

# Re-valuing the Fringe: Some Findings on the Value of Agricultural Production in Australia's Peri-Urban Regions

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## Abstract

The agriculture that occurs in Australia's peri-urban regions is not well understood, nor has its economic value ever been examined systematically. Using a spatial frame derived from research into population change, Agricultural Census data are used to calculate the value of this agricultural production. The analysis suggests that peri-urban regions in the five mainland States produce almost 25% of Australia's total gross value of agricultural production. Evidence gathered from other surveys suggests that, in some respects, this may be an underestimate. Although qualified and provisional, these findings have important strategic implications for agricultural development, urban and regional development and, ultimately, sustainable development. However, peri-urban issues are often submerged in public policy deliberations, and peri-urban agriculture is poorly served by the Agricultural Census.

**KEY WORDS** *peri-urban; exurban; urban fringe; agricultural production; gross value; Agricultural Census; Australia*

## ACRONYMS

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
BIMPR	Bureau of Immigration Multicultural and Population Research
ESD	Ecologically Sustainable Development
ESLM	Ecologically Sustainable Land Management
GVAP	Gross Value of Agricultural Production
NLWRA	National Land and Water Resources Audit
NAPUA	National Audit of Peri-urban Agriculture
NSW	New South Wales
RIRDC	Rural Industries Research and Development Corporation

## Introduction

Peri-urban regions are those superficially rural districts within the sphere of influence of adjacent urban centres. Alternatively referred to as 'exurban' regions, the 'rural-urban fringe' or 'the fringe', they are generally understood to comprise the zone of transition between the edge of the newest suburbs and the outer limits of the commuter belt (McKenzie, 1996)<sup>1</sup>. As this

implies, and as the research literature confirms, the term is most commonly used in relation to areas that surround large population centres. In other words, 'peri-urban' usually means 'peri-metropolitan' even though, in theory at least, all but the smallest urban centres have a discernible peri-urban sphere of influence.

Australia's peri-urban regions are an important and increasingly contested arena for sustainable

development. Writing in the mid-1990s about Australia's five major peri-urban regions, McKenzie observed that:

these regions are likely to have a range of problems associated with population growth pressures, as well as specific problems arising from the complex mixture of rural, residential and recreational land uses occurring within them. As the National Population Council (1992) noted in its study *Population Issues and Australia's Future*: 'In view of the emergence of this new dispersal pattern and the pressure on major metropolitan environments, knowledge of the environmental outcomes in these new non-metropolitan areas of major population attraction is of great importance' (McKenzie, 1996, 3).

Amongst the variety of policy problems present in peri-urban regions, a perennial theme is their importance in terms of agriculture. This traditionally manifests itself in a concern over the conversion of agricultural land in the face of urban encroachment. Differing views about this phenomenon have generated a long-running international debate over the loss of such land and the need to protect it (Best, 1977; Bryant and Johnston, 1992; Bunce, 1998). Previous research and writing relevant to an understanding of agriculture in Australia's peri-urban regions has tended to view this topic through the same lens (Wills, 1992; Bowie, 1993).

In contrast, the aim of this paper is simply to shed some light on the dimensions of the agricultural activity that occurs there. It does this primarily by reference to data describing area and gross value of agricultural production, as reported by the Australian Bureau of Statistics (ABS) Agricultural Census. This is not to ignore the debate over conversion of agricultural land. Indeed, there remain good reasons for thinking carefully about the fate of agriculture in peri-urban regions, not least because it is inextricably linked to land supply and, hence, to the unfolding pattern of development and resource use occurring there. However, any worthwhile new contribution to that debate first requires a reappraisal of agriculture in peri-urban regions. A better understanding of its economic contribution to agriculture at large, provisional though the insights from these data may be, is an obvious starting point.

Conventional wisdom about agriculture in Australia's peri-urban regions tends to be dismissive about its economic significance.

However, the research described here suggests otherwise. Specifically, it finds that peri-urban regions, which comprise less than 3% of land used for agriculture in the five mainland states, are responsible for almost 25% of total gross value of agricultural production. Furthermore, comparing the ABS data used to reach these findings with the results of surveys conducted by State agriculture agencies suggests that this figure may be conservative. Because peri-urban regions will be the site of significant population growth for the foreseeable future, these findings have important implications for policy-makers.

What follows is a summary of investigations that commenced in 1996, during the course of postgraduate research examining the public policy treatment of peri-urban agriculture in Australia. Those investigations are now being revisited as part of a National Audit of Peri-urban Agriculture (NAPUA) sponsored by the Rural Industries Research and Development Corporation (RIRDC)<sup>2</sup>. The findings are written up here in much their original form. Although the circumstances described have changed marginally in the intervening period, preliminary findings from the NAPUA project suggest the overall picture has not altered dramatically.

The remainder of this paper examines the value of agricultural production in Australia's peri-urban regions in three parts. The first part reviews contemporary insights regarding population growth and the likely extent of the peri-urban phenomenon in Australia. This is necessary to establish a spatial frame for calculating the area and value of production that occurs there. The second part details a procedure, using ABS data, by which the value of agricultural production in peri-urban regions can be calculated, and sets out the findings of that exercise. Those findings are then discussed in light of observed problems with the way the Agricultural Census deals with agriculture in peri-urban regions. The third part considers some of the implications of these insights for public policy and for the Agricultural Census. The paper concludes with directions for further research.

### **Contemporary perspectives on the peri-urban phenomenon in Australia**

While by no means a new phenomenon in this country (Golledge, 1959; Pryor, 1969), the past decade has seen a range of reports confirming the significance of peri-urban regions, and especially the peri-metropolitan regions, as major locations of population growth. Because this

paper is concerned with agriculture in peri-urban regions, rather than the peri-urban phenomenon *per se*, it is not necessary to rehearse the details of that literature here. However, to understand the spatial frame used to calculate the value of agricultural production in the following section, several key sources need to be mentioned and briefly discussed.

#### *Peri-metropolitan regions*

A national inquiry into *Population Issues and Australia's Future* found that 'non-metropolitan population [growth] has been strongly spatially concentrated at or just beyond the limits of commuting around the major cities and along the eastern and southeastern coasts of mainland Australia' (National Population Council, 1992, 62). Maher and Stimson (1994) confirmed this finding when they identified peri-metropolitan regions, along with the adjacent outer suburbs of metropolitan areas and accessible, high amenity coastal areas, as the dominant regions of absolute (numerical) population growth nationally. They noted that '[e]ven in the slowest growing regions, such as South Australia and Tasmania, there are parts of the metropolitan periphery undergoing substantial population increases' (Maher and Stimson, 1994, 37). At about the same time Bell (1995) conducted detailed research into internal migration patterns around the country and produced striking evidence of movement to these same regions.

Taking its cue from these findings, the then Bureau of Immigration, Multicultural and Population Research (BIMPR) commissioned a special report on population growth in peri-urban or, as its author described them, exurban regions. *Beyond the Suburbs* (McKenzie, 1996) examined the causes, dimensions and characteristics of population growth in the exurban regions of the five mainland capital cities. It found that the peri-urban phenomenon, defined according to ABS journey-to-work data, extends up to 100 kilometres from the central business district (CBD) of each city (McKenzie, 1996, 6). On this basis, the report identified and mapped the Local Government Areas (LGAs) that comprise the five major exurban regions.

Significantly, *Beyond the Suburbs* also found evidence of significant self-containment of the labour force in these regions. In other words, many exurban residents have exurban jobs and are not long-distance CBD commuters. Explanations advanced for this include the attractiveness of peri-urban localities to self-employed people,

changes in communications technology that affect work practices, and the continuing outward relocation of business and industry from the inner city to outer suburban and exurban sites (Bell and Maher, 1995; McKenzie, 1996). This finding suggests a greater degree of functional separation between peri-metropolitan and metropolitan regions, and especially the CBD, than has traditionally been thought to be the case.

Although it raises questions as to how these regions should be defined in future, self-containment does help to explain the considerable size of the regions identified as exurban in *Beyond the Suburbs*. Rather than being the normal length of commuter trips, a distance of 100 kilometres is the generally observed maximum extent of exurban activity. This also lends weight to claims by North American researchers that peri-metropolitan regions are emerging as a fundamentally new form of settlement pattern: a clearly discernible and increasingly important 'middle landscape' between the (sub)urban and rural (Davis *et al.*, 1994, 46). Burnley and Murphy (1995) have queried the applicability of this thesis to Australia, noting some important differences, but that was before the evidence on self-containment came to light.

#### *The peri-urban phenomenon in non-metropolitan regions*

Because of the historical primacy of the capital cities (Australia, Parliament, 1992), the peri-urban phenomenon in Australia is dominated by its metropolitan-orientated form. This is evident from the focus of most peri-urban research (Burnley and Murphy, 1995; Ford, 1997; Bunker and Holloway, 2001). However, expressions of the phenomenon are not limited to metropolitan regions. For example, research conducted for BIMPR during the mid-1990s suggests that peri-urban influence around some of Australia's larger provincial cities may extend as far as 30–40 kilometres (Fiona McKenzie, BIMPR, personal communication, 30 July 1996). Any serious attempt to form a national view of the peri-urban phenomenon also needs to account for these non-metropolitan forms.

Although acknowledged obliquely in reviews of planning and development at the local level (Ng, 1993; Edols-Meeves and Knox, 1996), there is little published research that sheds light on the dimensions of peri-urban influence in non-metropolitan regions. Certainly, there is nothing equivalent to *Beyond the Suburbs*. Nevertheless, high population growth rates in areas of relatively

high population density provide a clue to its likely extent.

Research on population growth at the Statistical Local Area (SLA) level helps identify three non-metropolitan forms of likely peri-urban influence that need to be included in the reckoning. Maher and Stimson identified high amenity areas 'all along the eastern and south-eastern coasts, as well as ... on the south-western coast,' as being significant sites of population expansion (1994, 37–39). This is the same pattern of growth that has more recently been termed 'coastal drift' (Productivity Commission, 1999). They note that '[e]ven in locations more remote from the metropolitan areas, some of these areas are creating their own urbanisation dynamic ...' (Maher and Stimson, 1994, 37). For the purposes of this exercise it was assumed that most of the SLAs they identify in this category, especially those comprising larger towns or contiguous with metropolitan regions, are also experiencing a degree of peri-urban influence.

Maher and Stimson also identified as significant a range of inland cities and larger towns, as well as some emerging agricultural districts experiencing expansion in irrigated or new intensive industries. At the time of their investigations, prior to the 1996 census, the former included the likes of Armidale, Ballarat, Bathurst, Bendigo, Dubbo, Lismore, Toowoomba and Wodonga (Maher and Stimson, 1994, 38). If the peri-urban phenomenon exists at all outside the peri-metropolitan regions, it will exist around these large, established, provincial centres; the so-called 'sponge cities' (Productivity Commission, 1999)<sup>3</sup>. The latter group included agricultural districts such as the Bega Valley, Margaret River and Mudgee (Maher and Stimson, 1994, 38).

#### *Towards a spatial frame for analysis of agriculture in peri-urban regions*

Combining these various peri-metropolitan and non-metropolitan perspectives enables the peri-urban phenomenon in the mainland States of Australia to be mapped on a provisional basis<sup>4</sup>. Specifically, Figure 1 does this using:

1. all peri-metropolitan regions identified by McKenzie (1996) in *Beyond the Suburbs*; and
2. those non-metropolitan SLAs identified by Maher and Stimson (1994) where population growth rates were greater than 10% over the period 1986–1991, and which broadly correspond with maps of national population

distribution and changing density (ABS, 1996, 232).

The resulting map is only indicative of the likely extent of the peri-urban phenomenon in Australia and it needs to be qualified on a number of counts. First, it has been necessary to use SLAs as the unit of analysis and, as a corollary, to assume that peri-urban influence is uniform within them. While there is evidence to support the delineation of the peri-metropolitan regions on this basis (McKenzie, 1996), it is problematic for some of the non-metropolitan SLAs. For those that include a large provincial city it is reasonable to assume that peri-urban influence might extend across most of the local government area, especially given the BIMPR findings referred to above. However, for SLAs that do not contain large population centres, this may significantly exaggerate the extent of peri-urban influence.

Second, there is an assumption that population growth in the non-metropolitan SLAs is not limited to townships, but extends into the hinterland of those towns. This can be resolved in part by reference to ABS data that describe population and development outside townships and small settlements; the so-called 'rural balance'. For example, analysis of population growth in Adelaide's peri-urban region by Ford (1997) reveals that the rural balance component there accounted for approximately 25% of the region's total population growth in the period 1976–1996. Likewise, Edols-Meeves and Knox (1996) found that 25% of new dwelling commencements in SLAs on the NSW north coast were located in rural areas. Figure 1 assumes a similarly significant percentage of population growth and development outside of townships in all selected non-metropolitan SLAs. Here again though, this may exaggerate the extent of peri-urban influence in some cases.

Third, there is an assumption here that the peri-urban phenomenon is linked to population growth; in particular, that it is limited to SLAs experiencing high rates of growth. However, as Graham (1994) has shown in relation to Hobart, low rates of population growth may mask substantial social change and development activity on the ground. Net change in SLA population, as used here out of necessity, is only a crude indicator of the presence of peri-urban influence. It reveals nothing about population turnover and its spatially variable expressions; nor does it indicate the practical implications of

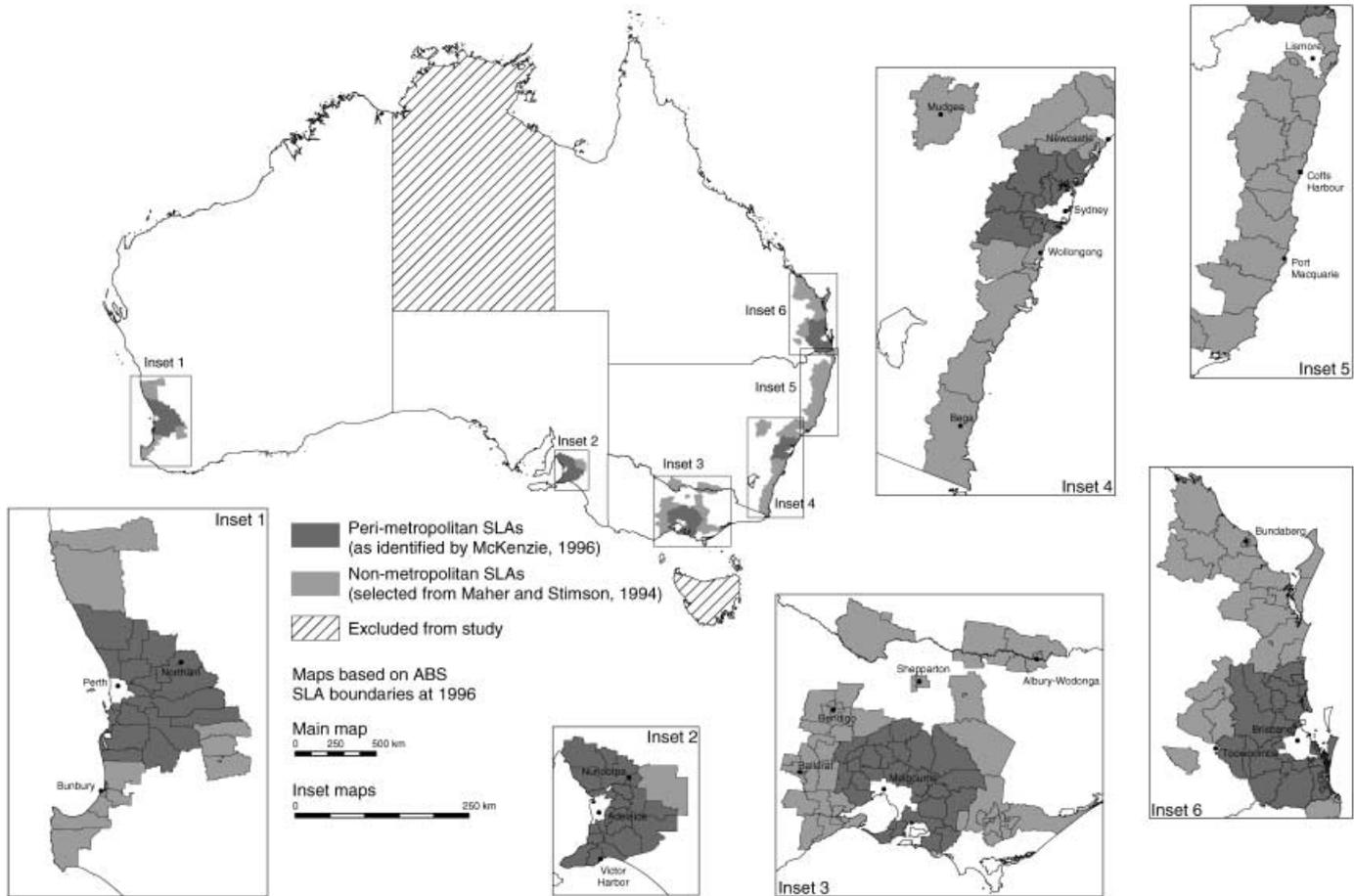


Figure 1 Statistical Local Areas subject to peri-urban influence, Australia, 1994. Refer text for explanation.

occupancy change in rural and peri-urban areas. The latter is especially relevant to any consideration of agriculture in peri-urban regions, as the ‘right-to-farm’ debate demonstrates. Consequently, there may be a number of apparently slow-growth SLAs, including some of the ‘sponge cities’ (Productivity Commission, 1999), which do not appear in Figure 1 but arguably should. In this regard the map may understate the extent of peri-urban influence.

Fourth, given that it is based on decade-old data and SLA boundaries, Figure 1 may seem somewhat out of date. Population research conducted since the 1996 census (Beer, 1999; Productivity Commission, 1999) suggests that some SLAs have dropped out of the non-metropolitan growth categories, and others have come in. More recent evidence on population change nationally also points to a significant trend towards inner-city SLAs and a slackening of growth rates in some peri-urban regions (ABS, 2002). However, mindful of the previous paragraph, it is questionable whether analysis of the peri-urban phenomenon would be improved by access to the very latest data on population change. It might also be argued that a frame of reference from the most recent period of acknowledged peri-urban expansion is more useful than one established now. On balance, any expansion of peri-urban influence in the past decade is probably off-set by the recent slowing of growth pressures in those regions.

These qualifications aside, Figure 1 is a reasonable representation of the likely extent of the peri-urban phenomenon in the five mainland States. The SLA is a standard unit of analysis for a great deal of population research and, in any case, is the smallest geographic unit for which Agricultural Census data are available. If it is at all possible to calculate the value of agricultural production in Australia’s peri-urban regions, it will have to be done on an SLA basis. Other assumptions about the presence, or otherwise, of peri-urban influence are unavoidable once the SLA is adopted as the unit of analysis. Some readers might want to nominate SLAs to be added to or removed from the map but the net effect is unlikely to be substantial. Shortcomings such as these are reasonable in an exploratory undertaking of this type.

Notwithstanding this conclusion, any interpretation of peri-urban influence based solely on demographic variables will always be less than ideal for examining agriculture in peri-urban regions. For any analysis of their agricultural

dimensions, peri-urban regions are best understood as rural districts under the influence of urban property markets (Nelson, 1990). It is the direct and indirect consequences for farming of this real estate factor, which includes demand from the self-containment and weekend retreat sectors (Trevor Budge and Associates, 1994; McKenzie, 1996), that differentiates peri-urban agriculture from agriculture generally. In other words, in attempting to understand the extent of agriculture subject to peri-urban influence it is not sufficient simply to look at primary indicators such as population growth and commuting patterns. What, ultimately, requires mapping are the secondary consequences of those phenomena, namely the actual or anticipated conversion of farmland to non-farm uses, and the implications of this for agriculture in the meantime.

In a researcher’s ideal world, it might be possible to map peri-urban agriculture on the basis of the ‘urban price shadow’ (Krushelnicki and Bell, 1989) and surveys of farmers’ perceived ‘time left for agriculture’ (Bryant, 1974). This would provide a spatial frame defined in terms relevant to agricultural investment and development. However, such an approach would be highly resource intensive and beyond the means of most researchers. Over the medium term a somewhat more sophisticated frame may be feasible. This could perhaps be defined with reference to building approvals, occupancy change and employment data for the rural balance section of SLAs, and possibly at the level of the Census Collection District. For the short term though, Figure 1, or something like it, is the only practical starting point for researchers wanting to analyse agriculture in Australia’s peri-urban regions.

### **The value of agricultural production in Australia’s peri-urban regions**

An early-1990s review of rural policy issues in the United States revealed that ‘farming in and near 12 of the nation’s major metropolitan areas [comprised] only 5 per cent of America’s farmland [yet generated] 17 per cent of all agricultural sales’. It was also noted that ‘while these areas account for only 20 per cent of the nation’s population, they contain 40 per cent of its [population] growth’ (Lapping, 1994, 12).

These statistics call to mind the fact that no similar analysis has been conducted for Australian agriculture. While the ABS has for many years collected the raw data with which to conduct such analyses, the insights we have are

limited to those found in undergraduate textbooks and atlases (NATMAP, 1980; Cooper, 1982; Scott, 1987). Whatever the reasons for this situation, it will suffice here to conclude that there is little evidence of research that seeks to analyse the spatial pattern of agricultural production value in Australia, rather than merely to describe it in the broadest of terms.

An opportunity to shed light on this subject arose in 1996 as part of postgraduate research examining the public policy treatment of peri-urban agriculture in Australia. In the course of that work it was necessary to examine the value of agricultural production in peri-urban regions relative to agriculture generally. The next two parts of this section describe how that work was undertaken and summarise its findings. The final part presents some contrasting perspectives which raise questions about how much is really known regarding agriculture in Australia's peri-urban regions.

#### *Research method*

Using data from the ABS Agricultural Census, a simple database was constructed for analysing regional variation in the area and value of agricultural production for the five mainland States. The database comprises total Area of Agricultural Establishments and total Gross Value of Agricultural Production data (hereafter 'area' and 'GVAP') for SLAs in each of the mainland States over the three-year period 1992/93 to 1994/95. A full copy of the database is available from the author.

Annual area and GVAP data were assembled by State, Statistical Division and SLA in an electronic spreadsheet, wherein a number of simple transformations and calculations were undertaken. First, area and GVAP for each SLA were converted to percentages of the respective State total for each year. In the case of the GVAP data this conversion obviated the need to adjust for the effect of inflation. The resulting annual percentage figures permit qualified year-to-year comparisons and analysis of temporal trends for all SLAs. It should be noted, however, that the percentage conversions do not moderate the effect of periodic changes to the ABS EVAO threshold<sup>5</sup>, which dropped from A\$22 500 in 1992/93 to A\$5000 in 1993/94. The effect of this change would have been to marginally expand the reported GVAP in the second and third years of the series.

Second, data for all three years, including the percentages, were averaged to produce a single

set of figures with which to make a generalised assessment of the significance of agricultural production in peri-urban regions. Normal practice with agricultural data would be to base such an average on at least five years of data so as to dampen the effect of annual fluctuations in production. However, additional years of SLA-level data were not readily available at the time when the database was developed. Although parts of Australia were drought-affected during these years, which may have temporarily inflated the value of peri-urban production, the three-year averages provide a more reliable indication of long-run GVAP than a single year of data.

One unintended advantage of this limited selection of years was that it avoided most of the local government amalgamation activity that occurred in a number of Australian States in the mid-1990s. Accordingly, only a handful of SLAs had to be adjusted because of changes to LGA boundaries. In most cases these were simple amalgamations of whole LGAs and were accommodated in the database by combining area and GVAP data for the affected SLAs in the pre-amalgamation years.

Following these basic transformations of the data, spreadsheet formulae were written to sum the average area and GVAP figures for all peri-urban SLAs in the database. Three scenarios were calculated on the basis of different perspectives on the peri-urban phenomenon, as discussed in the previous section. These scenarios are summarised on a State-by-State basis in Table 1.

Scenario A describes agriculture in peri-metropolitan regions using only those SLAs identified by McKenzie (1996) in *Beyond the Suburbs*. Since this leaves a residual component of metropolitan fringe agriculture unaccounted for, a second peri-metropolitan version, Scenario B, was also calculated. This uses total area and GVAP data for the Metropolitan Statistical Division (MSD) in each State, plus any SLAs identified in *Beyond the Suburbs* that lie outside the MSD. Scenario C describes total agricultural production in peri-urban regions in each State on the basis of Scenario B plus all selected non-metropolitan SLAs. A list of SLAs used in the different scenario calculations is available from the author.

#### *Findings*

The research method described above, and summarised under Scenario C in Table 1, suggests that peri-urban regions comprise a little less than 3% of the total land base used for agriculture in the five mainland States, but generate almost 25%

Table 1 Average area and value of agricultural production in peri-urban regions, Australia (excluding Tasmania, Northern Territory and Australian Capital Territory), 1992/93–1994/95<sup>1</sup> (Sources: Australian Bureau of Statistics (1996). AGSTATS (v 2.2) [CD-ROM]. Canberra, ABS. Cat.No.7117.0, Australian Bureau of Statistics (1996). IRDB96i (Integrated Regional Data Base) [CD-ROM]. Canberra, ABS. Cat.No.1353.0).

Scenario ...	A. Peri-metropolitan agriculture #1 <sup>2</sup>		B. Peri-metropolitan agriculture #2 <sup>3</sup>		C. Total agriculture in peri-urban regions <sup>4</sup>	
	Area (ha.)	Value (\$,000)	Area (ha.)	Value (\$,000)	Area (ha.)	Value (\$,000)
NSW	60 293 384	6 040 741	60 293 384	6 040 741	60 293 384	6 040 741
Peri-Urban	89 472	426 426	90 537	448 625	2 932 413	1 351 697
% of total	<b>0.15</b>	<b>7.07</b>	<b>0.15</b>	<b>7.44</b>	<b>4.86</b>	<b>22.40</b>
Qld	150 592 494	5 144 540	150 592 494	5 144 540	150 592 494	5 144 540
Peri-Urban	970 377	664 398	975 393	718 962	2 760 785	1 235 243
% of total	<b>0.64</b>	<b>12.91</b>	<b>0.65</b>	<b>13.97</b>	<b>1.71</b>	<b>22.10</b>
SA	56 640 670	2 317 913	56 640 670	2 317 913	56 640 670	2 317 913
Peri-Urban	1 199 104	571 791	1 204 502	598 586	1 204 502	598 586
% of total	<b>2.12</b>	<b>24.69</b>	<b>2.13</b>	<b>25.81</b>	<b>2.13</b>	<b>25.81</b>
Vic	12 669 270	5 297 131	12 669 270	5 297 131	12 669 270	5 297 131
Peri-Urban	735 050	819 817	743 184	855 047	2 005 878	1 464 887
% of total	<b>5.56</b>	<b>15.34</b>	<b>5.63</b>	<b>16.01</b>	<b>13.34</b>	<b>25.50</b>
WA	112 995 537	3 453 006	112 995 537	3 453 006	112 995 537	3 453 006
Peri-Urban	1 263 706	459 320	1 266 554	493 347	2 703 068	860 996
% of total	<b>1.05</b>	<b>12.91</b>	<b>1.06</b>	<b>13.90</b>	<b>2.20</b>	<b>23.58</b>
TOTAL	393 191 355	22 253 331	393 191 355	22 253 331	393 191 355	22 253 331
Peri-Urban	4 257 710	2 941 752	4 280 169	3 114 566	11 606 646	5 511 408
% of total	<b>1.08</b>	<b>13.22</b>	<b>1.09</b>	<b>14.00</b>	<b>2.95</b>	<b>24.77</b>

Notes: 1. Figures are based on data for Total Area of Agricultural Establishments and Total Gross Value of Agricultural Production averaged over the period 1992/93 to 1994/95.

2. Calculated on the basis of all ex-urban LGAs/SLAs identified by McKenzie (1996).

3. Calculated on the basis of the Metropolitan Statistical Division total, plus any ex-urban LGAs/SLAs identified by McKenzie (1996) outside the MSD.

4. Calculated on the basis of Scenario B plus all non-metropolitan SLAs shown on Figure 1.

of total GVAP. Amongst the States, the value figures are surprisingly uniform, ranging from Queensland's 22.1% to South Australia's 25.8% of total GVAP from peri-urban regions. In contrast, there is a marked variation in the area figures, with Victoria comprising the highest proportion of Area of Agricultural Establishments in regions of peri-urban influence (13.3%) and Queensland the lowest (1.7%). This variation can be attributed to factors such as;

1. the size of each State relative to its population and pattern of urban and regional development, and
2. the proportion of each State in agronomically favourable zones.

Scenarios A and B in Table 1 also show considerable inter-state variation in the significance of the peri-metropolitan regions. While the Sydney peri-metropolitan region comprises only a fraction of the total peri-urban area in New South

Wales (NSW) and generates about a third of its total peri-urban GVAP, the Adelaide region comprises nearly all of South Australia's peri-urban sector. The likely reasons for this variation are similar to those listed above, namely:

1. the pattern of urban and regional development in each State, and in particular the degree of primacy in its urban system;
2. the size of the peri-metropolitan (exurban) region identified in *Beyond the Suburbs*, and
3. the extent to which the peri-metropolitan region has been already built out or is otherwise unavailable to agriculture.

#### *A closer look at the value of agricultural production in peri-urban regions*

Table 1 provides a range of insights about agriculture in Australia's peri-urban regions but one stands out above all the others. Putting aside questions about the area of agriculture subject

to peri-urban influence in each State, and the relative significance of the peri-metropolitan regions, the figures on GVAP in Scenario C are remarkable. They easily exceed the US experience cited above, although that comparison needs qualification. They also fly in the face of conventional wisdom about agriculture in Australia's peri-urban regions. This is perhaps best illustrated by the coverage of ABARE's Farm Survey Report series; an annual survey of mainly broadacre industries that, with only rare exceptions, has ignored the 'small' and intensive industries situated close to major population centres. The figures in Table 1 seriously challenge that conventional wisdom.

Of course the caveats discussed in the previous section need to be reiterated here. The spatial basis of the calculations may be too generous in some respects and hence exaggerate what is counted as being subject to peri-urban influence. Nevertheless, there is a further body of evidence that offsets any spatial exaggeration in the research method and suggests the figure of 25% of GVAP may be conservative, and in some cases by a wide margin.

Published research by agriculture agencies and local government in several States shows that ABS data consistently and substantially understate value of agricultural production in peri-urban regions. NSW Agriculture found that total GVAP for the Sydney Statistical Division in 1990/91 was A\$461 million according to ABS data, but closer to A\$850 million according to their own ground-based surveys (Kennedy, 1993, 2). Subsequent revisions of those surveys have put the figure at A\$940 million (NSW Agriculture, 1995, 15–16) and 'at least A\$1 billion' (NSW Agriculture, 1998, 14), suggesting a discrepancy of about 100%. In the Hornsby Shire, north of Sydney, the same survey method found a discrepancy of almost 350% between ABS data (A\$22 million in 1990/91) and departmental figures (A\$98.3 million in 1994) for GVAP (Hornsby Shire Council, 1996, 76). The time-lag between the 1990/91 ABS Census and the NSW Agriculture ground surveys would explain only a fraction of these differences.

Similar discrepancies have been reported in Victoria, South Australia and Western Australia. For example, a study for the Shires of Yarra Ranges and Nillumbik, northeast of Melbourne, reported a difference of more than 200% between ABS data (A\$195 million in 1998/99) and industry-derived figures (A\$640 million in 2000) for GVAP (Langworthy and Hacket,

2000, 11). This is consistent with Gardner's earlier observations about the roughly comparable Upper Yarra Valley and Dandenong Ranges region in the early 1990s. At that time ABS data (A\$88 million) were also widely at variance with industry-based estimates (A\$275 million) (Gardner, 1994, 99). Both reports identify the flower, nursery and wine grape industries as key elements of the under-reporting.

Other reports provide insights about particular industries and sectors. For example, in Western Australia Kininmonth (2000, 2), citing van Gool and Runge (1999), notes discrepancies ranging from 10% for fruit production to 50% for vegetables. Similarly, a survey of production on the Northern Adelaide Plains (NAP), which includes the Virginia horticulture district, made the following observations:

ABS statistics for NAP vegetable, flower and nursery industries are inaccurate. Industry estimates and field surveys suggest that actual production is 25% above ABS data for field vegetables and 50% above ABS data for glasshouse vegetable crops.

ABS statistics indicate the flower and nursery industry on the NAP is valued at approximately \$2 m. Industry data suggests the NAP flower industry is worth \$10–12 m while the nursery industry is valued at approximately \$10 m (Primary Industries South Australia, 1993, 16).

These findings are even more remarkable than the figures in Table 1. Not only do they tend to offset concerns about spatial exaggeration in the research method; the scale of the discrepancies, if they are repeated elsewhere, raise the possibility that Australia's peri-urban regions may well produce more than 25% of GVAP. In the process, these findings also beg important questions about the credibility of the Agricultural Census and about its usefulness to decision-makers in government and industry. It needs to be said that these questions do not impinge on the accuracy of reporting about mainstream agriculture: as explained below, there are good reasons for believing the accuracy of ABS data on broadacre industries. Nevertheless, there are several aspects of the Census that are especially problematic for agriculture in peri-urban regions.

Most of the discrepancies described above would be the result of simple under-counting in the Agricultural Census; in other words, instances where the Census has failed to record the full extent of agricultural activity on the

ground<sup>6</sup>. This can take a number of forms. For example, failure to account for sequential cropping where two, three or four crops are grown on the same land each year, as is the case in Hornsby (Hornsby Shire Council, 1996), may explain some of the discrepancies in the vegetable sector. Alternatively, the self-administered nature of the Census leaves room for some producers to go missing entirely. In the mid-1990s, NSW Agriculture found that, while ABS statistics on vegetable production in the Blacktown LGA were based on census returns from 30 growers, their own records identified 182 growers. Predictably, this caused a considerable difference between the ABS figures for GVAP in Blacktown (A\$1.438 million) and the departmental estimate (A\$19.55 million) (David Mason, NSW Agriculture, personal communication, 8 November 1996).

Under-counting in its various forms is not altogether surprising in peri-urban regions. The diverse, dynamic and fragmented nature of these landscapes is a different proposition to broadacre agriculture, to which the Census is geared. This is likely to render many primary production activities invisible to a remotely-administered census which relies heavily on producers' cooperation and the volunteering of information. In this context under-counting may be exacerbated by social factors, such as the high numbers of producers from non-English-speaking backgrounds (Primary Industries South Australia, 1993; NSW Agriculture, 1995). It has also been observed that many producers in peri-urban regions operate in the cash economy and would be disinclined to participate in the Census (Frank Kelleher, University of Western Sydney, personal communication, 25 July 1996)<sup>7</sup>.

Evidence such as this suggests that agriculture in peri-urban regions is much more likely than agriculture generally to be affected by under-counting in the Census. Indeed, most of the traditional broadacre industries have centralised marketing structures and/or bulk-handling systems that leave little scope for the volume of production, and hence its value, to be misrepresented. However, under-counting is not the only way in which value of production in peri-urban regions may be misrepresented. Houston (1998) has also noted potential problems associated with:

1. the EVAO threshold, the effect of which is heavily concentrated in peri-urban regions;
2. the use of State average prices to calculate value of production, which may ignore sig-

nificant regional disparities in prices received for some commodities, and

3. the reporting of gross values, which fail to identify important regional differences in marketing costs, such as transport.

Against this background, the findings summarised in Table 1 leave the reader to speculate on the proportion of GVAP that is actually generated in Australia's peri-urban regions. The necessarily qualified finding of 25% is a remarkable figure. Even a reduction to, say, 20% to allow for any spatial exaggeration in the research method or the effect of drought in the survey years, would still have important implications for policy-makers. However, the intriguing possibility that more than a quarter of total gross value of agricultural production comes from peri-urban regions would force some changes in the way we think about agriculture in Australia, and about how we regard peri-urban regions. In the circumstances, though, it is best to leave the evidence, with all its qualifications and limitations, to speak for itself.

On this point, it also needs to be emphasised that the findings presented here are insufficient to enable any definitive conclusions about the wider significance of agriculture in Australia's peri-urban regions. GVAP data say little about the overall cost-benefit equation of agriculture in peri-urban regions, including its environmental consequences. Neither is it possible to detect in these data the effect that various direct and indirect subsidies may have had on agricultural production, or on the levels of farm debt underlying that production. These are questions that need further investigation, although they could equally be asked about agriculture generally and, in regard to subsidies, about urban fringe housing development too.

Answers to such questions would require a major economic modelling project, well beyond the scope of a modest research paper. So, for the moment, the findings presented here need to be kept in perspective. Nevertheless, recent national analysis of the spatial distribution of farm profitability, measured on a profit-at-full-equity basis, suggests that peri-urban regions may indeed be economically significant for reasons other than simple GVAP (NLWRA, 2002, Figure 1.16).

### **New perspectives on peri-urban agriculture and peri-urban regions**

The findings of the previous section have some unsettling implications for the ways in which

agriculture, peri-urban agriculture and peri-urban regions are viewed in Australia. Even if it is not possible to be precise about the extent of these implications, there is a clear case for closer examination. Such an examination should not be limited to the obvious task of better accounting for agriculture in peri-urban regions. It also seems worth inquiring into how public policy, and the instruments on which policy-makers rely, such as the Agricultural Census, might have contributed to this situation, and how both might need to change. This section briefly lays out some themes for future consideration.

#### *Implications for public policy*

Twelve years ago the House of Representatives Standing Committee for Long Term Strategies suggested that Australia is 'like an archipelago — islands of closer settlement surrounded by an ocean of arid or marginalised land' (Australia, Parliament, 1992, 5). This metaphor was intended to emphasise the extent to which Australia is an urbanised nation but it also made an important point about underlying environmental circumstances.

Five years later a submission to an inquiry into Ecologically Sustainable Land Management (ESLM) sought to convey a similar message using a series of maps illustrating agronomic potential, land degradation, current agricultural land use, population distribution and projected population growth (Houston, 1997). Viewed synoptically these maps reinforce the archipelago metaphor and show how Australia's room to manoeuvre with respect to its land resources is more constrained than first appearances might suggest. In particular, the maps show that the most favourable components of the nation's natural resource endowment, and the vast bulk of its population, are crowded together into sections of the eastern, southern and south-western coastal strips. Variations on this theme have been expounded previously by Nix (1990) and Cocks (1992), and acknowledged by the National Population Council (1992).

These relatively small areas of overlapping demands are, of course, largely coincident with the peri-urban regions shown in Figure 1 where, presumably, competition for resources is greatest. This puts peri-urban regions at the heart of a national tug-of-war, albeit undeclared, over the allocation of key natural resources. It also strongly implicates peri-urban agriculture, which is inextricably linked to land supply in these regions, in the unfolding pattern of development and resource use occurring there. If we now add

to this picture the findings about GVAP set out in the previous section, peri-urban regions and the agriculture that occurs there begin to assume a previously unheralded strategic significance.

There are important consequences in all of this for Australia's future options regarding agricultural development, urban and regional development and, ultimately, sustainable development. Because peri-urban regions will be the site of significant population growth for the foreseeable future, these competing interests need to be more actively and deliberately mediated. Amongst other things, successfully mediating the interface between urbanisation and agriculture will become increasingly important. Failure to do so risks more of the agricultural land-use conflict that characterised the peri-urban regions of several States during the past decade (Langworthy and Hackett, 2000; Henderson and Epps, 2001; Henderson, 2003).

However, an appreciation of the significance of peri-urban regions and peri-urban agriculture is routinely absent from public policy deliberations and data collection. Both themes were ignored in the Ecologically Sustainable Development (ESD) and ESLM investigations of the 1990s (Australia, ESDSC, 1992; Industry Commission, 1999) and, as described above, both the ABS Agricultural Census and ABARE research provide limited insights on the topic. More recently the National Land and Water Resources Audit (NLWRA) has also been silent on peri-urban issues. This was despite including maps, such as that showing the spatial distribution of profit-at-full-equity, which clearly implicates peri-urban regions (NLWRA, 2002).

The findings of this research suggest the need for a more fine-grained, informed and less taken-for-granted approach to peri-urban matters in Australian public policy. A full analysis of why this topic is so often submerged in policy deliberations would require more space than is available here, but two factors stand out. The first is the tendency in the agricultural sector towards aspatial, rather than spatially-based, analysis and reporting. The second is the more general influence of sectoralism in public policy.

Most of the routine analysis and reporting of Australian agriculture, especially as it relates to value of production, has a strong industry or sectoral orientation with little focus on geographic entities smaller than the States (see, for example, NLWRA, 2001, Table 8.1). This risks institutional blindness to events and circumstances at the regional and local level, such as

those described here. There is some evidence of emerging new pseudo-spatial frames for analysis, such as agro-ecological regions (ABS, 1996) and Barr's (2002) social typology of rural landscapes. However, even these suffer from aggregation or abstraction and fail to get close to the detail of local situations. To avoid institutional blindness, spatially based analysis at sub-regional and local levels is critical.

The fact that analysis and reporting so often ignore peri-urban regions can in turn be attributed to the influence of sectoralism in public policy. Sectoral policy networks set the context for how policy issues are understood and dealt with, including what gets measured (Bell, 1992). For major sectors that have their own policy networks this poses no problems. However, minor sectors and sub-sectors that lie at the edge of policy networks, literally or figuratively, will tend to suffer a deficit of analysis and political attention. Viewed this way, the problem for peri-urban development issues is that they sit awkwardly between the policy networks of the urban development and agricultural sectors (Houston, 1995). Policy-makers cannot change this fact of life, but they can be mindful of its consequences. The findings of the previous section illustrate the importance of so being.

#### *Implications for the Agricultural Census*

Against this background, the role of the ABS Agricultural Census appears crucial. It is the only feasible source of standardised, time-series data suitable for monitoring agriculture, including peri-urban agriculture, at a range of spatial scales. As such it is central to strategic intelligence about agriculture and vital to informed policy-making for industry development and resource management. However, in its current form, the Census is highly problematic. Beside its credibility problems in peri-urban regions, recent changes to ABS data collection mean that the Census has become even less 'friendly' to agriculture in peri-urban regions.

Since 1997/98 the ABS has collected agricultural data by way of an annual sample-based survey, with a full census every five years. Although satisfactory for surveying agriculture in broadacre regions, sampling is unsuited to the diversity and scale of agriculture in peri-urban regions. This might mean that, in four years out of five, data on agriculture in peri-urban regions are even more unreliable than the information which the full census ordinarily provides. In fact the situation is worse. The statistical limitations

of sampling mean that, for four years out of five, agricultural data are now simply not produced at the SLA level. This gives an extra layer of meaning to institutional blindness. Not only is agriculture in peri-urban regions submerged by a preoccupation with aspatial industries and sectors; it is now systematically excluded from official reporting for 80% of the time.

These circumstances suggest that there is a need for serious thinking about how the ABS deals with agriculture in peri-urban regions. For a diverse and dynamic sector that produces around 25% of Australia's GVAP, the inherent problems of the Census are bad enough. However, limiting the insights that it can provide to five-yearly snapshots seems completely inadequate at a time when States are seeking to adopt an increasingly strategic approach to their food sectors<sup>8</sup>. It throws into question the extent to which agricultural policy in Australia can be described as well-informed.

Fortunately there is also some positive news on this front. There is increasing acknowledgment, by ABS staff, of the problems with data on agriculture in peri-urban regions (Michael Vardon, ABS, personal communication, 5 April 2002). There is also the emerging possibility of the geocoding of ABS data (Randall and Barson, 2001), which raises the prospect of using a spatial frame of analysis that more closely approximates the true extent of peri-urban influence. Both developments coincide with acknowledgment of the need for better information about the small farm sector at a recent workshop for rural policy-makers (Tonts and Black, 2002), and a National Audit of Peri-urban Agriculture sponsored by RIRDC.

These circumstances hold some promise for a collaborative re-think about the ways and means of collecting and presenting data on agriculture in Australia's peri-urban regions. This would be welcome. A better understanding of this overlooked sector is necessary for informed public policy-making, both in the agriculture sector, and in those regions that are host to some of Australia's major sustainability issues.

#### **Conclusions**

This paper presents a provisional analysis of the value of agricultural production in Australia's peri-urban regions. Using Agricultural Census data and a qualified, but not unreasonable, spatial frame, the analysis suggests that peri-urban regions generate about 25% of Australia's total GVAP from less than 3% of the agricultural land

base. These findings, which may be surprising to some readers, become even more remarkable when ABS data are compared with the results of ground-based surveys and industry estimates. The scale of reported discrepancies in several States suggests that official data significantly under-represent agriculture in peri-urban regions.

In the circumstances it is not possible to be definitive about the true proportion of agricultural production value that is generated in peri-urban regions. Nevertheless, the findings presented here challenge conventional wisdom and preconceptions about Australian agriculture. In the process they also demand a re-appraisal of how agricultural data are collected and presented, and suggest a hitherto unrecognised strategic significance for peri-urban regions and for the agriculture that occurs there.

Given these revelations, two areas of research stand out for attention in the short term. First, there is a need to better understand the physical extent of the peri-urban phenomenon in Australia, especially as it affects agriculture. The spatial frame used here relies heavily on inferences drawn from population change at the SLA level, which may not always be a good indicator of peri-urban influence, especially in non-metropolitan regions. A more sophisticated approach is needed; one that uses indicators such as building approvals and occupancy change in rural areas, and gets closer to their actual impacts on agriculture. Ideally such an approach should also be capable of delineating the extent of peri-urban influence at a spatial scale below SLAs and LGAs.

Second, the characteristics and circumstances of agriculture in peri-urban regions need to be better understood so that routine ABS agricultural data collection can be improved. There is a number of separate but ultimately linked research tasks here including:

1. development of monitoring regimes that will better accommodate those features of agriculture in peri-urban regions that may contribute to under-counting (for example, sequential cropping, non-contiguous landholdings, land leasing, periodic phases of new industries, and new entrants to industries);
2. investigations into the influence of, and possible alternatives to, the EVAO threshold and, related to this;
3. investigations into the contribution and integration of so-called hobby- and micro-farming into local agricultural economies (Tonts and Black, 2002).

Attending to these matters will allow for a more definitive assessment of the proportion of GVAP generated in Australia's peri-urban regions. However, determining the wider significance of agriculture in peri-urban regions will require moving beyond these two basic lines of inquiry. In particular, research is needed to shed light on the overall cost-benefit equation of agriculture in peri-urban regions, including its environmental consequences, its reliance on subsidies, and its level of underlying debt. Performance on these parameters, relative to agriculture generally, will indicate whether the findings presented here have genuine strategic significance.

The basis for answering some of these research questions already exists in national-scale work, such as that undertaken for the NLWRA (2002). However, targeted, case study research is also needed. For example, it would be helpful to know more about the potential for peri-urban industries to deliver a sustainability dividend by virtue of their proximity to urban areas. By way of illustration, horticulture on the Northern Adelaide Plains increasingly uses treated urban waste water, thereby reducing both demand on existing water resources and disposal into Gulf St Vincent. Likewise, it would also help if more were known about the extent to which peri-urban industries figure in value-adding and employment generation in local economies, and about their contribution to export earnings. Answers to these types of questions, which treat agriculture in peri-urban regions as something more than a mere residual, will assist policy-makers to make sense of the findings reported here.

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#### NOTES

1. For the purposes of this paper, the terms 'peri-urban', 'exurban', 'rural-urban fringe', and 'fringe' can be treated as interchangeable. Although these terms have slightly different connotations in the literature, they describe the same phenomenon.

2. Details of the NAPUA project are available from the author.
3. The Productivity Commission report attributes this term to Salt (1998).
4. Tasmania, the Northern Territory and the Australian Capital Territory are excluded from the analysis because *Beyond the Suburbs*, which provided the starting point for this study, did not examine exurban regions in those jurisdictions.
5. The ABS uses a threshold based on Estimated Value of Agricultural Operations (EVAO) to define the lower limits of commercial agricultural activity and, hence, the scope of its census frame (ABS, 2003). Farm establishments with an EVAO below this limit are treated as 'Out of Scope' and not included in the data set that the ABS uses to describe agricultural activity and production each year. Currently the EVAO threshold is \$5000 per annum but it has changed considerably in the last two decades.
6. It is important to note that the Agricultural Census does not ask producers about value of production directly. Rather, it simply seeks information about volume of production, which is subsequently combined with wholesale price information to calculate GVAP for each commodity (ABS, 2003). Methods for calculating GVAP by the ABS and State agriculture agencies are essentially the same. The main difference appears to lie in how the volume figure is derived. The ABS relies wholly on Census returns; State agriculture agencies, however, undertake field studies to measure area of production and subsequently derive volume of production based on average annual yields as reported by field staff. In some instances, industry bodies have volunteered their own production data. Because both sets of statistics use wholesale prices, they each include an element of marketing costs, such as transport, and cannot be described strictly as 'farm gate' values.
7. The introduction in 2000 of the Australian Business Number (ABN) may eventually change this practice. The ABS has been investigating use of the Australian Taxation Office's ABN register as an alternative for administering the Agricultural Census (Gordon Cameron, ABS, personal communication, 14 August 2003).
8. See, for example, 'Food for the Future' (SA) <http://www.pir.sa.gov.au/>; 'Focus on the Future' (WA) <http://www.agric.wa.gov.au/agency/strategic/index.htm>; 'Boosting growth in the food and agriculture sector' (Vic) <http://www.nre.vic.gov.au/>; 'Tasmanian Food Industry Strategy' <http://www.dsd.tas.gov.au/indcouncil/fistrat.doc>.

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