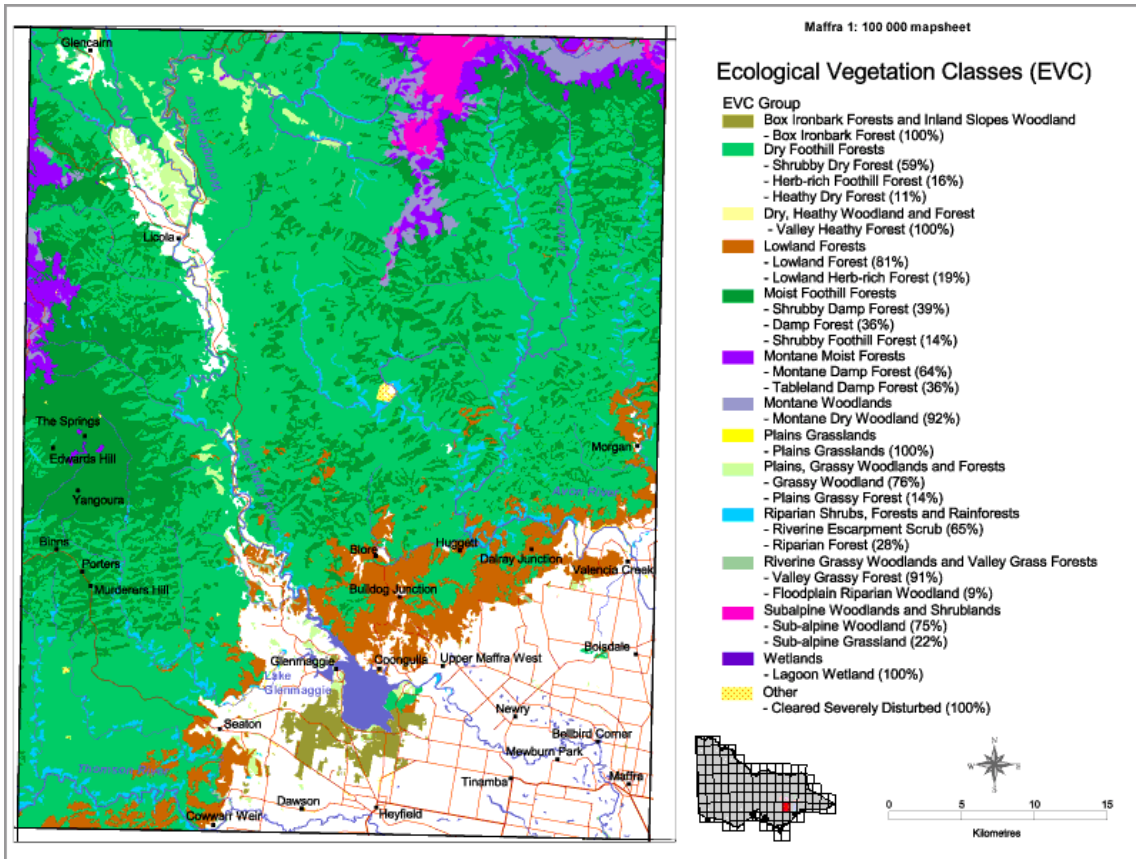


Figure 2 Ecological vegetation classes, Maffra, Victoria (Victorian Resources On-line, www.dse.vic.gov.au/vro).

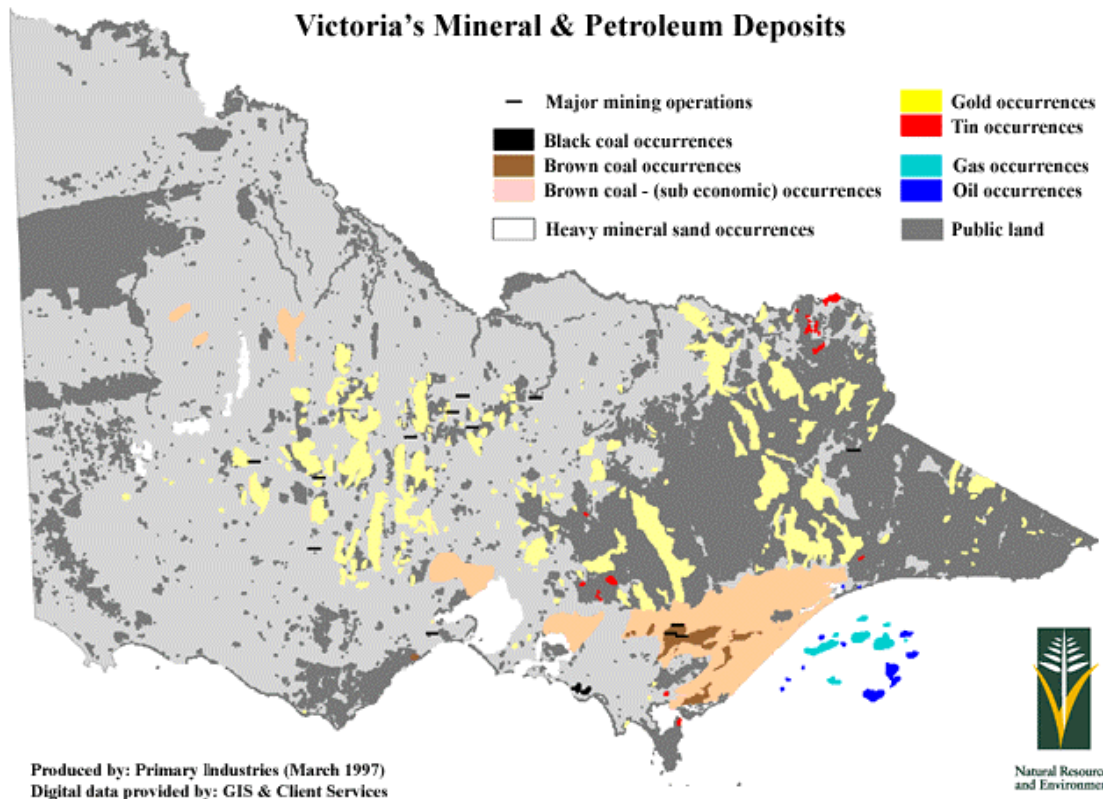


Figure 3 Map of Victorian mineral and petroleum deposits, 1997 (NRE, unpublished).



**Figure 4** Land utilisation in Victoria, 1944 (Victorian Resources On-line, ([www.dse.vic.gov.au/vro](http://www.dse.vic.gov.au/vro))).

### Land use: measuring it, classifying it

The challenge of measuring and classifying land use has been a subject of much debate both within Victoria and nationally. The Australian Land Use and Management Classification system (Bureau of Rural Sciences 2002) has been developed to address this wide variety of perspectives. This system, heavily influenced by Victorian natural resource scientists, is comprised of primary, secondary and tertiary classes, each with increasing definition. For example, one of the primary classes, 'primary production from dryland agriculture and plantations', includes secondary classes such as horticulture, farm forestry, and grazing improved pastures. In all there are over 100 possible classes within this system.

While land use may be one of the most commonly used concepts in natural resource management, its meaning varies greatly depending on the user and the issue at hand. In the case of this paper I have concentrated on just one high-level class of land use: agricultural land.

The data used in this paper is sourced from the Australian Bureau of Statistics (ABS). Until recently the ABS conducted an annual Agricultural Census. This census gathered a large range of data, but among the most elementary was the area of agricultural land and the number of farm establishments. The relevant question in the Agricultural Census asked the respondent to indicate their 'area of holding'. It further explained that this should include the land owned and operated by the respondent, including any leased land (ABS 2001). The responses to this question form the primary data for this analysis.

### Trends in area of agricultural land in Victoria

The area of land in Victoria that has been utilised for agriculture over most of the 20th century is shown in Figure 5. Until the 1930s the total area fluctuated dramatically. This is likely to have been caused in part to the closer settlement policies that were in place at this time. This includes the well-known Soldier Settlement Schemes. During this era these schemes operated in all parts of Victoria. They resulted in influxes of new farmers into rural areas, but then often also caused

dramatic and traumatic collapses of these new farms; so much so that the failures and hardship associated with the schemes were the subject of a Royal Commission in 1925 (Barr and Cary 1992).

Around the mid 1940s the area of agricultural land in Victoria appears to have peaked. At that time some 16.7 million hectares of land were occupied for agriculture. Following this peak there were two periods where the area of land used for agriculture declined rapidly: the late 1940s and the 1970s – early 1980s. By the late 1980s the total area of agricultural land used in the State had declined to just over 13.1 millions hectares, a decrease of 22%.

Beyond the 1980s data collection issues make interpretation more difficult. The time series shown in Figure 5 is broken during the 1990s because changes in the data collection mean that the series cannot be considered to be continuous through this period.

## Are the trends real?

### *The source data*

It is important to explore the validity of the data that underlies the observed trends. There are two elements to consider regarding this source data. The first is whether the data is exact, and the second is the whether the trend is real.

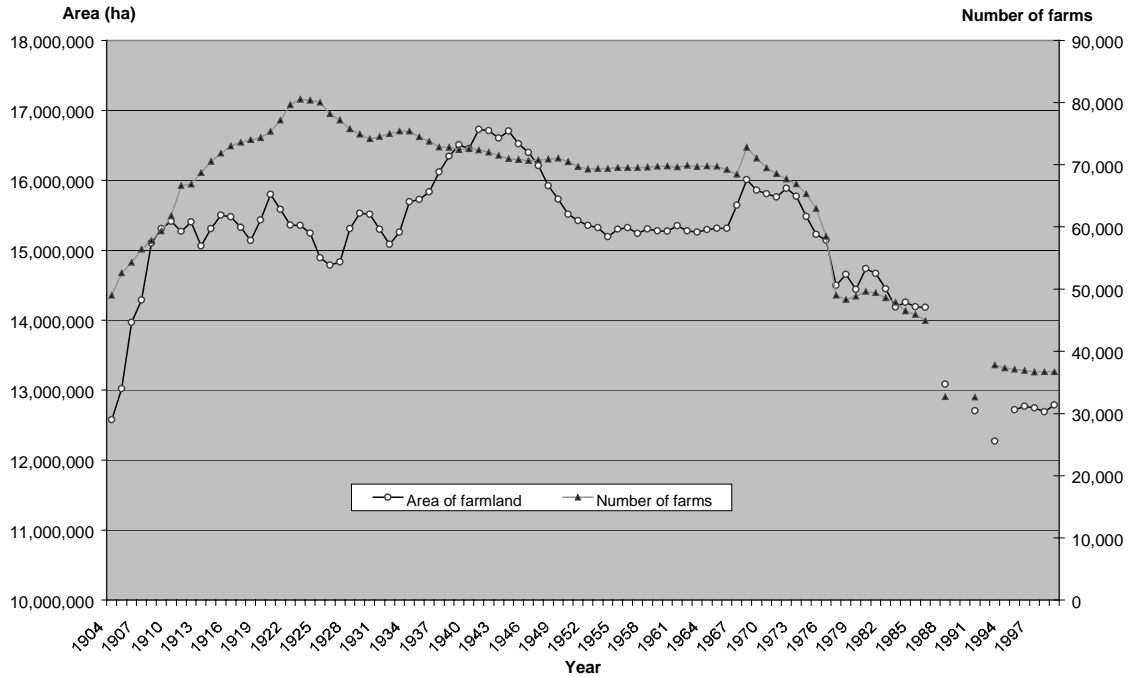
It is most unlikely that this data is a precise measure of all agricultural land in Victoria. There will be farms that were not included the ABS agricultural census. Even so, this does not detract from the focus of this discussion, which is on whether the trend is valid. In trying to establish whether the trend in the data is real, the key is whether the collection is statistically sound and whether the rules that govern who is included in the census have been consistent over time.

Changes in the census collection population and the criteria for inclusion in the census can make time series problematic. However, in the case of this data, the collection base or rules appear to have been quite stable up until the 1980s. That is, the data from 1904 until 1976 includes those properties that have an ‘area of 1 acre and upwards’. From that year forward, establishments were only included in the reported census data if they met a minimum estimated value of agricultural operations (EVAO). These minima varied over the subsequent years, as is shown in Table 2. These changes make time series problematic, particularly through the 1990s.

**Table 2** Changes in the ABS minimum EVAO over recent years.

Year	EVAO
1977 – 1981	\$1500
1982 – 1991	\$2500
1992 – 1993	\$22500
1994 – 1997	\$5000

The key conclusion from considering the ABS data collection is that it appears that there have not been major changes in the census technique or collection population over most of the period we have examined. In particular this applies to the two key periods when there appears to have been significant declines in the area of agricultural land. Table 2 also suggests that time series data after 1991 is likely to be problematic. The shifts up and down in the EVAO mean that the data in this period would not be reliable as a time series. This is why the series in Figure 5 is discontinuous in the 1990s.



**Figure 5** Area of agricultural land and number of farm establishments, Victoria, 1904–1999 (Australian Bureau of Statistics data).

### *Periods of decline in area of farmland*

In further investigating whether the trends in area of farmland are real, the logical question is whether the sharp declines in area during the 1940s and the 1970s are plausible. That is, do they correspond with events that could have led to declines in agricultural land.

#### The 1940s decline

South-eastern Australia experienced major droughts in 1937–38, 1940–41, and 1943–45 (Bureau of Meteorology 2002). In addition to these natural events, the years during and following the Second World War were clearly a time of major social upheaval, which must have affected the farm sector.

It is particularly notable that during the decline in area in the 1940s the number of farms was more or less constant. No doubt there could have been numerous factors at work simultaneously at this time, one of which was likely to be soldier settlement schemes. The Victorian Soldier Settlement Commission was formed in 1945 and commenced acquiring existing farms and setting apart suitable Crown land (ABS 1959). The vast majority of the land used for the scheme was existing privately held land (480,000 ha compared to 48,000 ha). By the late 1950s almost 3,000 holdings had been allocated to settlers. Overall it could be said that this process produced 3,000 more farm establishments with little increase in total farmland.

This raises the possibility that decreases in farm numbers may have been masked by soldier settlement. With no obvious major driver at work to decrease the area of farmland used in this era, it is unclear whether the declines shown in the data for this period really occurred. The strongest factor in favour of the decline being real is that the data collection population over the period appears to have been quite stable. In fact it could be argued that the pattern of area decline with farm numbers stable is consistent with areas of the state being removed from agricultural use while the Soldier Settlement Scheme maintained, and increased farmer numbers on the remaining areas.

### The 1970s decline

The decline in the 1970s corresponds very closely with a decline in the number of farm establishments. This decline in farm numbers is characteristic of a period of structural adjustment, where pressures on farm enterprises to 'get big or get out' are at work. Over this period, three major factors had dramatic impacts on agriculture in Victoria: the beef market crash, the impact of the entry of the UK into the European Common Market, and drought.

In 1974 the Australian beef industry was plunged into a recession by the sudden and almost simultaneous loss of exports markets in the USA, the European Community and Japan (Campbell 1980). In the mid 1970s beef prices in the Sydney market fell by two-thirds in less than two years. Low prices, and in particular a low producer share of the price, was the pattern in beef for most of the 1970s.

Many export-oriented industries in Australia were very heavily affected by the belated entry of the UK into the European Community in 1973, but none more so than the dairy industry (Campbell 1980). It ended the favoured access to the UK market that the Australian dairy industry had enjoyed, with serious repercussions for the industry in Australia. This came on top of some of the earliest government-backed initiatives to restructure the industry.

The Bureau of Meteorology reports that south-eastern Australia experienced a series of droughts from the mid to late 1960s into the 1970s. The 1964–68 drought is considered to be one of the most severe ever. This was quickly followed by another severe drought in 1972–73, and again in 1976 (Bureau of Meteorology 2002).

All three of these factors drove farmers to increase the size of their operations to remain viable or leave farming. Considering these events, it would appear that a decline in both area of farms and farm numbers over the 1970s is plausible, and perhaps likely.

In considering both of these periods of decline in area of agricultural land, these factors suggest that on the balance of probabilities, the trend being demonstrated in the data reported here is real. That is, from a peak in the 1940s of 16.7 million hectares, the area of farmland in Victoria had declined by at least 15%, to 14.2 million hectares, by 1986.

An indication of the order of magnitude of this decline in area is gained by considering that it is approximately the same as the total area currently farmed in Victoria's Western District.

Given that the pressures for structural adjustment in agriculture have continued to increase over the last 10–15 years, there has probably been further declines in the area of agricultural land in use in Victoria. The data used here suggest that the overall decline could be as high as 24.1% (that is, down to 12.7 million hectares) by the late 1990s. This latter conclusion should be treated with caution because the reliability of the time series data is affected by changes in the collection rules applied by the ABS.

### **Examining the trends by region**

The changes in farmland area have been further examined by region for two reasons:

- to further investigate the plausibility and causes of a decline in area of agricultural land
- to examine whether the decline has implications for policy related to land use change and biodiversity.

In examining more closely where the changes in the area of agricultural land have occurred, the time series issues with ABS data come to the fore. Changes in the boundaries of the regions used by the ABS mean that precise time series by region cannot be produced. However, it is still possible to examine time series of slightly aggregated regions. Again, it is important to understand that while the data here will not be strictly accurate, the analyses are still useful in indicating the trends and suggesting where the changes in area are likely to have occurred. Thus the focus is also on the trend rather than on the absolute change. The regions that have been created and used in this part of the analysis are shown in Table 3.

As mentioned earlier the two key periods of change in area of agricultural land were the 1940s and the 1970s. In the following sections these two periods are examined by region in order to further understand the nature of these changes.

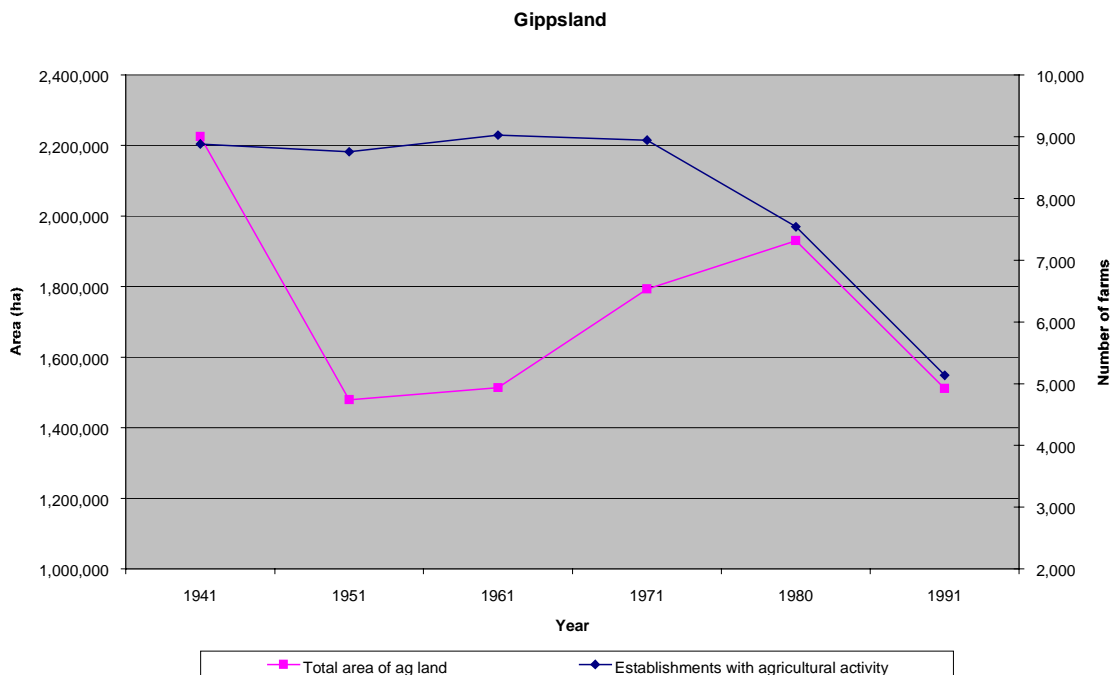
**Table 3** Regions created for time series analysis.

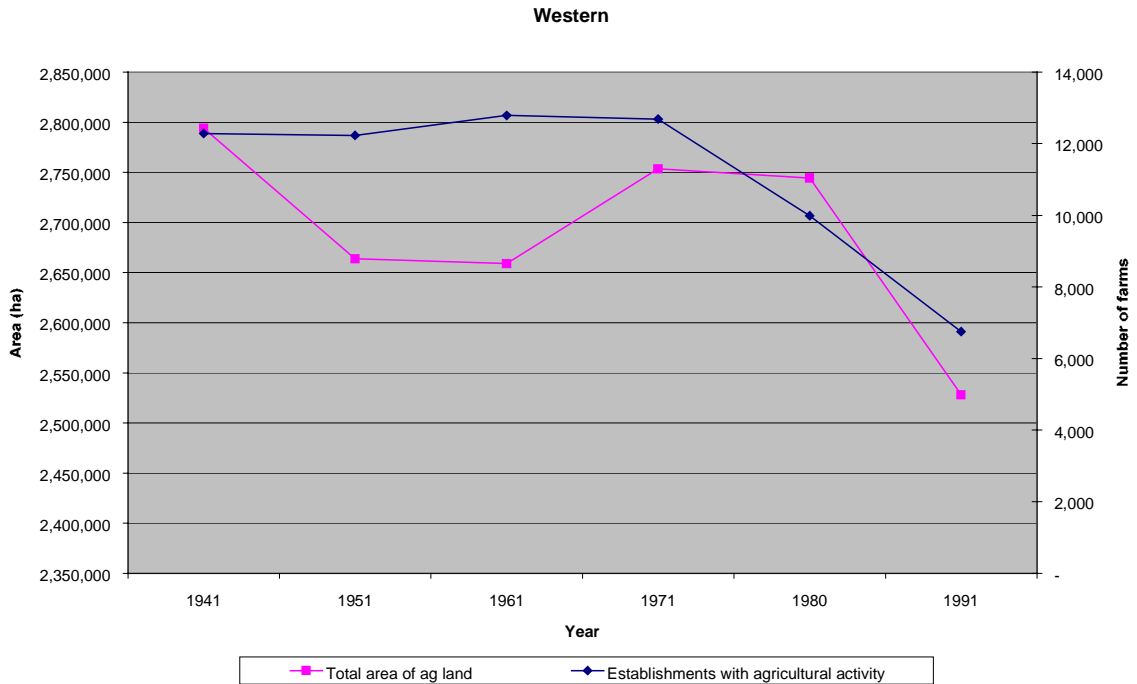
Region	Explanation
Gippsland	West Gippsland + East Gippsland
Central	Melbourne area + fringes
Wimmera – Mallee	Wimmera + Mallee
North East	North East
Western	Western + Central Highlands
North Central – Goulburn	North Central + Goulburn

### *The 1940s decline*

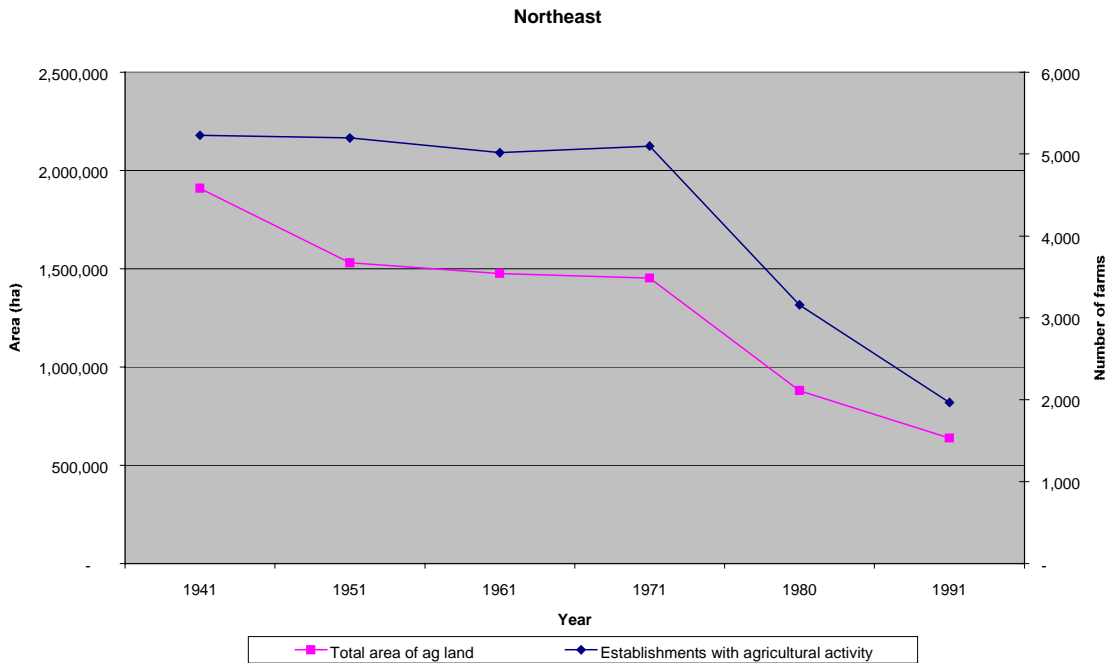
An examination of the data from the regional perspective does not reveal any obvious explanation for the declines in area of farmland in this era. The case still remains that the collection base did not change over the period, which suggests that the decline, which is centred on the Gippsland, Western and North East regions, really occurred rather than being some artefact of the data collection.

Figures 6, 7 and 8 show the time series for Gippsland, the Western region and North East Victoria. The decline in area in the 1940s can be clearly seen in these three regions, particularly Gippsland. Other regions did not show declines in area of farmland over this same period. At the state-wide level, a distinct feature of the decline in area over this period is that it was not accompanied by decreases in farm numbers. This pattern also holds true for the regions (Figures 6, 7 and 8). It is worth noting that Figure 5 shows that the decline in farmland area began after the war. As mentioned earlier, understanding this change could be complicated by the activities of the Soldier Settlement Schemes of that era. The Soldier Settlement Scheme was active throughout the state after the Second World War; Gippsland, for example, saw 200 new enterprises established (McRae 1976). This supports the suggestion made earlier that, while the area of farmland was declining, the closer settlement schemes were expanding.

**Figure 6** Area of farmland and number of farm establishments in Gippsland, 1941–1991.



**Figure 7** Area of farmland and number of farm establishments in the Western region, 1941–1991.



**Figure 8** Area of farmland and number of farm establishments in the North East region, 1941–1991.

In Gippsland (Figure 6), it is possible that the decline reflects reduction in leased grazing land. More detailed data shows that in the 1940s there was a large decrease in the area of what the ABS called ‘natural grasses’. As the State Regional Boundaries Committee Report of 1944 stated, ‘natural pastures are the main source of production’ in for East Gippsland. It also stated that ‘the upland areas of Crown Land and Forest are used extensively for range grazing’.

### The 1970s decline

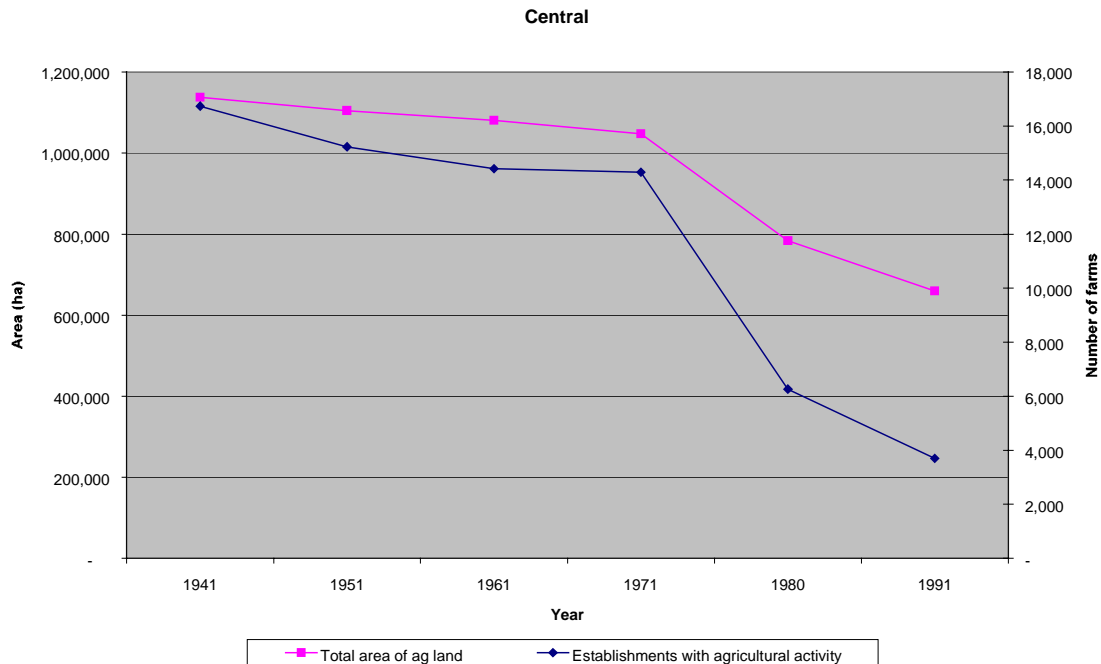
The decline in area in the 1970s seems to be more widespread than the 1940s decline. It is shown quite clearly in Figures 8, 9, and 10 covering the North East, Central and Wimmera–Mallee.

As mentioned earlier, a number of factors influenced Australian agriculture over this period. The recession in the beef industry would have had particular impact on the North East and Central regions, with drought and changes in export market access having a strong impact on the Wimmera–Mallee region. The declines in the Wimmera–Mallee may well reflect withdrawal of production on land leased for grazing, particularly public lands.

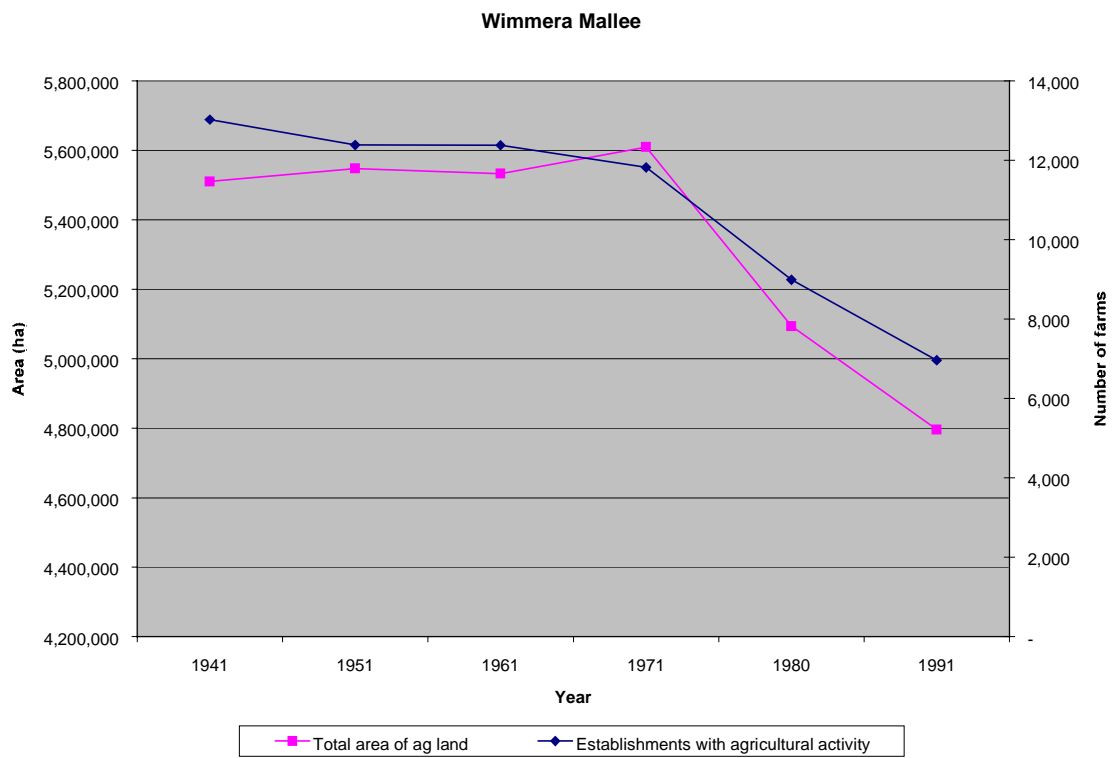
Declines in the Central and North East regions appear to show a sustained pattern. That is, in both regions the declines continue on a similar trajectory into the 1980s. The fact that the farm numbers show a parallel decline suggests that there was adjustment pressure at work in this period. That is, terms of trade or the cost–price squeeze is exerting pressure on farm size, driving farms to become larger to remain viable. However, this may not fully explain the decline in area of farmland. Given the regions involved here, another explanation of the declines in both farmers and area of farmland is that land is moving into amenity uses, such as part-time and hobby farming. This sort of change would mean that this land drops out of the census, and thus would contribute to a decline in farmer numbers and farmland area.

The State's dairy regions did not show strong declines in the area of agricultural land, but they did show declines in the number of farms. This perhaps indicates that the dairy industry issues in the 1970s did not cause actual loss of farmland, but rather the classic adjustment pattern of fewer larger farms.

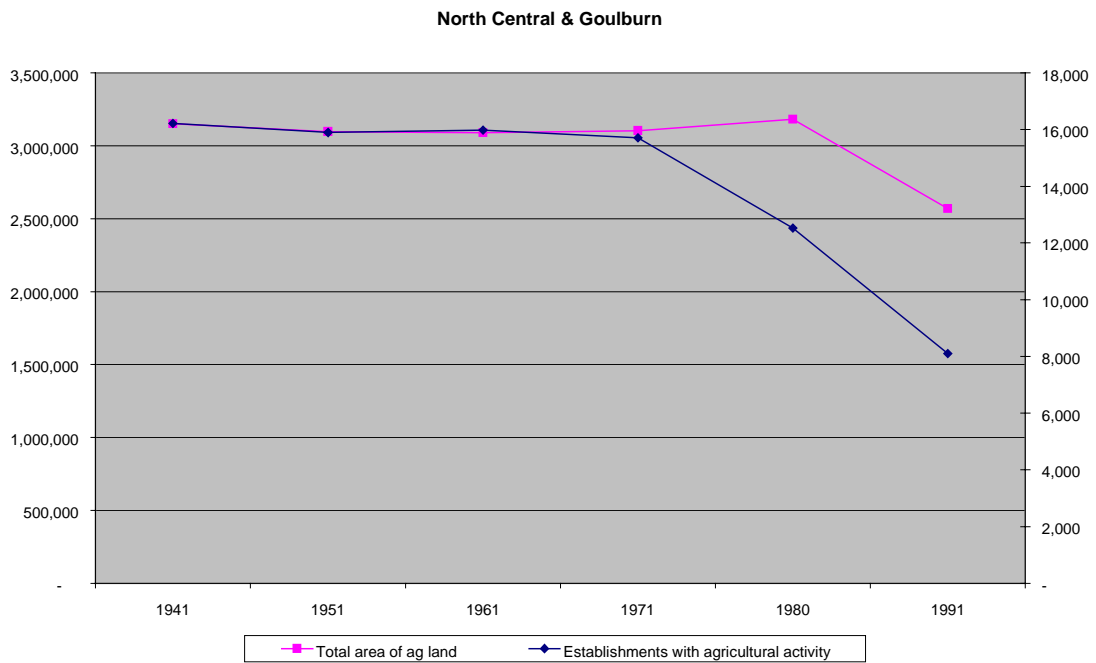
Figure 11 shows the same time series for the North Central – Goulburn region. This does not show any decline in the area of farmland until the 1980s. Declines in both farmer number and area are common across all six regions for the 1980s. This suggests systemic changes to agriculture across the state. Over this period adjustment pressures continued across all agricultural industries, and agricultural uses of land continued to move from full-time farming to part-time or hobby farming.



**Figure 9** Area of farmland and number of farm establishments in the Central region, 1941–1991.



**Figure 10** Area of farmland and number of farms in the Wimmera–Mallee region, 1941–1991.



**Figure 11** Area of farmland and number of farms in the North Central – Goulburn region, 1941–1991.

### The significance for land use change and biodiversity

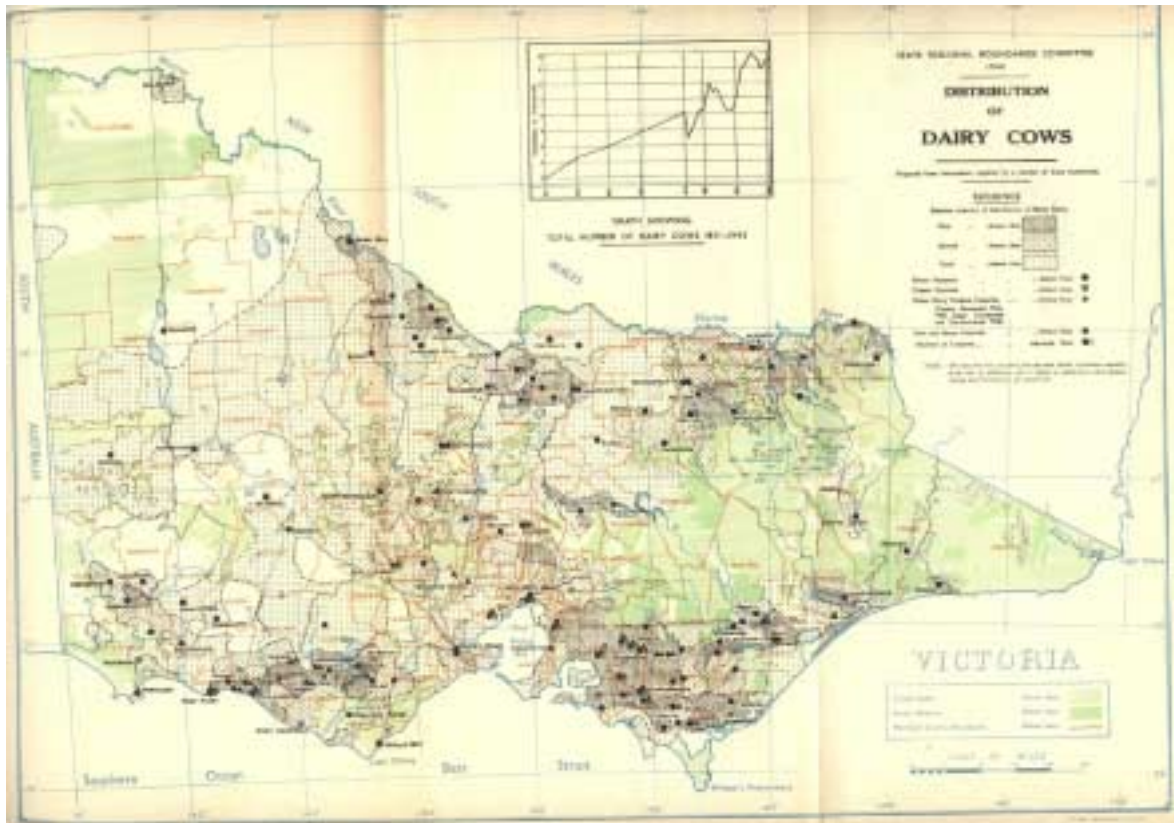
The analysis above has attempted to establish that it is both credible and plausible that there has been a decrease in the area of Victoria used for agriculture over the last 50 or 60 years. The trend has been very strong through the 1970s and 1980s. The key question here is to consider the significance of this for biodiversity and other land management policy issues.

#### *Land use in the 1940s*

If agricultural land use peaked in the 1940s, it is worth considering land use in the state at that time. By a remarkable coincidence, a comprehensive study on regional Victoria was completed in 1944. This study gives us an extraordinary insight into land use at that time.

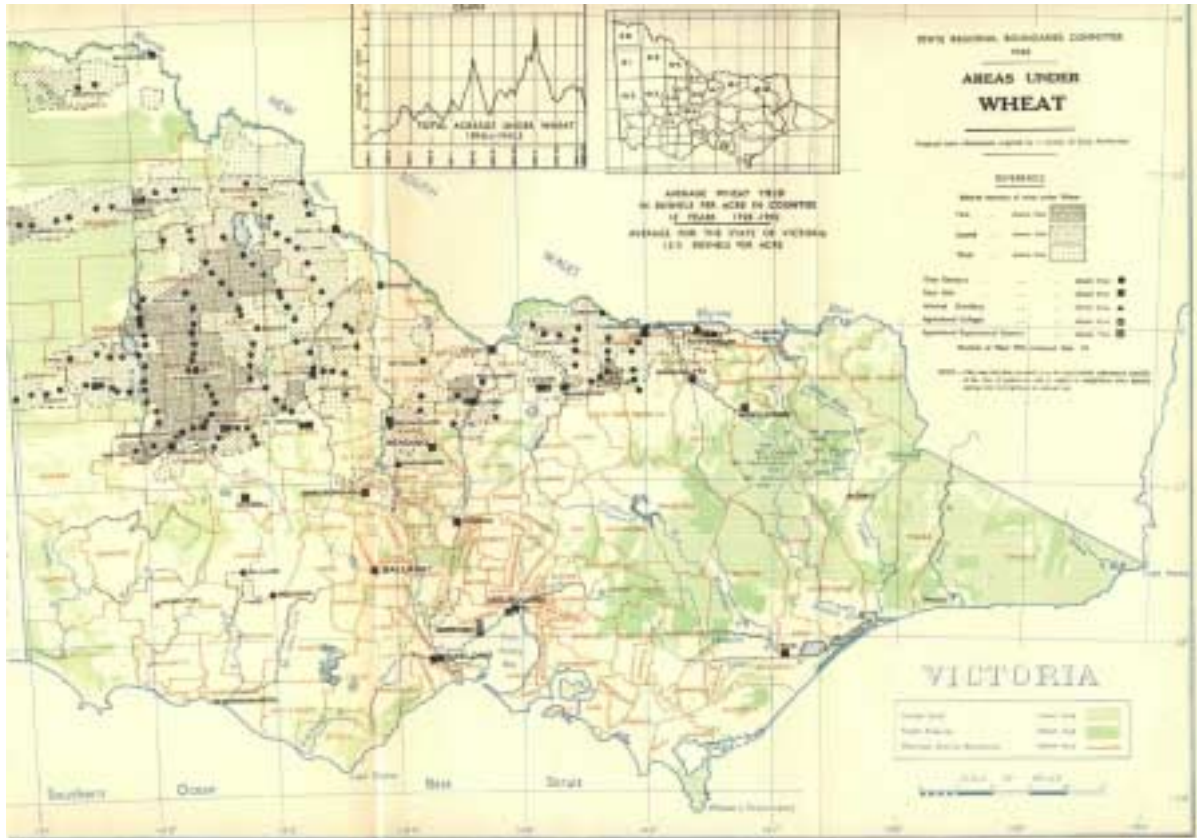
The study was conducted by the State Regional Boundaries Committee who were given the task of recommending 'the Regional boundaries which might be adopted within the State of Victoria.' In their 'Report on Regional Boundaries'<sup>1</sup> this Committee presented a selection of maps that give a picture of land use at that time. An overall land utilisation map was referred to earlier. The maps of dairying areas (Figure 12) and wheat-growing areas (Figure 13) reveal massive changes in these industries. Their locations are largely unchanged, but huge structural changes in the industries are evident.

Figure 12 shows that there were as many as 110 dairy factories across the state, yet today the industry is dominated by half a dozen large factories and a dozen or so small operations. Similarly, the map of wheat-growing in 1944 (Figure 13) shows a dense network of almost 150 grain elevators across northern Victoria. Today the industry is very different, with a far smaller number of grain-holding facilities. These types of changes point strongly to the social impacts of agricultural industry and land use change.



**Figure 12** Distribution of dairy cows in Victoria, 1944 (Victorian Resources On-line, [www.dse.vic.gov.au/vro](http://www.dse.vic.gov.au/vro)).

<sup>1</sup> More information from this report is available from Victorian Resources On-line ([www.dse.vic.gov.au/vro](http://www.dse.vic.gov.au/vro)).



**Figure 13** Areas under wheat in Victoria, 1944 (Victorian Resources On-line, [www.dse.vic.gov.au/vro](http://www.dse.vic.gov.au/vro)).

### *Land use trends*

In a number of ways the trend in agricultural land use that has been suggested here is not surprising. The long-running adjustment pressures on farms have resulted in a steady decline in the number of farmers. These adjustment pressures are unlikely to diminish any time soon, with globalisation maintaining the pressure for more efficient production. In parallel there has been an intensification of agricultural enterprises with major growth in intensive horticulture and intensive grazing operations in the state's irrigation areas.

From a broader perspective, this pattern of land use change could be associated with a well-studied land use pattern known as the forest transition (Rudel 1998). This transition is a long-term pattern that is characterised by an initial rapid deforestation during the early stages of economic development. As industrialisation and urbanisation becomes more prevalent, the social and economic forces change bringing, about rural to urban migration and abandonment of some agricultural lands. This leads to a turnaround in forest cover, with reforestation becoming more prevalent than deforestation. This trend has been empirically analysed and can be demonstrated in a number of countries, including Japan, the USA and Canada. Reforestation in these regions occurred under two particular conditions associated with economic development: a slow rate of population growth and a highly urbanised population (Rudel 1998).

In considering whether there may be signs of a 'forest transition' occurring in Victoria, an additional simple accounting-style analysis of current land use may be useful. Table 4 shows a current breakdown of land use in Victoria. Again this data should be treated with some caution. The figure for the area of farmland is drawn from the ABS Agricultural Census for 1997, whereas the other areas in this analysis are measured from satellite imagery. The analysis does suggest that there may be a supply of land that is not traditionally considered to be used for commercial agriculture. This is consistent with other work that suggests that there is a growing pool of land moving into what might be called 'amenity agriculture' (Barr 2000).

**Table 4** A 'balance sheet' of land use in Victoria, 2000 (DPI and ABS data).

<b>Land use</b>	<b>Area (ha)</b>
Public land	7 857 000
Urban	305 000
Water bodies	478 000
Farmland	12 789 000
Not accounted for	1 326 000
Total area of Victoria	22 755 000

### *Policy Implications*

There are at least two policy issues raised by this work. First, the downward trend in agricultural land use may in fact be supplying land for uses other than agriculture, which could well include revegetation for biodiversity conservation. The key issue is whether this 'supply' can be analysed further to understand its potential significance for biodiversity conservation objectives. These parts of the landscape could represent 'easy wins' for biodiversity conservation. There would clearly be a need for further analysis of where this land is and whether it represents potentially significant areas for biodiversity.

Second, we appear to have a growing pool of landowners who are unlikely to be influenced by traditional information and extension services. If they happen to manage land that has important habitat or is critical to major land management issues such as salinity, our current approaches may not be adequate.

To illustrate these policy issues, consider the South West Goulburn subcatchment of the Goulburn Broken catchment. This subcatchment covers just 10% of the Goulburn Broken catchment and is located around Kilmore, Seymour and north to Rushworth. The area's close proximity and easy access to Melbourne has resulted in the rapid growth of lifestyle farms, to the point where there are now more than 1600 landowners in this relatively small area. Many landowners in the region generate the majority of their income off the farm. This area could be a good example of what Barr (2000) refers to as amenity agriculture. Very few of these landowners would be part of the ABS agricultural census, so their land is likely to be in the 'area not accounted for' in Table 4. This area is clearly in the midst of a significant transition of land use.

A critical characteristic of this small region is that it contributes a massive 35% of the salt load in the Goulburn Broken catchment. This makes it one of just a handful of subcatchments in the entire Murray–Darling Basin that contributes in excess of 6 tonnes of salt per square kilometre per annum. To ignore, or fail to influence land management in this region is likely to have serious impacts on attempts to manage salinity in the Goulburn Broken catchment. A further issue is the biodiversity assets that may exist within the subcatchment.

### **Conclusion**

Agricultural land use in Victoria is in the midst of change. In the 1940s the area of agricultural land in Victoria peaked at around 16.7 million hectares. By the late 1980s this had declined by 22%.

This type of change is consistent with a long-term pattern of land use change that has been observed in other developed economies, and is referred to as the 'forest transition'. It results in land moving out of agricultural use as society becomes more urbanised. In the case of Victoria it appears that this transition is occurring across much of the state, but particularly in areas where there is growth in part-time and lifestyle farming.

The transition may offer opportunities in areas like biodiversity conservation and improvement. The threat is that the pattern of land ownership in these areas may mean that these landowners are not targeted by traditional extension practices.

Understanding more about this transition — where it is happening, what uses land is moving to — is critical to capturing opportunities for benefits from the change.

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