



Australian Government
Bureau of Rural Sciences

Biosecurity and Small Landholders in Peri-urban Australia

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Foreword

We would like to thank all of the interview participants who kindly gave their time and shared their insights with us. Howard Conkey, Graeme Garner, Fiona Macbeth, Michael Cole (from the Product Integrity Animal and Plant Health Division of the Department of Agriculture, Fisheries and Forestry), and Chris Adriaansen (Queensland Department of Primary Industries and Fisheries) of the Steering Committee provided direction and helped us shape the key questions for this research. Thanks also to colleagues from the Bureau of Rural Sciences, in particular Jodie Smith and Dominic Galloway who assisted us with their mapping expertise and Gail Kelly for providing comments on the draft report.

Executive Summary

The potential for risk	The Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) has recognised that the land uses and management practices of small landholders in peri-urban areas may pose risks to Australia’s biosecurity in terms of agriculture and international trade.
A focus on the land uses and practices of small landholders	This project builds on previous work by creating a typology of small landholders in peri-urban areas to understand their land uses and motivations. The study had a national focus and was concerned with identifying the practices of small landholders in peri-urban areas that may give rise to exotic pests and diseases that are currently not established in Australia (e.g. foot and mouth disease, swine fever and avian influenza).
A review of other research and the collection of new data	There were two main components to the research: a literature review and primary data collection consisting of interviews with stakeholders.
Gaps in knowledge identified	The literature review demonstrated that there are a number of gaps in knowledge, including: knowledge about the behaviours and attitudes of small landholders; their land uses and practices; their knowledge of how to manage animal and plant pests and diseases; what networks or industry groups landholders belong to; where small landholders source their information about land management and animal and plant health; and landholders understanding of the term ‘biosecurity’.
Main themes from interviews	<p><i>Types of small landholders</i> – the data shows small landholders in peri-urban Australia fall into two broad types: lifestylers and farmers. It was discovered that these categories are not static and that landholders can move from one type to another over time.</p> <p><i>Land uses and land management practices</i> - small landholders in peri-urban Australia undertake a diverse range of activities and land uses on their properties. Lifestylers keep diverse varieties of animals and plants for a range of personal and</p>

professional interests. Farmers are involved in intensive, high-value production and have an interest in new and emerging industries.

Small landholders source their stock from a range of outlets. Acquaintances, friends, and neighbours appear to be used frequently. Similarly, small landholders sell or trade animal and plant produce at a wide range of outlets. The main outlets are farmers' markets, direct sales to shops and restaurants, sale yards, and trade through neighbours, friends and acquaintances.

Knowledge and information - data suggest small landholders are enthusiastic to learn and are motivated to seek advice. However, knowledge about land management and biosecurity risk varies between landholder categories.

The potential risk posed by small landholders - small landholders' knowledge about land management was one of the main reasons they were considered to pose a potential risk to Australia's biosecurity. That said, it was believed that small landholders posed no greater biosecurity risk than any other segment of the population. Contrary to some stereotypes, small landholders from culturally and linguistically diverse backgrounds did not emerge as a higher risk group than landholders from English speaking backgrounds.

The best means of communicating with small landholders - multiple communication methods and approaches are likely to generate the best outcomes. Face-to-face delivery through a range of outlets was emphasised by interviewees. However, print and electronic media are also considered important.

Recommendations to understand the audience

Policy-makers are likely to be faced with significant challenges in explaining and communicating biosecurity risks to small landholders in peri-urban areas. It is important to understand the audience. In this regard, key recommendations are:

- Avoid stigmatising small landholders.
- Clarify the use of the term 'biosecurity'.
- Tailor messages for different types of landholders.

**Recommendations to
communicate effectively**

Recommendations for communicating with small landholders are:

- Improve the availability and accessibility of information and advice.
- Use a combination of direct methods (i.e. field days, extensions officers and workshops) and indirect methods (i.e. broadcast media, electronic and print sources such as television and radio, websites, and flyers and fact sheets to be distributed via clubs and specialist grower groups, vets, rural suppliers and chemical resellers etc.).
- Update the stocktake of biosecurity communications and activities conducted by DAFF in 2005 to establish what messages are being communicated to whom, and how.
- Establish a national website for biosecurity - to provide information about good biosecurity practice and for the reporting of potential biosecurity risks.
- Clarify all interested organisations and potential audiences in relation to biosecurity, and define roles for government agencies.
- Pool the resources of state/territory and Federal agencies to target future research in this area.
- Develop a national approach to biosecurity education and awareness campaigns with defined roles and responsibilities for government jurisdictions and industry.

**Recommendations for future
research**

Focus groups with small landholders could be used to verify the typology of 'lifestylers' and 'farmers'; test the term 'biosecurity'; and determine the types of messages small landholders respond to. Also, a national quantitative survey of small landholders is recommended to address current knowledge gaps and to provide baseline data.

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1.0 Introduction

1.1 Background

The Product Integrity, Animal and Plant Health Division (PIAPH) of the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) has recognised that the land uses and management practices of small landholders in peri-urban areas may potentially pose risks to Australia's biosecurity, agriculture and international trade.

At PIAPH's request, the Bureau of Rural Sciences (BRS) has previously undertaken two studies on small landholders and biosecurity in peri-urban areas. The first study by Aslin et al. (2004) scoped the issue by identifying where the majority of landholders are based, exploring their motivations and values, and suggesting ways to communicate with this segment of the population. This was followed by case studies of landholders in the peri-urban areas of the City of Swan (Western Australia), the City of Greater Bendigo (Victoria), and the Sunshine Coast Hinterland (Queensland) (Aslin and Mazur, 2005). This second study found that the peri-urban population is diverse and that biosecurity communication strategies may need to target specific types of landholders, depending on land usage, hobbies and interests. Aslin and Mazur (2005) found that the biosecurity risks associated with small landholders in peri-urban areas were:

- the spread of existing pests and weeds
- risks related to poor pasture, land management or animal husbandry and
- the spread or emergence of diseases currently not found in Australia (e.g. foot and mouth disease (FMD)).

Existing biosecurity information and awareness campaigns are generally not targeted at peri-urban Australians (Day 2005). This is because landholders with small properties in peri-urban areas are often considered to have minor involvement in primary production and are not linked into industry networks. A further complication is that landholders in peri-urban areas as a whole are very diverse and highly mobile (Buxton et al. 2006).

1.2 Project description

The current project built on these previous studies by creating a typology of small landholders in peri-urban areas that can be used to understand their land uses, values and motivations. This project had a national focus and was specifically concerned with identifying the practices of small landholders in peri-urban areas that may give rise to exotic pests and diseases that are currently **not**

established in Australia (e.g. FMD, swine fever and avian influenza (AI)). Irrespective that practices relating to the management of pests and diseases that are already established were not the focus of this study, the findings presented in this report are likely to have relevance to understanding small landholders in peri-urban areas across a number of natural resource management (NRM) issues.

For the future viability of agricultural industries in Australia, it is critical to develop coordinated approaches to understanding and communicating biosecurity risks in this segment of the Australian population as a means of generating better on-farm biosecurity practices. This project addressed the lack of knowledge about small landholders in peri-urban Australia and scoped directions for future research in this area.

Similar to the work of Aslin and Mazur (2005) this report focuses on risks to agriculture production and agricultural trade. Biosecurity risks to human health, biodiversity and the environment were not the main focus of this study. Hence, NRM biosecurity issues such as established weeds and pest animals are included when directly applicable to commercial agriculture.

1.3 Objectives

The objectives of this research were to:

- a) build on previous typologies of Australian landholders in peri-urban areas to categorise landholders who are potentially at risk of particular biosecurity threats
- b) analyse and define biosecurity risks for industry groups and pertinent human, animal and plant health portfolios by investigating the practices, motivations, and values of peri-urban landholders.

Secondary components were to contribute to developing a local communication model for generating positive biosecurity outcomes in association with PIAPH and the Yass Rural Lands Protection Board (provided in a separate document) and develop a stakeholder database by consulting with national stakeholders about peri-urban biosecurity.

This study will be used to guide coordinated approaches to understanding and communicating biosecurity risks to small landholders in peri-urban areas. At a broader level, the findings of this research will be used to drive future policy and education/awareness work in this area.

Furthermore, it is aligned with the future research programme of the nation's plant and animal

health executives. As a body they have recognised the lack of research on the risk of breaching biosecurity within peri-urban Australia. Specifically, this project:

- provides clear recommendations about next steps, and makes some assessment of the ‘risk’ posed by landholders in peri-urban areas
- suggests means of communicating with the different groups/sub-groups of peri-urban landholders
- highlights significant research gaps to be addressed by future work in this area.

1.5 Terminology

The peri-urban phenomenon is a new and emerging area of research and greater clarity is required in the definition and description of both the peri-urban landscape and those who inhabit it. The following section briefly discusses some of the key terms used. A detailed discussion of the literature around the landholders who inhabit the peri-urban landscape is presented in Chapter 3 (Literature Review).

The Peri-urban Landscape

The term ‘peri-urban’ is increasingly found in scientific literature, reports and policy briefs but there appears to be no universally accepted definition. Some of the current terms used to refer to the peri-urban landscape include: ‘exurbia’ (Burnley and Murphy 1995), ‘rurban’ (Buxton et al. 2006), the ‘rural-urban fringe’ (Black et al. 2000), and the ‘urban field’ (Friedman 1965 in Buxton et al. 2006). However, it is not the purpose of this study to debate or attempt to redefine this term. Buxton et al. (2006) provide an extensive review of the literature dedicated to this topic.

There is consensus in the scientific literature that the peri-urban landscape is a distinctive geographic area, adjacent to metropolitan development and surrounding regional/rural centres. It encompasses a multiplicity of land uses. Thus structurally and functionally this landscape is neither urban nor rural but contains elements of both landscapes (Ford 1999).

For the purpose of this study it is necessary to operationalise a definition of the peri-urban landscape and of the landholders who populate it, based on: 1) the most commonly found definitions of ‘peri-urban’ Australia in the literature; and 2) the land use, or main activity, conducted on the landholding. For this reason it was considered important to dedicate a portion of the report to discussing this issue.

Similar to Aslin et al. (2004), in this study the term ‘peri-urban landscape’ was used in a ‘common sense way’ to incorporate all possible areas in which small landholdings exist around Australia and to include all the individuals that populate them. It was defined as: **‘the transitional zone between rural and urban Australia.’** This flexibility allowed for adequate coverage of the research topic. It is likely that this definition could be refined as more information about peri-urban areas and small landholders emerges in the future.

Small landholders

‘Small landholders’ were specified as the focus of this research because the peri-urban landscape also hosts landholders engaging in traditional agricultural production (e.g. dairy farming). Traditional farmers are more likely to be connected to established networks and to maintain good biosecurity standards (Barclay 2005, East 2007).

Small landholders are often defined by land parcel size (e.g. Francis 2002, Hollier et al. 2004b). In this study they were generally considered to be those landholders on properties of between 1-200ha. However, because of the broad scope of the research, this definition was applied loosely.

Biosecurity

Biosecurity is defined by the Australian Biosecurity Co-operative Research Centre (2007 p. 1) as: “The protection of people, animals and ecological systems against disease and other biological threats. Biosecurity is achieved through systems that aim to protect public health, animal and plant industries, and the environment, from the entry, establishment and spread of unwanted pests and diseases.”

Biosecurity in the context of this study was defined as: **‘the protection of people, farms, animals and plants from the entry and spread of unwanted exotic animals, pests, diseases and weeds.’**

The study focused on pests and diseases which are:

- 1) mostly likely to have a significant economic impact on mainstream agriculture and
- 2) are not currently present in Australia.

1.6 Structure of the report

The following chapters contain: a brief overview of the approach and methods (Chapter 2), results of a review of other research on small landholders and biosecurity (Chapter 3), findings from interviews conducted with stakeholders and a discussion of overall results (Chapter 4) and recommendations (Chapter 5).

2.0 Approach and Methods

The issue of biosecurity in peri-urban areas is a relatively new research topic. Due to the lack of baseline data on this subject, and the need for thorough examination of a wide range of issues, an exploratory, qualitative approach was used. The data from this research could be used to design a future quantitative study.

The objectives developed at the commencement of the project were unpacked into the following key research questions which guide the methods selected:

- Who are small landholders in peri-urban Australia, and what are their motivations?
- What are the land management practices and land uses of small landholders?
- What knowledge do small landholders have about managing pests and diseases?
- What are the potential risks posed by small landholders to Australia's biosecurity?
- What are some of the best methods to communicate with small landholders about biosecurity?

The four key methods used were:

- a conceptual risk framework to understand the issue and guide the research
- a national peri-urban-biosecurity stakeholder database
- extending Aslin and Mazur's (2005) literature review to incorporate recent work on peri-urban issues, including research commissioned by the Rural Industries Research and Development Corporation (RIRDC) and Land and Water Australia (LWA) and
- collection and analysis of primary data via interviews with stakeholders and small landholders.

An informal Steering Committee of internal advisors was formed at the outset of this project. The Steering Committee consisted of staff from the Emergency Risk Management Unit (ERMU-PIAPH), staff expert in animal and plant diseases (PIAPH), and an expert in biosecurity from the Queensland state government (Department of Primary Industries and Fisheries). Meetings with the Steering Committee were held at key points in the project including: research design, development of a conceptual risk framework, sampling, review of pilot data, design of interview questions, and presentation of preliminary findings.

2.1 Conceptual risk framework

A conceptual risk framework was developed at the outset of the research in conjunction with the Steering Committee (Figure 1). The framework helped map possible points/steps for pest and disease outbreaks where risk may be increased or decreased.

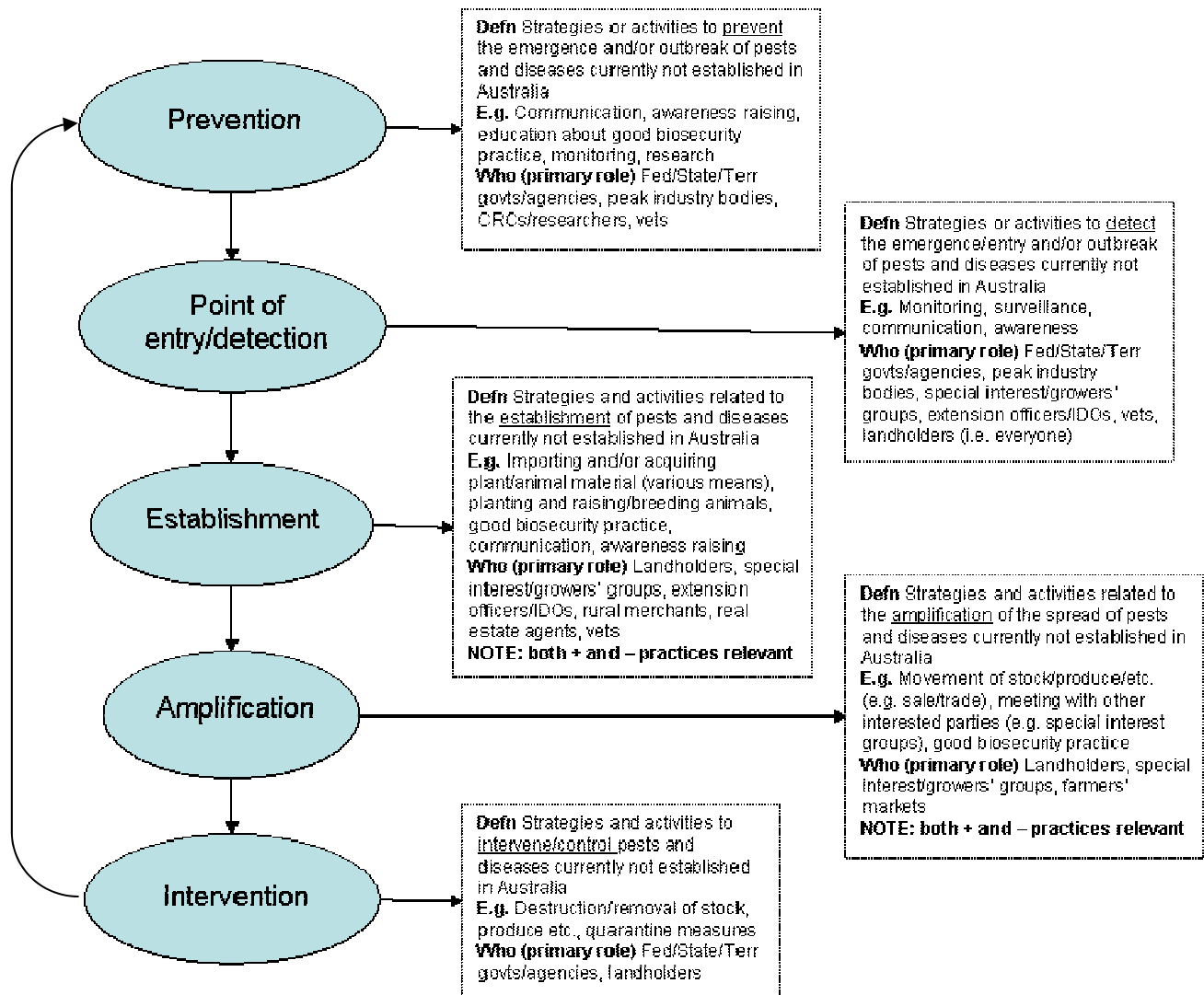


Figure 1: Conceptual risk framework

The framework was also used to identify the key research questions and inform the research design.

2.2 National stakeholder database

The framework was used to design a national peri-urban biosecurity stakeholder database where stakeholders from various points in the pathway were identified (with input from the Steering Committee). The database collected information on where stakeholders were most likely located in the risk pathway (i.e. where they played a primary role in either increasing or decreasing risk), what type of stakeholder they were (i.e. government, industry, researchers, special interest groups, rural merchants, real estate agents or landholders), their location, and their contact details (the database is not included with this report due to confidentiality requirements).

Initially, the database collected information about industry or government stakeholders with a focus on those likely to have contact with small landholders in peri-urban areas and known to PIAPH. Snowball sampling and the internet were used to expand and refine the database (guided by the conceptual risk framework and input from the Steering Committee) and to locate landholders.

At the conclusion of the project, the database contained over 200 entries, including:

- Federal/state government agencies dealing with peri-urban and/or biosecurity issues (in particular, the Australian Quarantine Inspection Service (AQIS), state departments of primary industries)
- industry groups
- rural service providers including rural merchants, farmers' markets
- special interest groups including animal and plant 'fanciers', growers' groups
- researchers and
- small landholders.

2.3 Literature review

A desktop analysis of research on biosecurity risks in peri-urban landscapes was conducted prior to the primary data collection. The purpose of the review was to build on the work of Aslin and Mazur (2005), and to analyse key gaps in the current knowledge. In addition to focussing on the topics of biosecurity and peri-urban land use, the review also included new research covering theoretical advances in risk perception and communication.

Combinations of key search terms were used to locate relevant literature and other documentation (Box 1). The search terms were based on the three key topics underlying this research: ‘risk’, ‘peri-urban landholders’, and ‘biosecurity’.

Peri-urban	Biosecurity	Risk
<i>Peri-urban</i>	<i>Biosecurity</i>	<i>Risk perception</i>
<i>Peri-urban farms/farmers</i>	<i>Plant health</i>	<i>Risk</i>
<i>Peri-urban producers</i>	<i>Animal health</i>	<i>Risk communication</i>
<i>Hobby farmers</i>	<i>Biosafety</i>	
<i>Small farms/farmers</i>	<i>Animal/plant pests</i>	
<i>Lifestyle farms/farmer</i>	<i>Animal/plant diseases</i>	
<i>Small landholders</i>	<i>Outbreak</i>	
<i>Small holders</i>	<i>Incursion</i>	
<i>Lifestyle landholders</i>		
<i>Rural-urban fringe</i>		
<i>Sea change/ers</i>		
<i>Tree change/ers</i>		
<i>Dirt change/ers</i>		

Box 1: Key search terms used to locate relevant literature

Other terms for specific animal and plant pests and diseases were also included in the search (e.g. FMD and AI). The search primarily focussed on reports, articles and documents published from 2000-2007 in an effort to uncover recent work. Work by other known researchers in this area was also extensively searched.

Databases (including Factiva, Science Direct and Expanded Academic) and electronic journals within the libraries of DAFF and the Australian National University (ANU) were searched in addition to research and development organisation websites (including LWA and RIRDC) and Google scholar.

The new material was synthesised with Aslin and Mazur’s (2005) work and used to develop a gap analysis matrix. A portion of the literature review was dedicated specifically to risk perception and communication.

2.4 Interviews

This project used an exploratory, qualitative approach to generate in-depth data. Data were collected using semi-structured interviews conducted by telephone and face-to-face. A range of interviewees were selected from the stakeholder database. The conceptual risk pathway was used to stratify the sample to have an even spread of stakeholders across the different points in the pathway (i.e. at the prevention, point of entry/detection, establishment, amplification, and intervention stages). Interviewees from a range of geographic locations were also sought (i.e. across the states and territories).

Questions

The interview questions drew on the previous work by Aslin and Mazur (2005) and were developed to cover gaps identified in the literature review. The questions were designed to focus on the activities and practices of small landholders in peri-urban areas. Some questions were designed to elicit data on interviewees' perceptions of peri-urban landholders' motivations and values. Other questions were designed to give an indication of how to communicate with this type of landholder (refer to Appendix A). The interviews took between 30 and 60 minutes depending on the interviewee.

Piloting

Before data collection, the questions were piloted with eight stakeholders (including representatives from state government organisations, rural merchants, growers' groups, and researchers). They were asked for their feedback on the style, flow and content of the questions. Feedback provided by these stakeholders indicated that the term 'peri-urban landholders' be modified to 'small landholders in peri-urban areas' to more accurately reflect the focus of the research. Apart from this, the questions were found to be well-worded and logically structured.

Data collection

Data were collected from the 26th March until 11th May, 2007. Guided by the conceptual framework, interviews were conducted until some consistent themes or topics were repeated in the data (Morse and Richards 2002). Interviews were carried out by three researchers and where possible they were conducted face-to-face. The interviews were recorded using digital voice recorders, and later transcribed verbatim. At the conclusion of each interview, interviewees were asked to provide the names of others who may be interested in participating in the research.

Field trip

To locate additional interviews, with small landholders in particular, a field trip to South Australia was arranged. South Australia was chosen because it would complement the three case study areas

already studied by Aslin and Mazur (2005) (located in Western Australia, Victoria and Queensland). Furthermore, previous research indicated that there are increasing numbers of small landholders in South Australia, in particular in the Barossa Valley and the Adelaide Hills (Houston 2005).

Social scientists attended a sale yard in Kapunda known to attract small landholders (van Dissel *pers. comm.*) on the 26th April, 2007. The sale of poultry and livestock was observed and potential interviewees were approached and invited to participate in the research. Social scientists also attended the Kapunda Farm Field Day in South Australia from the 27th to 28th April, 2007 to locate further interviewees.

Analysis

Interview transcripts were analysed using 'NVivo' (a software package that facilitates analysis of qualitative interview data). Data were initially analysed by question (i.e. grouping all interviewees' responses to each question), followed by more in-depth content analysis using broad themes and sub-themes that emerged from interviewees' responses. Findings were reviewed in conjunction with those arising from the literature review to create a typology of landholders and a matrix of key landholder types and potential biosecurity risks associated with each type.

3.0 Literature Review

This review brings together current knowledge about small landholders in peri-urban Australia with biosecurity, risk perception and risk communication. The focus of the review was to build on our understanding of who small landholders are, where they are located, the drivers of change in the peri-urban landscape, and the potential risks small landholders pose to Australia's biosecurity. From this, a gap analysis was developed to guide future work in this area. Recent research in risk perception and risk communication was examined in the light of the fourth research question ('what are some of the best methods to communicate with small landholders about biosecurity?').

3.1 Terminology clarification

As discussed earlier, there are many definitions of 'peri-urban'. For this reason it was considered important to dedicate a portion of this report to discussing this issue.

Black et al. (2000) describe a changing perception of the peri-urban landscape. Peri-urban land is no longer viewed as simply the land that has been incorporated into urban development, but as areas that have their own dynamic in which rural enterprises coexist with hobby farms and small lifestyle holdings. The physical structure of the peri-urban landscape is characterised by heterogeneous land use (Buxton et al. 2006). This characterisation is described by Land & Water Australia (2007) as: neither urban nor rural, but a dynamic interface and transitional zone characterised by a diverse range of land uses.

The peri-urban landscape caters for the needs of a diverse range of people and has many different economic, environmental and social functions (Buxton et al. 2006). The functions provided by the landscape are highly determined by the characteristics and values of the people populating it. Ford (1999) describes peri-urban as an area of dynamic rural urban confluence interacting to create a complex community with distinct characteristics.

Houston (2005p. 211) highlights that "Any serious attempt to form a national view of the peri-urban phenomenon also needs to account for non-metropolitan peri-urban areas." The term 'peri-urban' is most commonly used in relation to the area surrounding major urban centres, thus in most cases peri-urban actually means peri-metropolitan and that "...all but the smallest urban centres have a discernable peri-urban sphere of influence" (Houston 2005 p. 209). It is increasingly noted in the literature that the peri-urban phenomena has reached regional parts of Australia as population movement into non-metropolitan areas increases. Mackenzie et al. (2006) agree that the

phenomenon has moved beyond major urban centres and include in their definition the peri-urban areas adjacent to clusters of rural residential development. Hodges (2005) also acknowledges that any population centre regardless of size will exert peri-urban influence on surrounding rural lands.

3.2 The Australian peri-urban landscape

Historically individuals have settled at the fringes of urban centres. The peri-urban phenomenon is occurring both in Australia and worldwide (Ford 1999). Through the 1970s and 1980s ‘sea changes’ were popular as people populated the areas between urban centres and the coastline (Salt 2004a). This trend has continued with over 70,000 people moving to coastal regions in 2003 (Salt 2004a). More recently, ‘tree changes’ have also become popular where people are occupying small parcels of land in rural and ‘bush’ areas transforming traditional farming regions at a rapid rate (Hollier et al. 2004a, Hollier et al. 2004b). To date there are no concrete figures on exactly how many small landholders there are in Australia. For example, figures for Victoria based on anecdotal evidence suggest the numbers of small landholders ranges from 29,000 to over 400,000.

The Australian peri-urban landscape is reported to be predominately made up of ‘small’ landholdings, often referred to as ‘small farms’ (Francis 2002, Hollier and Reid 2006a). Francis (2002) believes there is no one accepted definition of ‘small farm’ as they vary greatly in size from less than 1ha to 300ha and can be commercial, quasi-commercial or non-commercial agricultural operations.

Population movement in Australia

Population movement in Australia is one indicator that can be used to broadly locate and spatially define peri-urban areas. Hugo (2002) affirms that strong population growth has occurred outside of metropolitan areas in Australia since the 1960s, contrary to popular belief that these areas are in decline. Population ‘turnaround’ has been a consistent trend in Australia. Since the 1970s demographers have recorded high rates of population growth in non-metropolitan urban centres and rural areas (Burnley and Murphy 1995). Maher and Stimson (1994 in Houston 2005) identified a number of regional centres, including Armidale, Ballarat, Bathurst, Bendigo, Dubbo, Lismore, Wodonga and other agricultural districts, that were undergoing expansion because of emerging irrigation and intensive horticultural industries. Through the 1990s, Statistical Local Areas (SLAs) contiguous to a metropolitan boundary have experienced the highest population growth rates in Australia (Fisher 2003). Hugo (2002) believes that non-metropolitan population growth is concentrated in certain areas in Australia, which are:

- surrounding metropolitan cities
- along east and southwest coastlines

- resort and retirement regions
- along the Hume Highway linking Sydney and Melbourne and
- relatively remote areas near mining activities, tourism and significant Indigenous populations.

There are currently efforts underway to accurately map the peri-urban areas of Australia. Previous mapping has been undertaken using spatial data from the Australian Bureau of Statistics (ABS) (i.e. SLAs). Houston (2005) used SLAs from the mid-1990s to map the peri-urban landscape (Figure 2).

Figure 2 shows dense concentration of peri-urban areas adjacent to all major urban centres, as predicted by traditional definitions of 'peri-urban'. Although useful, this map is based on data from the 1990s and cannot be considered a reliable indication of the current peri-urban areas of Australia.

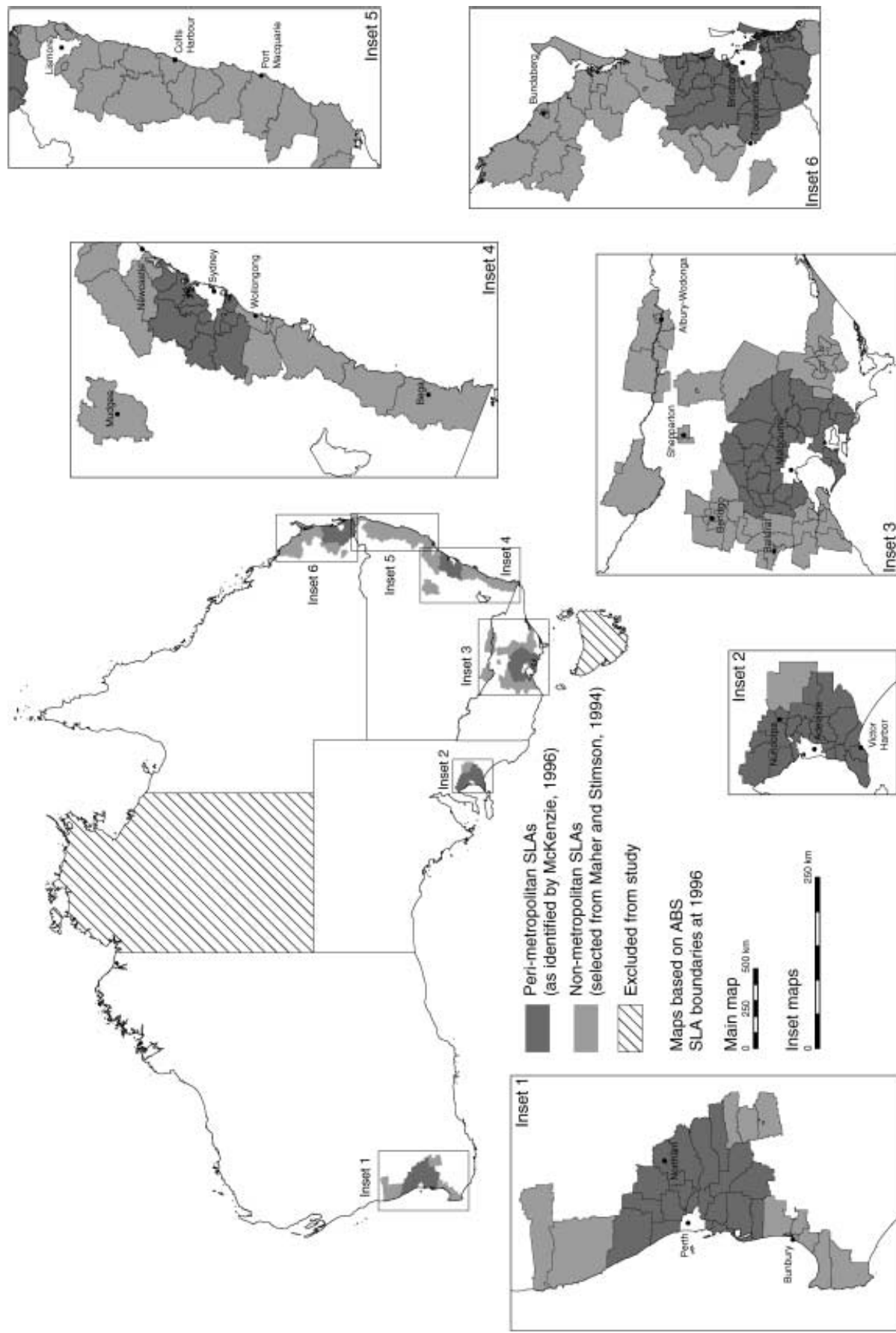


Figure 2: Peri-urban areas of Australia determined by Statistical Local Areas (SLAs) using 1994 and 1996 Australian Bureau of Statistics data
(source: Houston 2005)

The Land Management Sciences Programme within the BRS has produced a more current map of peri-urban Australia using 2006 data for the ‘rural-residential’ and ‘rural-living’ classifications from the Australian Collaborative Land Use Mapping Programme (ACLUMP) (Bureau of Rural Sciences 2007) (Figure 3).

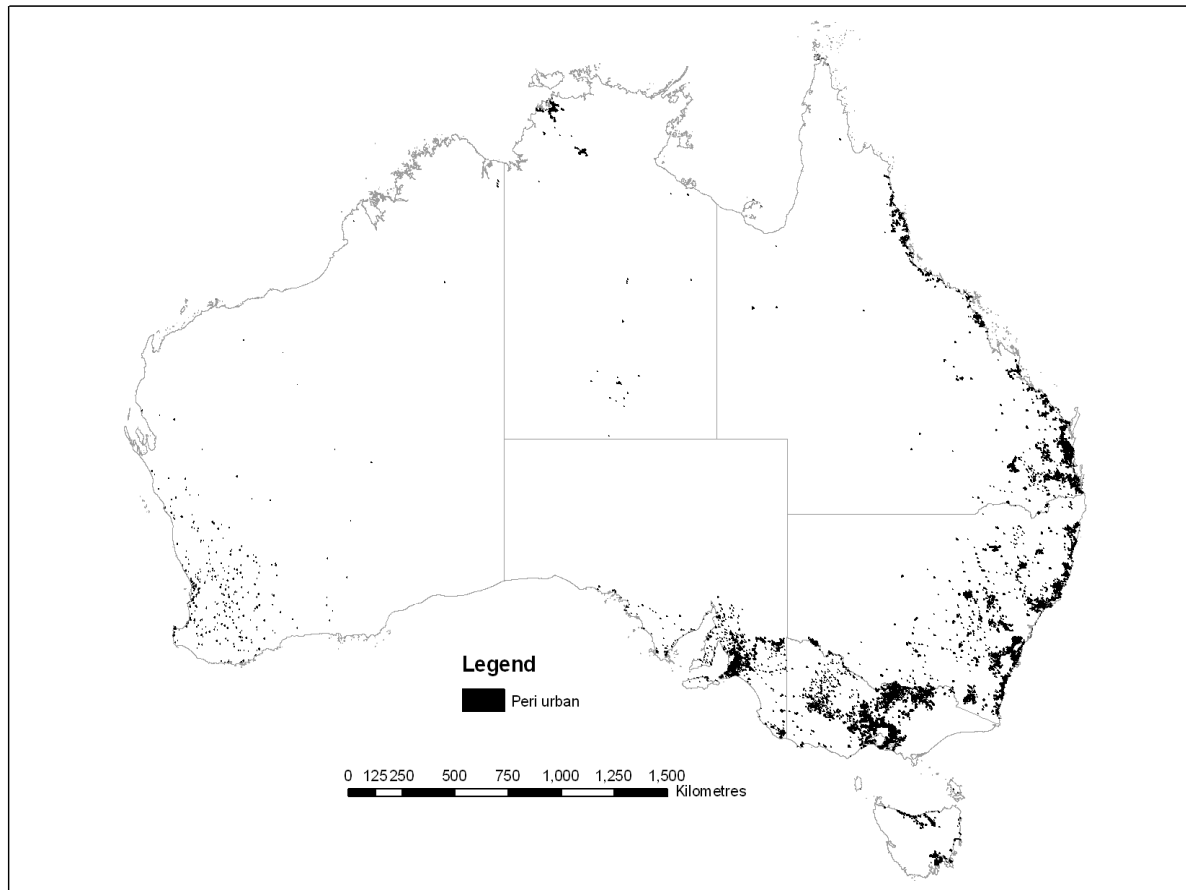


Figure 3: Peri-urban areas of Australia using 2006 ACLUMP data (*Australian Collaborative Land Use Mapping Programme*) (Bureau of Rural Sciences 2007) (Note: complete data for Western Australia and the Sydney basin are currently not available)

These data are sourced from the states and territories and ACLUMP is regularly updated. Figure 3 is a composite of two ACLUMP classifications. ‘Rural residential’ is characterised by agriculture in a peri-urban setting, where agriculture does not provide the primary source of income (Bureau of Rural Sciences 2006). ‘Rural living’ is characterised by rural residential areas that comprise a substantial amount of native vegetation (<90%) with no agricultural development (Bureau of Rural Sciences 2006). At the time of writing very little spatial information was available for Western Australia and the Sydney basin. This figure illustrates the ‘creep’ of peri-urban areas beyond the traditional zones adjacent to major cities. It is now evident that peri-urban areas pepper the rural landscape.

Together, Figures 2 and 3 paint a consistent picture of the main peri-urban regions of Australia. As more data becomes available the spatial accuracy to which peri-urban Australia can be mapped will increase.

Peri-urban 'hotspots' in Australia

Despite a general lack of population data, a number of peri-urban 'hotspots' can be identified by drawing on Figures 2 and 3 and the available literature. Peri-urban hotspots have been identified by Maher and Stimson (1994 in Houston 2005), Houston (2005), Salt (Salt 2004a), Aslin et al. (2005), Hollier et al. (2004b), and Hugo (2002). From Figures 2 and 3 it can be seen that they are concentrated particularly along the south-east coast of Australia, with dense spots around Brisbane (and south-east Queensland more broadly), Sydney and Melbourne. Although recent data is not available for the Sydney basin, previous work by Houston (2005) (Figure 2) clearly demonstrates a high concentration around this area. Other areas in New South Wales (NSW) include the Southern highlands, the Hunter Valley, around regional inland cities ('sponge cities') such as Wagga Wagga, Dubbo, Albury, Armidale, Bega Valley (Figures 2 and 3).

In the ACT peri-urban areas can be clearly seen around Canberra (Figure 3). As observed by Hugo (2002) (Figures 2 and 3), it is evident that peri-urban areas in Victoria are spreading through the central corridor towards the border of NSW. In South Australia the peri-urban zone can be seen to occur north and south of Adelaide, especially in the Adelaide hills (Figures 2 and 3). Although information is lacking for Western Australia, Houston's (2005) map shows considerable peri-urban growth outwards from Perth, stretching as far south as Margaret River (Figure 2). In Tasmania, peri-urban areas are concentrated around Hobart and north along the coast near Launceston (Figure 3). Figure 3 shows that Darwin is also experiencing the peri-urban phenomenon, which appears to be spreading south-east towards Katherine.

Drivers of change

Although discussion of the demographics of the peri-urban movement is available elsewhere (e.g. Aslin and Mazur 2005, Buxton et al. 2006, Fisher 2003, Ford 1999), there are some important drivers of change that are useful in understanding landholders' decisions to move to the peri-urban landscape.

Movement into peri-urban areas is often unrelated to economic drivers such as employment or business opportunities (Hollier and Reid 2006b, Murphy 2005). However, Murphy (2005) hypothesises that country towns have a competitive advantage which may be instrumental in their

population stabilisation and growth. This competitive advantage in land prices, scale, amenity and social climate could be factors driving the population growth of the peri-urban landscape. Other factors include:

- accessibility to urban centres (Burnley and Murphy 2004, Hollier et al. 2004b)
- changing individual values (e.g. alternative living) (Hollier and Reid 2006b)
- changing societal values (Curry et al. 2001, Holmes 2006)
- lifestyle aspirations and personal well-being (Hamilton and Mail 2003, Hollier and Reid 2006b)
- environmental stewardship (Hollier and Reid 2006b)
- connection to place (Hollier and Reid 2006b)
- increasing urban property and rental prices, home ownership affordability (Buxton et al. 2006, Fisher 2003, Hollier et al. 2004b, Holmes 2006)
- retirement migration (Burnley and Murphy 2004, Murphy 2005)
- increased mobility of the population (Holmes 2006)
- better transport and communication links (Burnley and Murphy 2004, Buxton et al. 2006)
- family security (Hollier and Reid 2006b)
- changing employment arrangements (Sinclair 2003, Holmes 2006)
- increasing disposable income (Burnley and Murphy 2004)

These drivers can be linked to different types of peri-urban dwellers.

Types of peri-urban landholders

Like the peri-urban landscape itself, those who populate it are diverse and possess a wide variety of characteristics (Mackenzie et al. 2006). This is not peculiar to small landholders in peri-urban areas; all landholders in rural Australia vary in their socio-economic characteristics, values, beliefs and capacity (Barr 2003). However, Hugo (2002) and Holmes (2006) argue that the composition of non-metropolitan Australia is becoming increasingly diverse. This heterogeneity has implications for communication, education and policy. Emtage et al. (2006) states that decision-makers and service providers need a better understanding of the range of socio-economic circumstances and value systems within rural communities and how this affects land management attitudes and behaviours. They comment further that these differences will determine the impact of policy and programmes across a community (Emtage et al. 2006).

Researchers have recommended the use of landholder classification schemes and typologies as a way of avoiding 'scatter gun' approaches to communicating with landholders, acknowledging that

it is impossible to have policies and programmes customised to individuals (Emtage et al. 2006). Emtage et al. (2006) postulate that there has been an increasing interest in landholder typologies and farming systems that parallels the social trends of population turnaround, counter-urbanisation and the sea-change movement.

Despite increasing interest, there is currently little consensus about who inhabits the peri-urban landscape (Hollier et al. 2004b). Mackenzie et al. (2006 p. 63) comment on the problem of attempting to construct a singular, all encompassing typology: “A typology at best is an abstracted model of ‘typical types’ that will provide only a broad indication of community variations relevant to the design of peri-urban initiatives. It should not be expected to pigeon hole all the different land uses and stakeholders in the region.”

Nevertheless, gaining a broad understanding of the types of small landholders in peri-urban Australia is an important step in determining how to tailor policies, programmes, education and communication for this population. Although consensus is yet to be reached, there are some commonalities amongst the types of small landholders in peri-urban areas described by those researching this topic. The most common means of classification are based on socio-economic drivers and attitudes to land use (e.g. Barr 1996 in Mackenzie et al. 2006), the forces behind demographic change (e.g. Burnley and Murphy 2004, Fisher 2003, Ford 1999), and the extent of agricultural activity (e.g. Aslin 2006).

A diverse range of small landholders in peri-urban areas fall under the ‘Lifestyle’ category, and these appear to be the type most frequently referred to in the literature (albeit by a variety of labels). ‘Lifestylers’ vary in values, socio-economic status, drivers and their land use practices. Some of the main sub-types identified include: **‘Downshifters’** – considered to be in search of a slower, less stressful, simplistic, less materialistic, environmentally focussed lifestyle. Their land use focus is primarily on amenity and recreation. **‘Sea changers’** – located predominately in coastal regions around Australia, considered by Burnley and Murphy (2004) to be:

- ‘free agents’ (retirees and people with independent incomes, alternative lifestylers, people with mobile occupations or able to work from home)
- ‘forced relocators’ (people effectively forced to move from cities because they cannot afford city house prices or living costs)
- ‘periodic populations’ (tourists, weekend and holiday visitors, some of whom may own holiday homes, and some of whom effectively live in two places)

- smaller categories of ‘gentrifiers’ (people who buy cheap working class housing and renovate it) and inter-state migrants (who may also fit within some of the other categories).

Sea changers are dominated by financially secure ‘post fordist’, ‘baby boomer retirees’ (Gurran 2007). **Tree changers** are similar to sea changers but are located predominately in inland ‘rural’ areas. **Small lifestyle farmers** are reported to be located predominately outside ‘urban’ centres of all sizes from rural towns to large cities. Their land use focus is on amenity and recreation, but may include agricultural production to some degree. Agricultural production may range from self sufficiency (growing vegetables, keeping chickens for eggs) through to quasi-commercial activities to supplement income (however, their main source of income is thought to be off-farm) (Hodges 2005). **Hobbyists** are reported to be located mostly within the urban landscape or on the true edges of urban centres. As implied in the label, their land use is dominated by hobbies such as bird fancying, specialist plant varieties or ‘pet’ farm animals.

Aslin (2006) identifies small commercial farmers as rural landholders in the peri-urban fringe. Small farmers are also a diverse group and unlike lifestyle farmers, derive their primary income from agriculture. Although the data used in his study did not differentiate between lifestyle and full-time farmers, Hodges (2005) reports that peri-urban farmers are more likely to be highly educated and to speak languages other than English at home. Hollier et al. (2004b) cite ABS (Australian Bureau of Statistics Data) census data from 2001 that shows 40% of horticulturists in the Goulburn area of Victoria are from culturally and linguistically diverse (CALD) backgrounds. From this it appears that small landholders from CALD backgrounds appear to make up a distinct proportion of landholders in peri-urban zones.

The peri-urban contribution to agriculture

Although it was thought previously that small landholders in peri-urban Australia were not involved in agriculture, recent research has shown this to be otherwise. Hooper et al. (2002) report that there are over 60,000 small farm operations in Australia occupying 20% of agricultural land managed by semi-commercial farmers. Other research (e.g. Houston, 2005, Hodges 2005) has found that small farmers contribute 25% to the national gross value of agricultural production in Australia despite occupying around 3% of agricultural land. For example, South East Queensland, an area known to be heavily occupied by small farmers, accounts for 14% of Queensland’s ‘farm gate’ turnover (QLD DPI 2002 in Buxton et al. 2006). Peri-urban agriculture in Queensland is thought to contribute to 60% of the state’s agricultural production, estimated at \$6 billion (Queensland Department of Primary Industries and Fisheries 2007). In the Sydney basin there are around 2000 market gardens which supply 90 per cent of Sydney’s perishable vegetables, and have an economic value of over \$200 million per annum (Parker et al. 2005, Sinclair et al. 2003). As

Houston (2005 p. 221) comments, these ‘official’ data may “significantly under-represent agriculture in peri-urban regions”.

3.3 Biosecurity

The possibility of an outbreak of an exotic disease in plants or animals is a constant concern for Australian agriculture. This is justified by potentially devastating effects, not only on agricultural production, but also for our natural resources, public health, trade and economic growth (Murdoch et al. 2006, Stohlgren and Schnase 2006). Australia currently enjoys a considerable market advantage as a result of its freedom from many plant and animal diseases found throughout the world. Within Australia, states like Western Australia and Tasmania enjoy an even higher advantage due to their relative isolation. This enviable status is reinforced by strict biosecurity policies (Sharma 2006).

The outbreak of diseases in countries previously free of them has resulted in significant negative economic consequences. For example, outbreaks of classical swine fever in the Netherlands in 1997 and Germany between 1998 and 2000 had an estimated cost of greater than \$US 2 billion (Appleby 2003, Marshall et al. 2007). The FMD outbreak in 2001 in the United Kingdom has been estimated in excess of £3 billion (Marshall et al. 2007). The cost of an FMD outbreak in Australia has been estimated between \$A8 and 13 billion (Productivity Commission 2002). These estimations include the direct costs of containment and eradication, and the wider impacts on foreign trade, and animal and human welfare (Marshall et al. 2007). However, they should be considered conservative as they do not include the wider social impacts on communities (e.g. unemployment). One estimate of the total cost of the FMD outbreak in the United Kingdom is £23 billion (Howard Conkey *pers. comm.*) while another is as high as £38 billion (Sunday Herald Editorial 2007).

Biosecurity and small landholders in peri-urban Australia

There are few studies (in Australia or internationally) on farmers and biosecurity awareness, and fewer still that focus specifically on small landholders in peri-urban areas and biosecurity. Sanson et al. (2004) conducted a study on small landholders, their land use, and biosecurity practices in New Zealand. To date, Aslin et al. (2004), Aslin and Mazur (2005), Hollier et al. (2006) and Schembri et al. (2006) provide some of the most useful Australian research on this topic. Aslin and Mazur (2005) covered peri-urban landholders in Western Australia, Queensland and Victoria; Hollier et al. (2006) focused on Victoria; and Schembri et al. (2006) researched pig producers in the Sydney basin.

Pig production provides an excellent example of a species farmed by peri-urban landholders that potentially poses a risk to Australia's biosecurity. Swine are highly susceptible to a variety of diseases including FMD, classical swine fever, African swine fever and H5N1 avian influenza (Marshall et al. 2007). The introduction of a foreign animal disease through the feeding of food waste (swill) is unique to the species (Marshall et al. 2007). Swine producers, large or small, can be a high biosecurity risk because of their animal husbandry practices. The risk will be increased for those producers who operate in an unregulated livestock system.

Schembri et al. (2006) surveyed a random sample of pig producers in the Sydney basin about their management practices. A small proportion (16%) was found to be commercial farmers, while 69% were classified as 'backyard hobby' producers (Schembri et al. 2006). Results for management practices showed that 4% fed swill to pigs, and 56% did not possess a tattooed swine brand (Schembri et al. 2006). Furthermore, 25% of commercial producers and 50% of backyard producers were found to have an exotic-disease-knowledge-rating of two or less out of five (Schembri et al. 2006). This rating was interpreted as not knowing what an exotic disease is, not being able to identify disease signs in livestock, and not understanding why swill feeding is a biosecurity risk (Schembri et al. 2006).

Another relevant study was conducted by Barclay (2005), who surveyed 3000 livestock producers across eastern Australia. Although Barclay (2005) was concerned with livestock producers generally, she drew her sample from the Yellow Pages and it is likely that some peri-urban livestock producers were included in her sample. Using a survey, Barclay (2005) investigated the extent of biosecurity practices on farms, the level of knowledge about exotic diseases in animals, and perceptions of risk and attitudes towards biosecurity issues. The questionnaire focused on: sources of biosecurity information, on-farm biosecurity, and perceptions of risk and attitudes to biosecurity (Barclay 2005). For on-farm biosecurity practice, Barclay (2005) found that: 58.3% of participants reported they had implemented some type of biosecurity strategy on their property; the majority of participants stated they would report any unusual symptoms in their stock to a vet; pig producers were more diligent about biosecurity than other livestock producers; and lack of finances, time, information and drought were the main reasons given for not implementing biosecurity strategies.

The sources of biosecurity information used by participants included: newspapers, radio, and television, followed by Rural Lands Protection Boards (RLPBs), farm journals, local vets and government mail outs (in descending order) (Barclay 2005). In the event of an outbreak, the RLPB/department of primary industries, local vet and radio were reported as the primary sources of

information. Just over a third (35.3%) of participants reported that they discussed strategies to protect their properties and livestock from disease with others in their community (Barclay 2005).

For results concerning the perception of risk and risk communication Barclay (2005) found that Australian farmers' attitudes towards biosecurity were very similar to British farmers. Their predominant attitude was that if government agencies do their job landholders do not need to be concerned about biosecurity. Participants saw the greatest risk of an exotic disease outbreak arising from neighbours failing to report sickness or death of stock, followed by feral animals, imported animals and imported semen (Barclay 2005). Barclay (2005) reported that only 9% of interviewees were knowledgeable of any biosecurity initiatives in their district but a high proportion of participants requested more information and education regarding biosecurity on farms.

Despite the relevance of these results to the present study, it is difficult to know what proportion of Barclay's (2005) sample comprised small landholders in peri-urban areas. Specific research on this topic is required in order to determine the level of risk potentially posed by small landholders in these areas. Gaps in knowledge about small landholders and biosecurity are discussed in more detail in section 3.5

Barclay's (2005) work touched on risk perception and communication. Recent theoretical developments in risk perception and risk communication are discussed in the next section.

3.4 Risk perception and risk communication

As mentioned, there is widespread agreement that biosecurity risks from plant and animal pests and diseases impose costs on the economy, as well as posing risks to the environment and to public health (Murdoch et al. 2006, Stohlgren and Schnase 2006). Various international agreements have elevated biosecurity risk issues onto the international policy agenda. The World Trade Organization (WTO) Sanitary and Phytosanitary (SPS) Agreement establishes scientific risk assessment rights and obligations to ensure that SPS measures are applied to the extent required to protect human, animal, and plant health. The field of biosecurity risk assessment requires the formulation of globally relevant and scientifically sound methods and approaches (Andersen et al. 2004). It also requires an understanding of how the field could contribute to improved decision-making by establishing the benefits of communicating biosecurity risk.

Both the psychological and sociological aspects of risk perception have implications for how peri-urban Australians perceive, act upon and react to biosecurity messages. In particular it is important

to consider “how far people are to be seen as passive recipients of information about risks to which they then respond, or as in some sense active in identifying and conceptualising some issues as risks and others as less significant” (Taylor-Gooby and Zinn 2006 p. 407). In light of what is known about risk perception from social science, and what is unknown about biosecurity risks, policy-makers are likely to be faced with significant challenges in explaining/communicating biosecurity risks and their assessment mechanisms.

Public attitudes to specific risks are influenced by a wide range of cultural, moral, political, scientific and economic arguments and are significantly influenced by how people feel. There are a number of well-established ‘fright factors’ discernible in the literature as the necessary ingredients for a public scare. The perception of risk is influenced by whether:

- risk is seen as involuntary, inequitable and inescapable
- the source of risk is unfamiliar or novel and man-made
- the damage may be hidden and irreversible
- there is a danger to small children or future generations
- the form of harm arouses particular dread
- the victims are identifiable rather than anonymous
- risk appears poorly understood by science
- the risk is perceived as beneficial to an individual (‘something in it for me’)
- there are contradictory statements/science from responsible sources (Duncan 2004).

Communicating biosecurity risk is complicated. Added to the mounting evidence for biosecurity risk is the potential for uncertain biosecurity outcomes, the existence of multiple and conflicting biosecurity objectives and the fact that they tend to be expressed by many and diverse stakeholders with differing views on both facts and values. Given the complexity of this topic, there is a need to use interdisciplinary approaches to biosecurity risk assessment, then marry these with integrative approaches to risk management, risk communication and risk perception. In this section, we:

- a) consider recent approaches to risk perception and risk communication
- b) examine implications and lessons of this new work for communicating biosecurity.

Recent approaches to risk perception and communication

It is important to reconsider the reasons for investigating risk perception, albeit briefly. Risk perception affects the reception of any and all risk communication. Risk communication is an essential tool in the management of risk, which in turn cannot be separated from risk assessment

given the “essential connections between the social values at stake in invasive species decisions (including decisions about plant and animal pests and diseases) and the scientific knowledge necessary to predict the likely impacts of management actions” (Maguire 2004 p. 859). Hence the perception of risk inevitably affects risk outcomes, for both individuals and institutions.

In late 2003, the European Commission held a conference on risk perception where the following five factors influencing risk perception were identified:

- governance (relationship between government and society via risk managers)
- science (isolated or engaged with society)
- society (level of debate, extent of civil society)
- culture (assumptions and values associated with risk perception across cultures)
- media (how risk is reported) (Duncan 2004).

Recently, developments in psychology and sociology have acknowledged the increasing importance of the positive power of emotions and the cultural framing of risk perceptions and responses to manage uncertainties (Taylor-Gooby and Zinn 2006). From psychology, “experimental work indicates that in some contexts individuals can be understood to use emotionally-based judgements to supplement or supplant rational judgement in assessing situations or making choices, particularly those involving time pressure or uncertainty” (Taylor-Gooby and Zinn 2006 p. 399).

A leading risk perception theorist, Paul Slovic, has recently combined affect (how people feel) with cognitive heuristics (what and how they think) and suggests that both factors may be working together, leading to more complexity in how people judge risk. “For example, the effectiveness of cigarette advertising, even for groups that are aware of the damaging health effects, may be partly attributed to the success of commercial interests in associating cigarettes with positive affect, which overrides the concomitant cognitively-based decision to quit” (Slovic et al. 2004 in Taylor-Gooby and Zinn 2006).

From sociology, there are two relevant approaches to risk perception which in combination may be referred to as ‘cultural issues’. The first (and oldest) of these comes from the social anthropological work of Mary Douglas who sought to identify fundamental principles in how people see themselves and each other. She posited a key distinction between one’s self and the ‘other’

identified as those identified or defined as ‘different’, not belonging, or outside the identity of the group – often a source of concern or fear.

The second sociological lesson on risk perception relevant to peri-urban biosecurity comes from the ‘risk society’ perspective where risks are seen as increasing exponentially for both individuals and society. In this view, everyone must act consciously and ‘reflectively’ and no one has absolute rights or responsibility for issues such as biosecurity. In this view, studies illustrate a decline in received authority, less confidence in distant experts and more awareness of the shortcomings of official decision-makers and scientists. All of this points to the need to develop specific relationships between government and peri-urban Australians based on mutual trust and critical questioning of biosecurity rather than the taken-for-granted deference to accredited experts (Taylor-Gooby and Zinn 2006 p. 403).

There are a number of recent developments in risk communication of relevance here. First however, it is critical to re-establish that risk communication is conceptually different from other kinds of communication. Three factors have been identified as central to risk perception and thus to risk communication: *trust*, *stigma* and *uncertainty*, with trust seen as influencing most aspects of risk communication. These are discussed below.

1) Trust - the public has a sophisticated understanding of source characteristics associated with biased communications.

The trust placed in risk managers is affected by public perception of:

- competency (knowledge, expertise)
- consistency (predictability of arguments and behaviour)
- commitment (to obligations and responsibilities)
- independence (lack of bias)
- openness (transparency)
- empathy (caring, dedication, acting in ‘my interests’) (Frewer 1999, Karatzas 2004, Kaspersen 1992, Renn 1998, Renn and Levine 1991).

Provision of more information about a specific risk issue does not automatically lead to uncritical acceptance. “[P]ublic dislike of biotechnology, particularly in agriculture, if anything, grows as people become better informed about it. This confirms that more information does not necessarily mean more effective communication, and that good information is a necessary but not sufficient pre-requisite of good communication” (Bucchi and Neresini 2002, Lorenzet and Neresini 2004 p.

18). Distrust is associated with deliberate distortions of information as well as a history of provision of 'erroneous' or mis-information (Frewer 1999). Critically: "in the era of science-based crises, it is no longer possible to count on there being automatic trust in scientific methods and aims, rather this trust has to be sought/reaffirmed through a process of negotiation with the public" (Lorenzet and Neresini 2004 p.18).

2) Stigma - associated with risk has multiple dimensions.

Certain places, people or products have become, and may easily become, stigmatised. Stigma has become a component of public opposition to many new technologies (e.g. biotechnology in the United Kingdom).

3) Uncertainty - fundamentally associated with risk perception and communication.

The degree of risk managers' openness will affect both risk perception and risk communication. There are three points of note here: the public can handle uncertain information; uncertainty when associated with controversy becomes news-worthy; and the impact of admitting uncertainty can vary in relation to the source of the information.

To sum up, the communication of risk frequently occurs in a context of public anxiety. In these contexts, there is an increased likelihood of low levels of trust in risk managers. Hence there are some very salient lessons for communicating biosecurity to be learned from the social science of risk literature.

Implications and lessons for communicating biosecurity

There has been considerably more work conducted on risk communication and over a longer time within the public health sector than in other fields. The over-riding messages to come out of this are: 1) be pro-active; 2) have a plan; and 3) focus on people. In 2004 at the European Commission's conference on risk perception and communication, the following 8-step maxims on risk communication were provided by a representative of the European Union Scientific Advice and Governance Unit:

- 1) develop a theme/goal with common interest for the audience
- 2) identify all interested organisations and potential audiences
- 3) understand, listen to and engage these audience's values and concerns
- 4) develop a strategic plan for communication with these audiences
- 5) communicate a credible and consistent message
- 6) establish direct relationships with these audiences

- 7) acknowledge and respond to both rational and affective/emotional arguments
- 8) evaluate the effectiveness of your communication intervention (Karatzas 2004 p. 3).

It is important to avoid the usual dichotomy of speaker-message or sender-receiver associated with communication as understood by the media (as one-way flow from top-down to multiple faceless people). To do so, consider the following principles underpinning this communication effort which can be loosely bundled under the heading of ‘engagement’:

- a) people want to know about things happening to them
- b) people want to participate in the negotiation of ‘acceptable’ risk
- c) people want access to both (scientific) reasoning and decision-making in relation to those risks
- d) it is vital to understand public perceptions of the risks that are being managed
- e) it is important not to assume that publics are ‘anti-science’ or irrational or epitomise ‘the everyday man/woman on the street’ or are the same as ‘consumers’.

In order to incorporate these principles into an effective communication strategy about peri-urban biosecurity, it is important to consider:

- Who is at risk?
- Through what process does this occur (e.g. technical risk assessment model)?
- Whose knowledge is included or excluded in any risk assessment?
- What kinds of expertise are involved in making judgements on risk?
- How can rural and peri-urban Australians make decisions in light of contradictory scientific expertise on biosecurity risk?
- Where is the idea of biosecurity risk coming from?

Finally, there are three significant problems or challenges associated with risk communication about biosecurity with peri-urban Australians. There is enormous complexity associated with assessing all causal and temporal relationships surrounding plant and animal pests and diseases. Even if this complexity can be accurately assessed in a timely fashion in specific communication contexts, it is impossible to erase uncertainty (i.e. those factors beyond control). Lastly, ambiguities remain in reaching conclusions on what peri-urban biosecurity risk means. In future communication with peri-urban Australians about biosecurity, it is therefore desirable to have:

- a) specific long-term local relationships established between agronomists, veterinarians, agricultural extension officers and peri-urban landholders and

- b) local forums, venues and networks established for information exchange, social learning and effective dialogue about peri-urban land use.

3.5 Gaps in knowledge

A summary of current Australian research on small landholders in peri-urban Australia and biosecurity is presented in Table 1. This matrix highlights that although studies are few, there is some research available to guide policy making in this area. It is important to note however, that much of the available research is case or location specific; there are currently no national studies on small landholders in Australia.

It is also evident that there are a number of other gaps in knowledge regarding small landholders in peri-urban Australia and biosecurity. These issues have been highlighted by others. For example, Aslin and Mazur (2005), Hollier et al. (2006), Schembri et al. (2006) and Hodges (2005) suggested that small landholders in peri-urban areas potentially pose a high biosecurity risk due to their behaviours and attitudes, knowledge of biosecurity, land use practices, location and from their unknown numbers. While not specifically focused on biosecurity risks, the Review of the National Landcare Program (Department of Agriculture Fisheries and Forestry 2003) identified small landholders in peri-urban regions as a rapidly growing group that had little understanding or application of sound soil, water, vegetation, animal and pest and weed management. Other unknowns include small landholders' membership of networks or industry groups, where they source their knowledge of land management and animal and plant health, and their understanding of the term 'biosecurity'.

This is acknowledged by others, including Ford (1999) who identified a lack of literature at the macro level on peri-urban landscapes and those who dwell within them. More recently, Buxton et al. (2006) also state that there is a lack of peri-urban analysis at the national level. Without national data much of what we know about small landholders in peri-urban areas is by inference. Houston (2005) believes that too much is inferred from coarse population change data and suggests a more sophisticated quantitative approach using more specific indicators such as building approvals and occupancy change in rural areas. Black et al. (2000) propose that quantitative data should be used to complement existing qualitative data to shed more light on the peri-urban environment.

Some key questions and/or issues that remain to be addressed are summarised in Table 2. The primary data collection conducted in this study (presented next) attempts to address some of these gaps.

Table 1: A matrix of gaps in knowledge regarding small landholders and biosecurity in peri-urban Australia, including what research is currently available (if any) (Note: based on Australian and New Zealand research located during time allocated for this project)

Topic	Literature available	Case/ location specific	Australia-wide
Who are small landholders in peri-urban areas?			
Demographics	(Barr 2004, Burnley and Murphy 2004, Buxton et al. 2006, Fisher 2003, Ford 1999, Hugo 2002, Murphy 2005, Salt 2004b, Sinclair et al. 2003)	X	X
Socio-economic data	(Hollier et al. 2004b, Kelly and Hosking in press)	X	
Networks	(Hodges 2005, Sanson et al. 2004)		
Types of small landholder	(Aslin 2006, Aslin et al. 2004, Burnley and Murphy 2004, Emtage et al. 2006, Hollier et al. 2004b, Mackenzie et al. 2006, Sanson et al. 2004, Sinclair et al. 2003)	X	
Values, motivations, attitudes	(Fairweather and Robertson 2000, Hollier et al. 2004a, Hollier et al. 2004b, Kelly and Hosking in press, Mackenzie et al. 2006, Sanson et al. 2004)	X	
Where are small landholders located?			
Spatial information	(Aslin and Mazur 2005, Bureau of Rural Sciences 2007, Burnley and Murphy 2004, Hollier et al. 2004b, Houston 2005, Salt 2004b)	X	X
What are the land uses and land management practices of small landholders?			
Agricultural and other land uses	(Barclay 2005, Buxton et al. 2006, Francis 2002, Hodges 2005, Moran 2005)	X	
Source of animal/plant stock	?		
Movement of stock (i.e. sold, traded, otherwise distributed)	(Schembri et al. 2006)	X	
What knowledge do small landholders have about land management? Where do they source their and information from?			
Knowledge	(Hodges 2005, Hollier et al. 2004a, Hollier et al. 2004b, Kelly and Measham unpublished)	X	
Information	(Sanson et al. 2004)	X	
What are the best means of communicating with small landholders? How do you communicate with small landholders about risk?			
Perception of government	(Open Mind Research Group 2005, Parker et al. 2005)		
Biosecurity	(Barclay 2005, Hollier et al. 2006, Sanson et al. 2004)	X	
Methods/approaches	(Hollier et al. 2004a, Morgan 2003)	X	
Risk perception and risk communication	(Barnes 2002, Botterill and Mazur 2004, Piseniallo et al. 2002)	X	X

Table 2: Key research issues/questions on small landholders in peri-urban areas still to be researched

Who are small landholders in peri-urban areas?
<ul style="list-style-type: none"> Current rate of change, movement in and out of peri-urban areas Reliable estimates of the number of small landholders in peri-urban Australia Variables such as age, gender, education, ethnicity, religion
<ul style="list-style-type: none"> Socio-economic profiles of small landholders, including financial resources and on-'farm' and off-'farm' income
<ul style="list-style-type: none"> What networks do small landholders belong to, if any? (e.g. Landcare, industry groups, other animal or plant related associations) Role of government agencies at local, state and national levels
<ul style="list-style-type: none"> A clearer understanding of the relationship between types of small landholder and their potential biosecurity risk – do some landholders pose greater risks than others (due to factors including their practices, interests, and motivations)?
<ul style="list-style-type: none"> Representative data about the values, motivations and attitudes of the types of small landholders found in peri-urban areas? What are their drivers? Why do they move to peri-urban regions?
Where are small landholders located?
<ul style="list-style-type: none"> Updated mapping of where small landholders in peri-urban areas are located at a national scale. Ground-truthing
What are the land uses and land management practices of small landholders?
<ul style="list-style-type: none"> Representative data on the main land uses of small landholders, and: <ul style="list-style-type: none"> What land management practices do they engage in? e.g. animal husbandry What is their understanding of natural resource management? What do small landholders contribute to Australian agriculture? What are the effects of land use competition from peri-urban areas with traditional agricultural production?
<ul style="list-style-type: none"> Representative data on where small landholders' source their animal and plant stock from
<ul style="list-style-type: none"> Where do small landholders' source their animal and plant stock from? Do they comply with systems such as the NLIS, Property Identification Codes and move stock through regulated channels? Where do small landholders sell or trade their animal and plant products?
What knowledge do small landholders have about land management? Where do they source their information from?
<ul style="list-style-type: none"> Small landholders level of knowledge about land management, and animal and plant health Level of interest in natural resource management issues
<ul style="list-style-type: none"> Where do small landholders source their information on animal and plant health from? How willing are they to learn, engage with knowledge providers?
What are the best means of communicating with small landholders? What is the best way to communicate with small landholders about risk?
<ul style="list-style-type: none"> What are small landholders' perceptions of government agencies?
<ul style="list-style-type: none"> What is small landholders' understanding/awareness of 'biosecurity'? Do they connect their land management practices with biosecurity?
<ul style="list-style-type: none"> What is the best way to communicate with small landholders about biosecurity?
<ul style="list-style-type: none"> Current thinking on risk perception What are small landholders' perceptions of risk? Are small landholders perceived as a risk to Australia's biosecurity and Australian agriculture? How can risk be communicated to small landholders?

4.0 Interview Findings

This chapter blends results with discussion and is based around each of the key research questions:

- Who are small landholders in peri-urban Australia, and what are their motivations?
- What are the land management practices and agricultural land uses of small landholders?
- What knowledge do small landholders have about managing pests and diseases?
- What are the potential risks posed by small landholders to Australia's biosecurity?
- What are some of the best methods to communicate with small landholders about biosecurity?

The data is presented in tables and figures, with direct quotes (in italics) from interviewees used to illustrate key points. For some sections, counts of response types (or terms used) in interviews are presented. In other sections, the number of interviewees who discussed a topic is presented. Percentages are not provided due to the small size of the sample. A summary of the main points arising from each section is included.

Data were collected for approximately six weeks over March and April, 2007. In total, 45 interviews were conducted, which produced 28 hours and 500 pages of data. Seven people who were contacted and asked to participate declined. The distribution of the sample (both geographic and according to the conceptual risk pathway) is presented in Table 3. Thirty-one interviewees were male and 14 were female.

The majority of interviewees were from South Australia given that this was the site of the field visit (Table 3). There was a relatively even spread across the other states and territories. Most interviewees were from state and territory governments, reflecting the emphasis in the conceptual risk pathway. This is due to the project's focus on pests and diseases not already established in Australia. Over 20% of interviewees were in special interest groups. This category included specialist growers' groups or associations, animal or plant fanciers, and farmers' markets.

Table 3: Distribution of the sample (including geographic location, interviewee type, and point interviewees occurred in the conceptual risk pathway)

Location n (%)		Interviewee type n (%)		Point in risk pathway n (%)	
SA	15 (33%)	Government	17 (38%)	Prevention	15 (33%)
NSW	10 (22%)	Special	10 (22%)	Point of entry/detection	9 (20%)
VIC	5 (11%)	interest	6 (13%)	Establishment	8 (18%)
ACT	4 (8%)	Landholder	5 (11%)	Amplification	10 (22%)
QLD	3 (7%)	Research	5 (11%)	Intervention	3 (7%)
WA	3 (7%)	Rural	2 (5%)		
TAS	3 (7%)	merchant			
NT	2 (5%)	Industry			
Total	45 (100%)	Total	45 (100%)	Total	45 (100%)

Role in protecting Australia's biosecurity

Nearly all interviewees believed that they had a role to play in this regard. The majority saw their role as educating, informing and raising small landholders' awareness of biosecurity. There was a recurrent theme in the data that maintaining Australia's biosecurity was very important and the responsibility of everyone, not only those involved in agricultural land uses.

"I think everybody's got to take some responsibility along the line..." (Interview 26)

This is in contrast to similar work by Barclay (2005). In interviewing livestock producers, Barclay (2005) found that although 38% reported that producers were primarily responsible for biosecurity, 84% of the sample believed that the responsibility lay with the Federal Government, and 65% thought that responsibility for biosecurity lay with state governments. This indicates that there is a disjunct between the perceptions of government employees and landholders about who is responsible for biosecurity. This topic could be explored further in future research.

4.1 Who are small landholders in peri-urban Australia?

a) Developing a typology

A typology is simply the 'study and interpretation of types' (Jary and Jary 1991 p. 347). Despite some precautions discussed earlier, a typology of landholders in the peri-urban landscape will provide a multi-dimensional profile of peri-urban landholders and the interrelationships between their values, attitudes, communication behaviours, socio-economic characteristics and land management practices (Emtage et al. 2006). The process of developing typologies is fundamental

to understanding landholders, especially as the composition of individuals in rural landscapes continues to diversify, and will support policy development and engagement programmes.

Interviewees were asked to describe the types of people they believed live on or own small properties in peri-urban areas of Australia. A wide variety of terms and descriptors were used by interviewees to capture their descriptions. However, these could be distilled into some main types of small landholder, using income source and time spent on their land as the key variables to develop a typology.

The large diversity of small landholders in peri-urban Australia makes any classification challenging. To capture this diversity, the typology uses broad groupings rather than discrete categories. This caters for the fact that some landholders could belong to multiple types.

Small landholders from culturally and linguistically diverse backgrounds (CALD) have often been highlighted as a separate type of small landholder in other research (e.g. Bayrante et al. 2003, Couchman 2006). During data collection for the present study, it was apparent that small landholders from CALD backgrounds could fall into any of the types described; hence they were not drawn out as a separate category. It is possible that in future larger scale quantitative studies, CALD landholders could form a sub-type within broader categories.

The integrity of the typology presented was tested to ensure it adequately represented the data. This was achieved by checking that all data were accounted for in the categories, by using inter-rater reliability. Inter-rater reliability requires two or more researchers to independently code a portion of the data and compare results (Robson, 2002). Two researchers independently tallied the types of small landholder referred to by each interviewee. A comparison of the results demonstrated a high level of agreement. Furthermore, the categories contained in the typology are consistent with similar Australian work in this area (e.g. Hodges 2005, Hollier et al. 2004b, Sanson et al. 2004).

b) The typology of small landholders in peri-urban Australia

Types of small landholder described by interviewees were categorised according to their income source and the time spent on their land. The land uses of small landholders are a function of these two variables, which in this study resulted in two main types: 'lifestylers' and 'farmers'. Small landholders who fall into either of these types can be classified further as part-time or full-time, and earn all, some or none of their income from their land. The typology is presented in Figure 4.

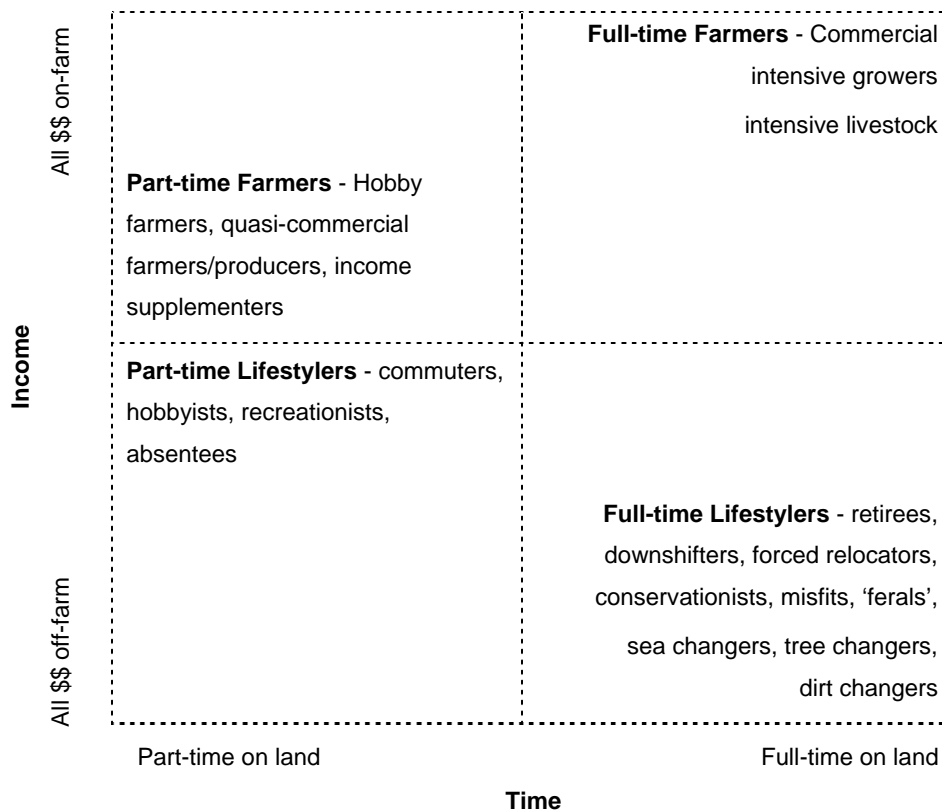


Figure 4: Income and time as variables used to classify small landholders in peri-urban Australia

Interviewees did not often distinguish between part-time and full-time lifestylers; hence these are grouped together in the following discussion. ‘Lifestylers’ were largely thought of as city dwellers wanting to live a rural lifestyle, but not wanting to earn income from their land. They were described as living on their land full-time or part-time, working locally or commuting to the city, and covered a broad demographic with varying socio-economic status. Interviewees described lifestylers as usually having multiple, mixed animal and/or plant types.

“They are looking for a life change. They talk about the sea changers and the tree changers, these are... basically the dirt changers. They want to get away from the 600 square metre suburban block, where they are hemmed in by neighbours and they can’t do a lot of the things that they might like to do.” (Interview 1)

“... they do tend to want to own the fancy poodle animal. You know, I’ve just been taking photos of miniature Galloway cows... But there is a hell of a lot of people out there that, you know, they’ve got their fruit salad orchard, they might have a couple of horses...” (Interview 10)

These characteristics of lifestylers are found in other research (e.g. Hollier and Reid 2006a, b, Sanson et al. 2004).

‘Farmers’ are small landholders who earn some of their income from producing one or multiple types of animal and plant varieties on their land (i.e. semi-commercial and commercial landholders).

“Nah, supplementary [income] I think. Particularly with the ethnic ones or whatever you call them. They’re... the older generation that, you know, traditionally home kill stuff... so they’re doing it mainly as a means of getting food and I suppose it’s cultural as well. I suspect that will die out as those fellows die out and the children take over. I don’t think they’re that interested... With the other guys the hobby farmers, the richer farmers, I think they’re just doing it for something to do, they’re not relying on it for income” (Interview 15)

As illustrated by the previous quote, farmers were not perceived as an homogenous group. Some interviewees commented that this type of small landholder is quite serious about what they produce on their land:

“A lot of those people don’t take it with a part-time attitude. You know I met a guy the other day in the olive business. He’s on a couple of boards of public companies and each one of those he takes pretty bloody seriously, and he takes his olives seriously too. You know, he doesn’t go to the farm to lie back under the tree and sort of think about the meaning of life” (Interview 14)

Full-time farmers on small landholdings are those who earn all of their income from producing one or multiple types of animal and plant varieties on their land.

“.... I see them characterised in a number of ways as more intensive, using less land, producing higher values through more intensive stuff. In flowers, food, horticulture generally, mushrooms, fruit and vegies and all of that. They’re a different bunch of people obviously and they’re making their livelihood out of it. The typical stuff about the Vietnamese fruit and vegie growers, the mushroom growers, the chooks, the pigs, all these sorts of people. In a sense I see them as being very diverse too, as being intensive, but reliant on those very diverse forms of activity and agriculture for a living.” (Interview 33)

Intensive niche farming (or ‘sunrise’ industries) enables income to be derived from a small acreage. One interviewee commented that government grants such as the New Industries Development Programme are used by small landholders to set-up their sunrise industry. The availability of these grants may explain the numbers of small landholders interested in these types of industries. Despite their differences, all types of small landholder were considered by interviewees to have an interest in niche breeds or specific varieties of animals and plants.

The typology of small landholders can be presented in the form of a continuum based on whether any income is earned from the land, from lifestylers (who do not earn any income on-farm) to farmers (who earn their entire income on-farm) (Figure 5). The details of small landholders' land use is presented in the section below entitled 'Land uses and management practices'.

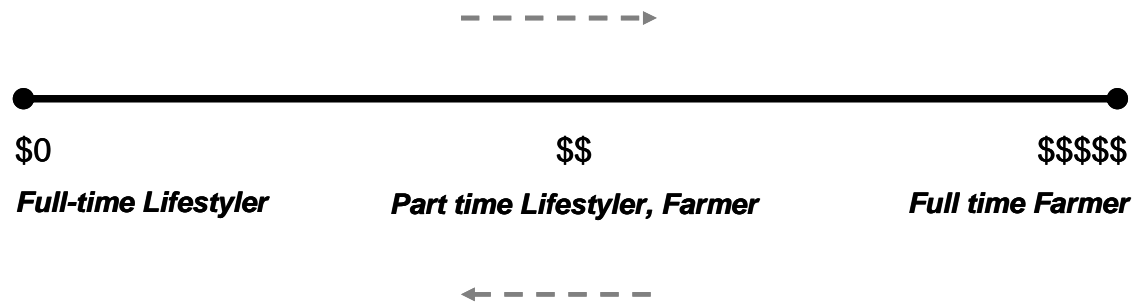


Figure 5: A continuum depicting a typology of small landholders in peri-urban areas

Movement along the continuum can occur from left to right, where small landholders who originally purchase their land for lifestyle purposes change to conducting commercial activities. Some of the reasons for this described by interviewees included the development of hobbies into viable businesses or the desire to increase or supplement income. It is possible that many small landholders commence using off-farm income to fund the set up of sunrise industries which eventually become their primary source of income (e.g. setting up an orchid or olive farm).

The continuum also operates in reverse (right to left) where small landholders who purchase land solely for commercial activities eventually maintain a lifestyle block. Reasons provided by interviewees included retirement, the failure of commercial ventures, or because it was perceived that some landholders have the idea of setting up an agricultural enterprise but let their land 'go back to bush'.

The value of considering small landholders as types along a continuum is that it accounts for this change over time. The movement of small landholders from one type to another was a strong recurrent theme in the data. For example, some interviewees discussed the popularity of farmers' markets which have given many small producers an alternative commercial outlet. It was perceived that the demand for niche products was increasing as markets become more popular.

“I’ve got a lady who had a few hydroponic tomatoes. Since then she has got three sheds and she does at least six markets a month. It’s almost like the markets have, and this is what a lot of the purpose of the farmer’s market was, that it was a business incubator for a lot of people...what we are looking for is that niche sized grower.”
(Interview 22)

Motivations

When asked to consider what motivates small landholders to move to peri-urban areas, interviewees listed a wide range of factors. These have been grouped by landholder type in Table 4.

Table 4: The motivations of small landholders in peri-urban areas (n=43)

Motivation	Description
Lifestyle	<ul style="list-style-type: none"> ▪ Space, seclusion, independence, being able to ‘do own thing’, having a buffer zone ▪ Life changers, dirt changers ▪ ‘Downshifting’ or retirement - both city people and traditional farmers who are looking to downsize ▪ Environmental/ideological aspirations, environmentally friendly lifestyle, clean air, eat/live healthier i.e. grow organic vegies, biodynamic farming ▪ Recreational and hobby pursuits i.e. horses, poultry, alpacas, motorbikes ▪ Aesthetics, pursuit of rural lifestyle ▪ Getting away from it all but being able to commute to work, maintain contact with urban networks ▪ A safer environment to raise children ▪ Self sustainability/sufficiency, perception that home grown food is better ▪ Reconnection with a landscape from childhood, getting back to their ‘roots’ ▪ Personality, individual interests ▪ Lower cost of land and real estate, forced re-locators (real estate agents targeting city people to relocate to peri-urban, regional areas)
Farming	<ul style="list-style-type: none"> ▪ Agricultural skill base (in the case of CALD landholders many come from an agrarian based lifestyle/society) ▪ Supplementary income ▪ Pursuit of an agricultural enterprise, ‘sunrise’, alternative, or specialty industry

The typology developed above offers some explanation for the diversity in results discussed in the following sections.



Plate 1: An alpaca for sale at Kapunda Farm Field Day

4.2 Land uses & land management practices of small landholders in peri-urban Australia

a) Land uses and management practices

The type and extent of activities and land uses that small landholders engage in may be a significant factor in their potential biosecurity risk to Australia's biosecurity. Interviewees were asked about the main activities and land uses small landholders engage in on their properties. Responses were diverse and ranged from aesthetic and personal land use purposes (i.e. not engaging in agriculture) through to commercial land use with a wide range in between.

“Anything and everything. They’ve got pigs but they also keep sheep, cattle, goats, horses, and mixed cropping as well. They are generally mixed farming enterprises.”
(Interview 4)

“Horticulture, agriculture, viniculture, viticulture, all those. You know, fruit growing, flowers there is dairy farmers, there is hobby farmers.” (Interview 7)

Factors determining the type and extent of activities and land uses were clustered under these headings:

Socio-cultural

- individual values and belief systems (organic, environmental, free range, revegetation)
- recreational, hobby pursuits
- past experiences, for example they used to have cattle on the family farm (linked to motivations)
- cultural influences
- length of time on land and/or generational factors
- age of landholders

Geographic

- geographic position, climate, production viability (soil)
- size of land parcel
- government zoning, proximity to urban centre

Economic(farmers only)

- market opportunity
- economic viability

Types of animals and plants kept or produced by small landholders are presented in Table 5, and discussed below according to the typology presented earlier.

Table 5: Animal and plant species kept or produced by small landholders (n=44)

Lifestylers		Farmers	
Animals	Plants	Animals	Plants
Horses, sheep, cattle, goats, swine, alpacas (camelids), poultry, native and exotic birds, rabbits, cats, dogs, camels, kangaroos, donkeys, freshwater aquaculture.	Olives, citrus, stone fruit, nut trees, vines, avocado, guava, passionfruit, herbs, mixed vegetables, native vegetation.	Bees, snails, swine, deer, goats, alpacas (camelids), emus, rabbits, ostriches, cattle, poultry, native and exotic birds, sheep, freshwater aqua culture.	Vines, avocado, guava, mushrooms, passionfruit, aloe vera, olives, citrus, stone fruit, cherries, avocados, grapes, berries, lavender, nut trees, mixed vegetables, cut flowers, herbs, tree crops.

Lifestylers' land use is predominately based around their values and interests in terms of what they do with their time. For example, keeping horses for recreation or retaining native vegetation for aesthetic and biodiversity conservation (Box 2).

Lifestylers	
Animals	
▪	Small numbers, large variety
▪	Functions are pets, recreation, 'lawnmowers', food, protection, status symbols and hobbies
▪	Organic, free range
Plants	
▪	Small amounts of a wide variety of species
▪	Functions are food, self sufficiency, aesthetics, conservation
▪	Organic, biodynamic

Box 2: Summary of land uses and activities of lifestylers

The majority of interviewees believed that lifestylers owned small numbers of diverse animals (Table 5, Box 2). Reasons for owning these animals varied, for example, interviewees mentioned that alpacas were owned for personal status reasons (the 'new poodle'), because they were considered 'cute' and because they were different.



Plate 2: A selection of rabbit breeds produced by a small landholder for showing, breeding and meat

Typical farm animals such as ducks, sheep, cows and domestic pets were seen as common animals owned by these small landholders.

“We joke about the small landholder flock being a cow, two horses, 20 chooks and an alpaca or sheep.” (Interview 10)

Interviewees mentioned that many lifestylers have a mixture of plant varieties on their small landholding. Citrus and stone fruit were the most commonly mentioned, which were frequently described as ‘fruit salad’ orchards. Berries, vines, nut trees and vegetables were also perceived as popular. Interviewees believed that the production of plants was mainly for private or own use, food supplementation, self sufficiency and aesthetic reasons (Table 5, Box 2). Retaining remnant vegetation was mentioned as lifestylers land use, but regeneration of native species was not.

Farmers were also described as undertaking a diverse range and level of agricultural activity and land uses (Table 5, Box 3). However, their values and interests were based around what they do in economic terms. Interviewees mentioned either intensive animal production or intensive horticulture as the main forms of agricultural production.

Farmers
<p>Animals</p> <ul style="list-style-type: none"> ▪ Medium to high numbers, large variety, intensive production, high value ▪ Unique, alternative, specialty, rare, exotic, niche varieties ▪ Functions are breeding (e.g. sperm, embryos), live sales and slaughtered products, value added products (e.g. smoked fish, ham, wool, honey) ▪ Organic, free range <p>Plants</p> <ul style="list-style-type: none"> ▪ Medium to high level of production, small variety, intensive production, medium to high value ▪ Unique, rare, alternative, speciality, niche varieties and common mainstream, demand driven species (i.e. Asian vegetables) ▪ Intensive horticulture around major urban centres is dominated by Culturally and Linguistically Diverse (CALD) groups ▪ Functions are propagation, produce sales, value added products (e.g. cheese, olive oil, preserves) ▪ Organic, biodynamic

Box 3: Summary of and uses and activities of farmers

This finding is in agreement with Hodges (2005) who reported that peri-urban farmers are likely to produce high-value agricultural products including fruits and vegetables, flowers, and eggs.

Traditional agricultural activities and products such as beef and avocados were mentioned, but the majority of interviewees believed these small landholders were engaged in new or niche industries. Curry et al. (2001) report that small landholders in the Denmark Shire of Western Australia are involved in producing herbs, berries, chestnuts, rabbits, llamas, deer, ostrich, emu and wildflowers.

Farmers with small landholding keep a wide variety of animals ranging from traditional but unique varieties of cattle and sheep to more exotic species like barramundi, snails and bees. A similar observation was made by Howden et al. (1998 in Hollier et al. 2004b) who reported small landholder production of exotic cattle, mohair and angora goats. Organic products such as eggs, chicken and lamb were also commonly mentioned.

“There are 7,500 registered bee keepers, 5,500 of which we would consider to be non-commercial, hobbyists or part-time and 2000 commercial.” (Interview 16)

“A lot of them are into cattle. When they are into cattle they tend to be into, I won’t say boutique, they are just as likely to have breeds that are not necessarily mainstream... but they will tend to have things like Low Liners and Devons and you know those types of breeds....” (Interview 14)

These landholders were also perceived to farm small numbers of a variety of animals for their own consumption.

“The other guys, the ethnic group, they are pretty into the sheep and goats, not so much cattle but some of them do run small feed blocks and some of them have pigs but... not as many.” (Interview 15)

Farmers with small landholdings produce a wide variety of plant species (Table 5, Box 3). Olives and vines were most frequently mentioned followed by intensive horticultural crops. CALD small landholders who resided in the Sydney basin and the Virginia area of South Australia were mentioned by a number of interviewees. These small landholders were perceived to produce large amounts of horticultural produce, mainly mixed vegetables.

“Most of the Bok Choy is grown by Chinese farmers but not all of it. They started it but others are taking it up ... the Vietnamese, grow what we generically call Vietnamese foods and vegetables that you would find if you went to Vietnam. For all the others, the crops that they grow are broadly concerned like greenhouse tomatoes, greenhouse cucumbers, cherry tomatoes and all of the Asian leafy vegetables.” (Interview 20)

Summary

Small landholders in Australia are undertaking a diverse range of activities and land uses on their properties. Much of this is agricultural in nature, with considerable variation in the level of commercial production. ‘Lifestylers’ undertake little or no agricultural activity, but possess a variety of animals and plants, kept mainly for recreational reasons and/or to be self sufficient. ‘Farmers’ undertake a variety of activities, and as a group produce a wide range of animal and plant products. These are farmed intensively, are of high value, are unique or new varieties and species, and are often farmed using organic or biodynamic methods.

The fact that many small landholders are undertaking some form of agricultural activity increases their biosecurity risk. The diversity and extent of their activities may also have implications for the level of biosecurity risk they present.

b) Practices of small landholders

Where small landholders source their animal and plant stock from

Interviewees were asked about where they believe small landholders source their animal and plant stock. A range of sources were described; these could be grouped into four main types: incidental, traditional, retail outlets and other (Table 6).

“From sale yards, from livestock markets, farmers’ markets, from stud farms, from ag shows, private producers, somebody knows somebody, you’ve got something that they’re interested in, word of mouth.” (Interview 4)

Most responses indicate that small landholders source their animal stock from incidental sources such as acquaintances, friends and neighbours as well as from traditional sources like commercial breeders, agricultural shows, and sale yards. Plant stock is sourced mostly from traditional outlets such as nurseries, and seed suppliers (Table 6).

Table 6: Where peri-urban landholders source their animal and plant stock from (n=41)

Type	Animals		Plants	
	Description	No. responses	Description	No. responses
Incidental	Acquaintances, friends, neighbours, locally; ads in magazines and papers, grow their own stock, farmers’ markets	17	Acquaintances, friends, neighbours, locally, grow their own stock, farmers’ markets	5
Traditional	Breeders, ag. shows, sale yards, stud farms/semen suppliers, industry groups, associations, stock agents, rural suppliers (e.g. Landmark, Elders), field days	17	Nurseries, seed suppliers, certified organic suppliers, industry groups, associations, rural suppliers/ traders, Landcare	10
Retail outlets	Produce barns, commercial suppliers	2	Commercial suppliers (e.g. Bunnings, Woolworths)	2
Other	Interstate, or overseas	2	Interstate, or overseas	2

Lifestylers were thought to be more inclined to source their animal stock from friends, neighbours and non-traditional sources, as well as from saleyards. For plant stock, it was perceived that generally this type of landholder purchased their plants from nurseries and retail outlets. Secondary sources were perceived to be friends and neighbours. One explanation for lifestylers use of these sources was that they only wanted small numbers of animals or plants.

“They are unlikely to go to the traditional or commercial plant and animal suppliers, because they are dealing in small volumes.” (Interview 1)

Farmers with small landholdings were perceived to be intensive plant and animal producers and therefore are more inclined to source their stock from a recognised industry source, especially those who specialise in niche products. As one landholder who bred goats mentioned:

“I know probably 90% of the South Australian members. I know what they’ve got and a lot of people ring me, that sort of thing. And I can put them onto other people. You’ll find most people in most states work within their area, because we’ve got our own herd books... We have our own Goat World [publication] that comes out every two months, so if you see something in there that you like, you buy it. So we basically buy within our Society, privately.” (Interview 44)



Plate 3: Sheep for sale at a sale yard in a peri-urban region of South Australia

Few responses show that small landholders use retail outlets. Similarly, few responses indicated that small landholders source stock from interstate or would import it from overseas (importing is addressed in more detail in a later section).

Summary

The results highlight the large number and wide variety of places that small landholders source their animal and plant stock from. Although lifestylers source animals and plants from incidental sources such as acquaintances, friends, and neighbours (more so for plants), they are equally likely to use traditional outlets. Farmers are more likely to source both their animal and plant stock from traditional outlets.

Where small landholders sell or trade their products

Where small landholders sell or trade any products obtained from their land has important implications for the amplification of biosecurity risks. Results have been presented separately for plants and plant products (Table 7) and animals and animal products (Table 8). Responses were grouped into two main types: local/direct/informal, and non-local/indirect/formal. Local, indirect and informal sources were thought to more likely be used by lifestylers rather than farmers.

Table 7: Where small landholders sell or trade plants and plant products (n=40)

Type	Description	No. responses
Local, direct, informal	<ul style="list-style-type: none">▪ Farmers' and other local markets▪ Direct sales (local shops, restaurants)▪ Roadside stands▪ Sell to/trade with/give to neighbours, friends, acquaintances	34
Non-local, indirect, formal	<ul style="list-style-type: none">▪ City wholesale markets▪ Agents, marketing companies▪ Large retailers	10

Most responses indicate that lifestylers sell or trade their plants/plant products through sources such as farmers' markets, or direct sales to local shops and restaurants. Other outlets included roadside stands, and passing on produce to neighbours, friends and acquaintances.

“Some of them have roadside stalls and they sell them to neighbours and swap with neighbours too. I think there’s a bit of “I’ll give you carrots if you give me apples”. There’s a fair bit of that going on.” (Interview 8)

Far fewer responses indicated that small landholders in peri-urban areas sell or trade plants and plant products to non-local (i.e. regional, interstate) and indirect outlets, such as wholesale markets and large retailers.

“It depends, I mean in terms of fruit and vegetables, they won’t be selling through the traditional main wholesale markets. They are far more likely to trade through either

direct sales to the local fruit and vegie shops, or through farmers or local weekend markets.” (Interview 1)

To sell or trade plants and plant products, farmers were thought to use non-local and formal outlets such as wholesale markets, as well as local and informal outlets.

“[They] either [sell] at Sydney markets, through agents or direct sales. There’s not a lot of gate sales. There’s also Cabramatta markets where most of the Vietnamese farmers and some of the Chinese farmers also have shops. Some of it goes directly to restaurants.” (Interview 20)

Table 8: Where small landholders sell or trade animals and animal products (n=40)

Type	Description	No. responses
Local, direct, informal	<ul style="list-style-type: none"> ▪ Sell to/trade with/give to neighbours, friends, acquaintances ▪ Farmers' and other local markets ▪ Direct sales (local shops, restaurants, butchers) ▪ Produce/kill for own consumption ▪ Roadside stands, trading post or similar publications 	37
Non-local, indirect, formal	<ul style="list-style-type: none"> ▪ Sale yards, abattoirs, wholesale markets ▪ Shows, field days ▪ Agents, marketing companies 	24

Similar to plants, responses indicated that lifestylers sold their animals through local, direct and informal sources (Table 8).

“So if there are small landholders who aren’t really a commercial business, but they are selling all their animals to their neighbours as, you know, lawnmowers or whatever, I think if they are actively sort of selling animals for meat, I mean, we don’t have a grip at all on what is happening with sort of backyard butchering at all.” (Interview 10)

A few commented that lifestylers keep poultry and livestock for their own consumption, but this was not considered to pose a significant biosecurity risk by one interviewee:

“ [A small landholder who has] a couple of goats and they are ready for killing... a few of his mates might come over and have one for a bit of a celebration or something like that. Seems to be popular with the Bulgarians and those sorts of guys, but yeah that’s the end of the road for the animals, it doesn’t go anywhere else... so that’s why I don’t perceive [home killing] as big a risk as some people might think.” (Interview 15)



Plate 4: Backyard butchering services offered in a peri-urban region

Farmers were thought to use both local and informal outlets (e.g. farmers' markets) as well as non-local formal ones to sell their animals and animal products (e.g. sale yards).

"...[At the farmers' market] there would be [small farmers] selling their free range organically grown chickens and also there would be free range organically grown eggs." (Interview 25)

"Small landholders who are seriously raising cattle would take them [to wholesale markets]... I've got family who've got cattle...[they] take them to [wholesale] markets." (Interview 8)

Contrary to the above, some responses indicated that the use of local and informal sources by small landholders had been reduced through the introduction of Property Identification Codes (PIC numbers) and the National Livestock Identification Scheme (NLIS).

"I can't see any other way that they can sell or buy the cattle or sheep. Yeah they're done through traditional sale yards to the best of my knowledge – go through an agent and yeah, be sourced and sold through the sale yards. And the agents have to, they all know they have to follow the identification stuff." (Interview 2)

Summary

A range of outlets where small landholders sell or trade animal and plant produce were described by interviewees. Lifestylers were thought to sell or trade their animal and plant products through local, indirect, and informal sources, such as farmers' markets or through direct sales to shops and restaurants. Farmers were thought to sell their animal and plant products through local, indirect and informal sources as well as non-local, direct and formal ones, such as sale yards. There was some concern that many small landholders are trading animals and plants through neighbours, friends and acquaintances, bypassing formal identification and monitoring systems.

It appears that biosecurity education campaigns about the exchange of animal and plant material between neighbours, friends and acquaintances may need to be targeted at local communities in peri-urban areas. However, the extent to which small landholders use these outlets needs to be verified by further research. Once verified, these outlets could play a key role in biosecurity awareness campaigns.

4.3 Knowledge and information

Small landholders' knowledge of pests and diseases

The extent of small landholder's knowledge of pests and diseases relevant to their property is important in determining the extent to which small landholders are a risk to Australia's biosecurity. Interviewees were asked if small landholders have adequate knowledge of pests and diseases relevant to their property. The results are presented in Table 9.

Table 9: Do small landholders have adequate knowledge of animal and plant pests and diseases? (n=45)

YES	NO	UNSURE
No. Interviewees	No. Interviewees	No. Interviewees
13	22	10

Most interviewees responded that small landholders did not have adequate knowledge of pests and diseases relevant to their property.

“Generally they have very, very limited knowledge, hence the level of contact and advice that they seek.” (Interview 1)

“We have had the phone calls, you know, ‘Why has my horse died in the middle of the pretty purple wild flowers?’” (Interview 10)

However, others qualified their negative responses and many were not sure.

“I couldn’t really answer that question, it would vary enormously.” (Interview 28)

“You have to assume that for some, yes [they have a low level of knowledge], but groups are usually a mixture of people. They would be a mixture of full time farmers and the hobby farmers as well.” (Interview 26)

It appears that the level of ‘knowledge’ is dependent on interviewees’ perceptions of ‘who’ the small landholder is and what their land use is. Those from CALD backgrounds were not highlighted as having more or less knowledge of pests and diseases on their properties than that of other small landholders. However, many interviewees thought that lifestylers had less knowledge on this topic than the farmers.

“Some are quite switched on, the commercial grower is, but the hobbyist is not.” (Interview 25)

They believed this was due to lifestylers’ general lack of awareness and understanding of biosecurity issues. Furthermore, some responses indicate that small landholders are ignorant of their obligations associated with owning a small property (e.g. time, resources, pest and weed control). Other interviewees perceived that lifestylers are enthusiastic to learn and are willing to seek advice when they need it (e.g. if their animals appeared sick they would contact the vet, a neighbour or person they bought from).

“I think they might. I think they are more aware than we realise [lifestylers]. People are not as dumb as you think. I have a strong feeling that people generally underestimate the wisdom of small landholders.” (Interview 7)

“... these people have a very high interest level. So they're really keen to have those animals, have those plants, do these things and have this lifestyle. And they're quite intelligent often, people... but they just don't have any true... knowledge of agriculture, of pests and diseases... But they're keenly interested in knowing more and be involved and do all these things. But they just lack complete knowledge on that front” (Interview 24)

Hollier et al. (2004b) also report that lifestylers with small landholdings have a strong interest in learning, particularly in developing their skills in sustainable agriculture and biodiversity conservation.

Interviewees who thought that small landholders did have adequate knowledge of pests and diseases frequently referred to farmers. These commercial small landholders were considered more

serious about their activities and to have a significant financial investment in their activity, making it in their best interest to have this biosecurity knowledge.

“I think they do [have good knowledge of the pests and diseases on their property] and I think they are very serious about seeking out the information. A lot of the alpaca people, again this comes often from their background, they’ve been in businesses, they have had other pursuits in life. They come to this activity and they decide ‘right I am going to have some alpacas’ and they go to take courses and all sorts of things and they join these societies and get information. They generally don’t spend a heap of money to buy the farm and buy these alpacas and just watch them die. I think they have got a very positive attitude to finding information.” (Interview 14)

Summary

The majority of interviewees believed that small landholders did not possess adequate knowledge of pests and diseases relevant to their properties. This was qualified by some who asserted that small landholders were highly motivated to gain this type of knowledge, and were willing to seek advice. Interviewees who believed that small landholders did have adequate biosecurity knowledge were generally referring to farmers who have a significant financial investment in their activities. Many interviewees were unsure if small landholders had adequate biosecurity knowledge and this was mainly due to the fact that they saw this group as very diverse.

The findings highlight that there is a perceived lack of knowledge about animal and plant pests and diseases amongst small landholders in peri-urban Australia. The findings also highlight that small landholders need and want information on pests and diseases relevant to their property. A large-scale survey of landholders would directly assess the level of knowledge on pest and diseases possessed by small landholders.

Sources of information on plants and animals

Interviewees were asked where they believed small landholders source their information on how to care for plants and animals. Twenty-four different sources were mentioned (Table 10).

Table 10: Sources of information on plants and animals (n=42)

Source type	Description	No. responses
Trusted, credible contacts	Friends, family and neighbours, incl. other landholders Clubs, associations, societies (interest groups) Vendors (of stock), sale yards Vets Rural suppliers (e.g. Wesfarmers, CRT) Chemical resellers Markets, swap meets	68
Independent	Internet (searching, looking at association websites) State govt dept – call centre, in person Books Field day, rural shows Industry publications (newsletters, magazines etc) Stock journals Courses (e.g. TAFE), workshops Radio TV DPI handbook General newspaper Magazines – aimed at small landholders, lifestyle +others	62
Both	Consultant Shire council, local government Hardware stores (e.g. Bunnings) Nurseries	10

Most interviewees thought that small landholders relied on friends, family, and neighbours for their information. However, the internet, interest groups, and state government departments were also frequently mentioned as places where landholders seek information (Table 10). Other sources included: vendors, magazines, vets, and rural suppliers such as Landmark and Wesfarmers.

These sources fall readily into two types: 1) trusted, credible sources and 2) independent authorities. In the first group, clubs, associations, vendors, vets, and rural suppliers were all mentioned as sources of trusted, credible knowledge via personal contacts. In the second group, the use of the internet, state government departments and magazines is linked to small landholders' willingness to learn and motivation to do independent research relating to their interests and activities.

The use of trusted contacts as sources of information appeared common among lifestylers and farmers. One landholder commented about this extensively within the context of her industry association:

“I guess it is an exchange of ideas. I think that is why it works so well. It is a network, people support each other. People come to the meetings and then they will follow up that contact by going to each others properties and ringing each other and getting ideas. We also get in speakers... we usually have some sort of a specialised speaker four or five times a year. I really think that a big part of the value is in the networking. In getting someone else in the area who is either trying to do the same thing you are or has done it and has already found some of the solutions that you are looking for.”(Interview 32)

Similarly, CALD landholders rely on specialist growers groups as a source of trust and credibility:

“I’m not sure about the animal but with the plants, a lot of it comes through their own grower groups, the Chinese Growers Association or they get it from talking to people on the wholesale floor at the markets, within their own ethnic communities I believe, that is trading information amongst themselves.” (Interview 45)

Small landholders’ willingness to contact government for information differed according to interviewees’ perceptions of cultural and ethnic practice. There was a perception that CALD landholders preferred to rely on neighbours and friends for advice, rather than seeking help from government, even if they do have a problem:

“... these sort of blokes [CALD small landholders] that have dramas don’t really tend to contact anyone, and if they do they will probably speak to their neighbour rather than someone from the government...” (Interview 15)

This finding is consistent with other research commissioned by DAFF, where farmers from CALD backgrounds were found to be wary of contact with government employees, and tended to associate the government with punitive measures (i.e. fines) (Open Mind Research Group 2005).

There did not appear to be a distinction between lifestylers’ or farmers’ willingness to seek information from government, despite their varied motivations:

“Their chickens might be getting attacked by foxes or they might have a pest they can’t kill or their creek is eroding, or they want to know about plants or, they need help with fencing.”(Interview 18)

“Some of them want to make more money or make more effective use of their investment. Some of them just want to do it right. Some of them would be wanting to understand the biology of what they are managing better...” (Interview 26)

These findings have some commonalities with research undertaken by Sanson et al. (2004) and Hollier and Reid (2006b). Sanson et al. (2004) researched small farmers in New Zealand. When asked about where they sourced information on new exotic diseases, pests or weeds most landholders responded that their own experience was of most importance, followed by other farmers and growers, government agencies, local retailers/suppliers, and vets (Sanson et al. 2004). Hollier and Reid (2006b) found that small landholders valued land management advice and technical knowledge from local agribusiness firms and local farmer networks.

Summary

Interviewees described an extensive list of sources where small landholders seek information on how to care for their plants and animals. Distinctions were made between independent authorities and trusted credible contacts as sources of information and knowledge. It seems that small landholders are willing to learn and proactively research information relating to their interests and activities. They conduct this research by drawing on readily available written and independent information (i.e. the internet) and through face to face contact with people in their community. Although both lifestyle farmers and farmers were thought to draw on government departments (usually when they have an issue that needs resolving), interviewees believed small landholders from CALD backgrounds were less likely to contact government.

4.4 Do small landholders pose a risk to Australia’s biosecurity?

Interviewees were asked a series of questions designed to ascertain whether they thought small landholders in peri-urban areas pose risks to Australia’s biosecurity.

a) The likelihood of small landholders importing animal and/or plant material to Australia from overseas

Interviewees’ perceptions were divided on the likelihood of small landholders importing animal or plant matter (Table 11). Over one third of interviewees believed that small landholders are no more likely to import material than the remainder of the Australian population.

“I think their risk of bringing stuff in is the same as you and me if we go overseas and bring something back.” (Interview 4)

Table 11: The likelihood of small landholders importing animal or plant material to Australia (n=35)

Likelihood of Importing animal or plant material	No. Interviewees
Unlikely	13
Likely	10
Depends/maybe	9
Don't know	3

However, nearly one third of interviewees commented that small landholders *were* likely to import material. And almost another third responded that it depends on their motivations, knowledge and awareness (Table 11).

“It’s really difficult to know. It really depends on their intellect and their knowledge of sources and their feelings of responsibility....I think the ones who read books and who are interested would know that you don’t go out and do those sorts of things...”

(Interview 8)

Although no obvious distinction between lifestylers and farmers was apparent in the data, some interviewees provided a rationale for their assessment of whether small landholders were more or less likely to import animal and plant material (Table 12).

Table 12: Rationale for why small landholders might import animal or plant material from overseas (n = 35)

Reasons why small landholders might import	No. responses
1. Market edge (commercial producers only)	6
2. Interest in niche breeds, varieties	6
3. Cultural reasons (CALD landholders)	5
4. Ignorance	4
5. Because of the internet	1

The main reasons were cited as: gaining a market edge over competitors or because of an interest in unusual breeds or varieties of animals and plants.

“...they do tend to find out what they need to do and they’re quite prepared to do that [legally import animal or plant material] and get the product that they believe that is going to be their niche market.” (Interview 9)

“People import German horses. They will import stock from Germany or they will import semen in to inseminate the thoroughbred mare so they have got a German horse. We had friends that were doing that sort of thing. So it depends what their ambition is, their level of knowledge is and how wealthy they are.” (Interview 35)

However, four interviewees mentioned that they believed small landholders import overseas animal and plant material because they are unaware of quarantine laws and/or the potential threat this activity may pose to Australia’s biosecurity.

“There will probably be some cases where, and this will be through sheer ignorance, that you know, they don’t know any better and so they are unaware of either the requirements or the implications of doing so. So they might be inclined to bring stuff in out of pure ignorance really.” (Interview 1)

Some interviewees commented that small landholders of CALD backgrounds were highly likely to source animals and plants from overseas.

“Early migrant groups who are bringing a lot of agricultural practices that they were using in their home countries into Australia. And a big biosecurity risk in that is that they are also bringing [in] a lot of the ... cultivators and the varieties ... or not taking them through the proper quarantine processes but they are also using practices that probably wouldn’t be acceptable here in Australia.” (Interview 45)

“The Vietnamese may look to bringing new varieties. I have never heard of anybody actually doing it but that you would have to wonder where some of the crops are growing are coming from.” (Interview 20)

However, this was contradicted by a comment from one interviewee who firmly believed that landholders from CALD backgrounds would not import anything from overseas:

“... I think it’s a really easy assessment to make that, ‘Oh because they don’t speak the language, they don’t understand and they’re all getting stuff in from overseas all the time too’. Well they’re not, they’re just not doing that. We’re not getting new crops all the time. The Vietnamese are hunting around here for crops that are already in Australia... and they’re building new crops all the time from product that is already here. They’re not sneaking it in and you know, they’re not bringing seed in.” (Interview 20)

Summary

Interviewees were divided on the issue of small landholders importing animal and plant material from overseas, with many commenting that it depended on individuals. Further large-scale survey research is required to clarify these findings, particularly in relation to the likelihood of importing being tied to certain types of small landholder over others compared to the general population of Australia.

b) Understanding of Biosecurity

Interviewees were asked to convey their understanding of the term 'biosecurity'. Twenty-one interviewees gave a response that was similar to the definition of biosecurity used in this study ('the protection of people, farms, animals and plants from the entry and spread of unwanted exotic animals, pests, diseases and weeds'). One person said:

"For me it's about minimising the risk associated with pests, weeds and diseases and mechanisms to effectively reduce the risk of those." (Interview 40)

From this response it can be assumed that interviewees were well aware of common definitions for 'biosecurity' in Australia. This finding is not surprising considering the high percentage of government stakeholders interviewed.

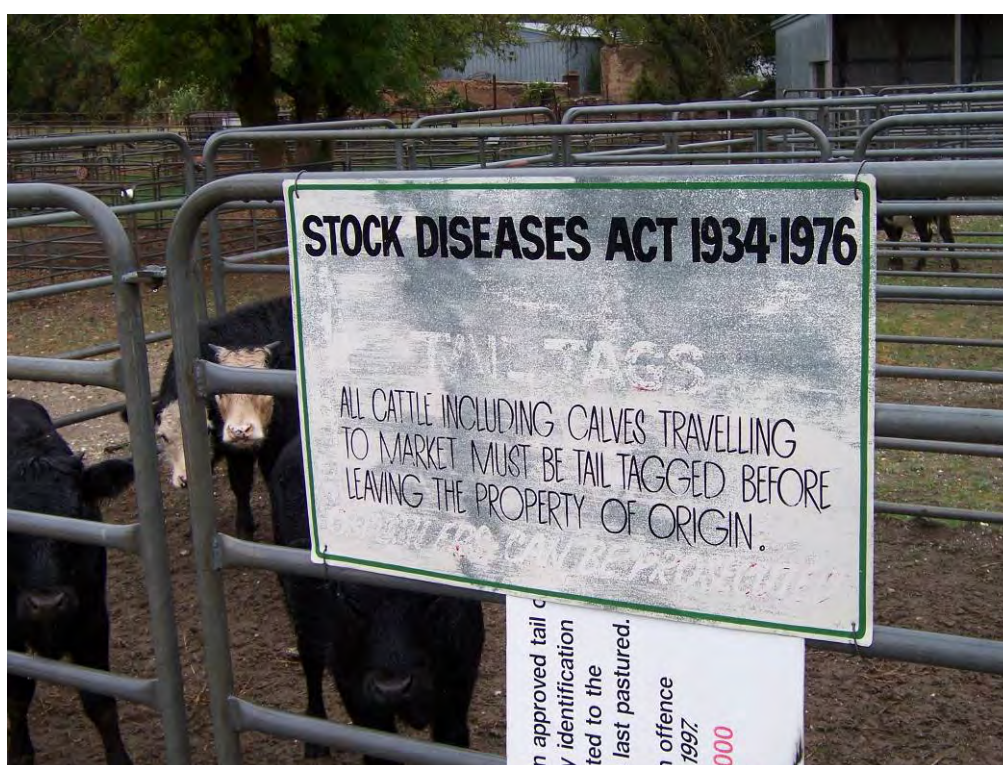


Plate 5: Signage at a sale yard in a peri-urban region

Only three interviewees remarked that they did not know, or were unsure of, what 'biosecurity' meant. All of these were small landholders and not government stakeholders.

“I don’t know I have never heard of it [biosecurity]. But the layman people don’t [know it].” (Interview 34)

c) Pests and diseases of concern

Comments about pests and diseases were not made by all interviewees. Forty interviewees from the total sample of 45 answered this question (n=40). When asked: “are there any specific pests and diseases that you are concerned about that are likely to be associated with small landholders in peri-urban areas?”, interviewees made a clear distinction between major and minor pests and diseases defined in terms of their potential to inflict damage. Minor pests and diseases were considered ‘common, here, readily visible, just background, ordinary, straight-forward, day-to-day or economically unimportant’. They included rabbits, weeds, flies, fluke, ticks, mange and worms. One interviewee suggested that peri-urban pests and diseases were less concerning than those in mainstream agriculture because they were “economically unimportant, smaller in scale and unexposed” (Interview 4). Another interview went further suggesting that there’s no need to worry too much because “there’s not a great deal of pests and diseases overseas that we couldn’t manage in Australia... and [for horticultural crops] we get them anyway, they just blow in” (Interview 20). Typical of this less worried, more laid back perspective, one interviewee said:

“You see the odd things that shouldn’t have made it into Australia... it could have only come from overseas. There’s the grapevine leaf rust... I’m sure we’ve probably had [it] about 4 or 5, 6 times since I’ve been here. Different things, sort of half forgotten. [There was] the original blue-tongue scare back here in the 70s. There was a suspected pig disease. There was one sighting of a monkey... there’d been a cat with no tail and a few other insect fruit fly quarantine things and that sort of thing that’s come about. Some rock melon diseases which I can’t remember the name of.”
(Interview 18)

In contrast, those who had major concerns about peri-urban pests and diseases described them as ‘uncommon, exotic, serious, dramatic, untraceable, hardly known, disastrous, quickly spreading, catastrophic’. They were described as having diverse and multiple sources, for multiple species and in close proximity to Australia which give rise to a whole host of economically expensive pests and diseases. Mentioned specifically in this category were ‘bird flu’ and FMD. Typical of this very worried perspective, one interviewee said:

“I’m concerned about the pests for apples and about bringing in foreign prawns, bringing in foreign pork with diseases. We had trouble with bananas and we had that trouble with citrus with the virus and also there’s a problem with the rabbit calici virus...all these problems. They keep saying ‘Oh yeah, we can bring in apples from

foreign... it'll be alright'. They... brought in cane toads and that was a disaster. There's things that are coming in that most would say 'Look, we don't want that in this country', but nobody listens to us. They say 'It's alright' but then we discover later on that there's a problem..... We see on television the other day that a lot of these salad vegetables are full of diseases! What's going on? Where are the checks? They're missing somewhere.' (Interview 8)

The pests and diseases of concern to interviewees are summarised in Table 13.

Table 13: Pests and diseases of concern in peri-urban Australia

Livestock affected:	Pests & diseases
Goats	Indistinct transcript – similar to AIDS for goats
Bees	Varroa, tracheal mites
Alpacas	Ovine Johnnes disease
Sheep	Lice, footrot, scabby-mouth, fly-strike, hydatids
Horses	Bot flies
Pigs	Swine fever, porcine reproductive and respiratory syndrome virus (PRRSV), FMD
Poultry	'Bird flu'
Aquaculture	Tristichia
Horticulture affected:	Hairy panic blight, red-legged earth mite, fruit fly, apple farm blight, phylloxera, silver-leaf blight fly, fly blight, western flower thrip, lettuce aphid, citrus canker, light brown apple moth, glassy-winged sharp shooter, codling moth
Agriculture affected:	<p>Pests</p> <p>Kangaroos, domestic pets, red fin perch, koi, tristichia, feral goats, feral pigs, cane toads, foxes, rabbits, rainbow lorikeets</p> <p>Weeds</p> <p>Black berries, thistles, pattersons' curse (salvation Jane), alligator weed, khaki weed [kikuyu]</p>

These pests and diseases can be further analysed by level of concern and degree of threat (Figure 6).

Level of concern	High	Alligator weed Phylloxera Foxes into Tasmania Hairy panic/scourge Fly-blown lawn-mowing sheep Uncontrolled manure stacks Illegal imports Feral animals & birds Apple farm blight <u>Total responses: 18</u>	‘Bird flu’ Foot and Mouth disease Swine fever Porcine Reproductive and Respiratory Syndrome Virus Postweaning multisystemic wasting syndrome (PMWS) Varroa mite Glassy-winged sharp shooter Ovine Johnnes disease Swine fever <u>Total responses: 11</u>
	Low	Rabbits, thistles, Patterson’s curse, lice, worms, mange, feral goats, silver leaf white fly, blight, western flower thrip, phylloxera, fruit fly, weeds in general. <u>Total responses: 24</u>	Alpaca Johnnes disease ‘Bird flu’ Foot and Mouth Ovine CJD Dairy goat AIDS equivalent <u>Total responses: 7</u>
		Minor	Major
		Degree of threat	

Figure 6: Pests and diseases: Analysis of level of concern analysed by degree of threat

Not surprisingly, there was the largest number of responses for common pests and diseases of low concern to interviewees. The low concern is reflected in comments such as ‘there are too many of them to worry about’, and may be paraphrased as ‘things we know how to manage’. Higher concern for these common pests and diseases were expressed by interviewees worried about the potential for peri-urban Australians to threaten neighbouring commercial farms with “their five lawnmowers with fly strike” (Interview 35). Some of this concern centred around a belief that small landholders have different land management practices: “...they truck in natural manures – leading to uncontrolled manure stacks” (Interview 24) or “... the small guys easily transport more virulent diseases” (Interview 38) and different attitudes to commercial farmers: “these people feed native birds” (Interview 24). Interestingly however, one peri-urban landholder interviewed who self-identified as an animal lover worried about her neighbouring commercial farmer who “gets

sheep from all over the place” not caring about their welfare on an individual level (Interview 34). Another strand in this data was that “small landholders don’t tell authorities” (Interview 18). Of those major pests and diseases (defined as having the potential to inflict serious damage), “amateurs not telling authorities” (Interview 45) was cited by one interviewee for his high level of concern for varroa mite attacking the bee industry. ‘Bird flu’ and FMD were also cited here as being major diseases of high concern, or as one interviewee put it, “enough to turn my few remaining black hairs grey”. However, there were almost as many ‘low concern’ responses in this category. Some interviewees mentioned that this was because diseases such as FMD (mentioned 11 times by eight interviewees) or ‘bird flu’ (mentioned by four interviewees) was not here in Australia and therefore was not yet an issue or anything to worry about.

In terms of the source of the threat or danger posed by peri-urban pests and diseases, there seemed to be a continuum of responses placing peri-urban Australians as unwitting protagonists at one end (due to lack of education, knowledge, care, time) to those with knowing malicious intent at the other. Well known domestic causes of feral animal problems – the national parks system were cited once, but so were peri-urban Australians who had lost a mob of sheep (owners retrieved them once a notice was put into the local paper) or people who belonged to the dairy-goat industry, but chose to keep unregistered animals. A common theme appeared to be lack of care or attention to the well-being of plants and animals. Unmanaged or otherwise derelict orchards were cited as being responsible for spreading insect pests.

Summary

In summary, pests and diseases were categorised in two distinct groups (of major and minor concern) based upon potential to inflict damage. There were more citations of common pests and diseases than uncommon or rare ones. While there were more responses from interviewees citing low concern with these common pests and diseases, the level of concern about peri-urban or small landholders’ biosecurity practices and attitudes remains high. Uncommon or rare pests and diseases such as ‘bird flu’ or foot and mouth disease were not seen by interviewees as any more of an issue for peri-urban Australians than for the rest of the population.

d) Perception of risk

Interviewees were asked if they believed that small landholders posed a risk to Australia’s biosecurity (Table 14). A small majority of those interviewed believed that small landholders did pose a biosecurity risk.

“I do... in the fact they just don’t understand what they are playing with, you know?”
(Interview 5)

Table 14: Do small landholders pose a risk to Australia's biosecurity? (n=43)

Yes	No	Not sure
No. Interviewees	No. Interviewees	No. Interviewees
17	14	12

Note: the 'Not sure' response was neither one way nor the other OR where small landholders were perceived as no greater risk than anyone else

However, a similar number of interviewees thought that small landholders were not a risk, while twelve interviewees were not sure, or they considered small landholders to pose no greater risk than the general population (Table 14).

“Well, in all honesty, they are as much risk as anybody else.” (Interview 16)

“Are they worse than mainstream ag?” (Interview 6)

Twelve interviewees mentioned that a lack of knowledge was the most important factor that made small landholders a biosecurity risk

“If they are not informed, yes, then I think they do [pose a risk]... The non-informed person is always the risk.”

(Interview 7)

“[With]... the small farm, hobbyist type farms I do think there is an issue there. I do think there is a problem there, and I think we need to educate, somehow educate them better on what they are doing... but certainly, they do need to be made more aware of some of the issues...”

(Interview 5)

Lack of knowledge around animal biosecurity and health were specifically mentioned as a concern:

“A classic example might be swill feeding and the like. There's probably a bit of that goes on. That would be down to people just not being aware, not moving in the circle or seeking the information to let them know it's not appropriate.” (Interview 26)

However, this was contradicted by another interviewee who believed that swill-feeding is largely in the past.

Interviewees identified a number of reasons for why small landholders pose a lower or higher biosecurity risk (Table 15).

Table 15: Biosecurity risk: Analysis of level of risk by type of small landholder

Typology	Higher risk	Lower risk
Lifestylers	<ul style="list-style-type: none"> • Lack of knowledge of biosecurity (BS) risks • Low level knowledge concerning animal & plant health • Lack of connection with industry & government • Non compliance with biosecurity regulations (e.g. the National Livestock Identification Scheme (NLIS) and Property Identification Codes (PICs)) • Poor land mgt practices • Absentee owners • Animal husbandry practices • Time poor (commuters) • Lack of financial resources • Proximity to urban centres • Complexities in communicating biosecurity risk 	<ul style="list-style-type: none"> • Lack of agricultural activity • High level of care for animals • Good perception of government • Willingness to report to government • Financially well resourced • High education levels
Farmers	<ul style="list-style-type: none"> • Seeking competitive advantage through importing animal & plant products • Large numbers of animal & plants • Lack of knowledge of biosecurity risks • Reluctance of some to report to government • Time poor • Proximity to urban centres • Complexities in communicating biosecurity risk • Cultural background 	<ul style="list-style-type: none"> • Livelihood protection • High level of knowledge of biosecurity risks • High education levels • Connection with industry & government • Adherence to biosecurity risk regulations (e.g. NLIS)

Note: not listed in order of importance

Summary

Slightly more than a third of interviewees consider that small landholders pose a risk to Australia's biosecurity. Yet, slightly less than two-thirds perceived that small landholders were not a risk or that they were no greater risk than anyone else. CALD groups were not identified as being a high biosecurity risk and lack of knowledge was seen as the biggest factor in small landholders' biosecurity risk.

4.5 Communicating with small landholders about biosecurity risks

a) Networks of small landholders in peri-urban areas

Small landholders' networks could be an important means of communicating with landholders about biosecurity. Interviewees were asked about whether they believed small landholders in peri-urban areas belonged to any networks or groups, and to describe them if any. The results are presented in Table 16.

Table 16: Networks small landholders belong to (n=41)

	Network	No. responses
Belong	<ul style="list-style-type: none">Interest associations, clubs, groupsLandcare or similarSocial, community networks (e.g. Rotary)	47
Varies	<ul style="list-style-type: none">Varies (some belong others don't)Farmers' marketsNeighbours, other landholdersTraining groups	28
Don't belong	<ul style="list-style-type: none">None at allDon't belong to Landcare or similar	13

Although they are not strictly considered a network, some interviewees also mentioned that small landholders commonly frequent sale yards. Most responses indicate that small landholders belong to specialist or niche interest groups and associations, Landcare or conservation groups, and social and community networks (Table 16).

"Well, I see them belonging to stud societies and associations... so if you have got Low Line cattle you go join the Low Line Cattle Association or the Devon Cattle Association or the Alpacas Association, and yeah they belong to those."
(Interview 14)

However, consistent with some previous research (Curtis et al. 2000 in Hodges 2005), a small proportion of responses indicated that small landholders were not interested in belonging to groups such as Landcare:

“Well, there might be the individual that does, that belongs [to Landcare], but not as a rule because ... they’ve got their own individual issues.” (Interview 25)

Overall, data suggest that small landholders in peri-urban areas may not be members of mainstream farming groups. This finding is consistent with other research (Department of Agriculture Fisheries and Forestry 2003, Hollier and Reid 2006b, Hollier et al. 2004b). One explanation is that some small landholders do not identify as farmers or rural landholders:

“And then you discover that yeah, they’ve got a lifestyle block and they’ve got 40 head of cattle on it and - well, actually, Madam, you’re engaging in an agricultural activity.” (Interview 10)

Or alternatively, it was reported that small landholders may feel they don’t belong in the same networks as mainstream farmers:

“... I think that most of them do regard the mainstream agricultural agencies as existing principally for the primary producer, the bone fide primary producer. So they are often reluctant to make that first contact, because they think as a hobby farmer, this agency is not going to want to service me.” (Interview 1)

One government employee stated:

“... we have got far more smallholders than we have got commercial farmers. You see our department hasn’t really recognised them as core business up until now, but now it begins to sort of appreciate that they are important in terms of things like biosecurity.” (Interview 13)

Although some interviewees believed that small landholders didn’t belong to any networks, others commented that landholders’ connection to networks and groups varied somewhat, depending on individual backgrounds, interests and agricultural experience.

Some interviewees mentioned that landholders’ connection to networks depends on how long they have lived on their land, implying that the longer they have lived in peri-urban locations the greater their connection to networks will be. This may be supported by data from the Australian Bureau of Agricultural and Resource Economics (ABARE) which found there was no difference in Landcare

membership rates between peri-urban and other farmers (Hodges 2005). Time on the land was not covered in this research.

Summary

The data suggest that small landholders belong mainly to interest groups based around what they do on their land (i.e. specialist interest groups). Other networks they are likely to be part of include Landcare or similar groups, and social/community networks. However, small landholders' membership (or lack thereof) of particular networks reflects the inherent diversity of this community, and is dependent on individual interests, backgrounds, longevity of land use, and experiences. Overall, it was apparent that small landholders are not members of mainstream or traditional farming networks such as farmers' federations.

Future research could draw on the typology outlined earlier to determine which networks particular types of landholders belong to. This information could be used to communicate specific biosecurity messages to landholders through their networks.

b) Perceptions of government

Interviewees were asked about how small landholders perceived government agencies like AQIS and departments of primary industries (Table 17). Small landholders' perception of government may determine their willingness to engage with those agencies on biosecurity issues and may thus affect their level of biosecurity risk.

Table 17: Perceptions of government agencies (n=40)

Positive perception	Negative perception	Unsure
No. Interviewees	No. Interviewees	No. Interviewees
16	9	15

Note: 'unsure' response includes neither a negative or positive perception or both

There were more positive responses about the perception of government agencies than those which were negative or uncertain.

"I think everybody would trust the government information because they see it as the basic, like the encyclopaedia information...Because when you have not grown a product before, that is the first place you go." (Interview 7)

In particular, those landholders who had consistent contact with government agencies appeared to hold positive perceptions.

“At the moment, we have a very good group working hand in hand with most government bodies. We have our Goat Industry Council, which is answerable to government bodies, so I’d say probably over the last five to ten years, we do work very closely with most government bodies, yes, in most States. I wouldn’t say every individual member, but as a group and as a breed society, yes...” (Interview 44)

Interviewees employed by government frequently commented that many small landholders did not know that their agency existed, or were unsure of the services government agencies could offer small landholders in terms of information and assistance.

“They just need to know that we exist. Sometimes that’s a bit tricky because they don’t know that we communicate that very well to the public ... I think traditional farmers, like primary producers know that DPI exists but that’s because we’ve been trying to target that group for ages.” (Interview 11)

In response to a new service being provided for small landholders, one interviewee said:

“Well, we’re getting a pretty good response. I mean a lot of people are glad to see us actually because they haven’t engaged in this and we haven’t engaged with them before. I think they trust us and I think it’s all pretty good.” (Interview 2)

Nine interviewees (three of them employed by government agencies) believed that small landholders had a negative perception of government.

“If you are from the government, they just don’t want to know. It is a bit of the same culture, that if you are from a government department, somehow you are the enemy.” (Interview 13)

“I think getting access to them and being receptive ... and that’s not what you get when you ring up a government agency. Very rare to get anybody that’s interested and if you do find anybody whose interested to ring back, either you can’t get onto them or they’re out, they’re at a meeting, their mother’s having a baby, they’re on holidays, they’re on long service leave or don’t come in today or there’s somebody acting in their place and doesn’t know anything anyhow.” (Interview 8)

“[Government is perceived as] a pain in the arse. As a necessary evil but a handicap to them doing business, let’s put it like that...” (Interview 22)

One of the recurrent negative themes of government concerned small landholders from CALD backgrounds who mistrust government agencies. Factors listed included: language barriers, not understanding the role of government, and negative experiences of government from their country of origin.

“They have a huge level of mistrust of any outsider let alone someone from the government. They don’t understand government procedures or operations or the role of government... Yes, so there’s a great deal of mistrust, a great deal of misunderstanding and they really don’t want to talk, they will not actively talk to government unless they can see a benefit in it so one of the main ways they come to us is if they have a problem with pest and diseases. They really don’t want us coming on to their farms to help them because they don’t necessarily see it as help.” (Interview 20)

While mistrust of government may be perceived as an ongoing feature of CALD landholders, one interviewee believed that over time this may change:

“Yeah, it does take a while to build that [a good relationship] up. [I’ve been in the] job five years now and it has taken a while to get the trust of some of these guys but you get that.” (Interview 15)

Nearly half of the interviewees believed that small landholders did not have either a positive or negative perception of government agencies. This appeared to be associated with the diversity of the small landholder population. Some interviewees thought that individuals may not be anti-government *per se*, but that they may have issues with some government initiatives, for example the National Livestock Identification System (NLIS).

“They are sceptical about them, they do trust government but believe they are too intrusive i.e. NLIS.” (Interview 12)

Summary

One third of interviewees believed small landholders perceive government agencies positively. Another third reported some individual variation, ambivalence or a perception that some types of small landholder have more positive perceptions than others. Less than a quarter thought that small landholders perceive government negatively – and some of this was associated with CALD landholders’ mistrust of government in general. These findings need to be considered bearing in mind that most of the interviewees were employed by government agencies.

c) Reporting disease outbreaks and pest incursions to the authorities

An important aspect of biosecurity is early detection. Interviewees were asked to assess the likelihood of small landholders reporting outbreaks of disease and pest incursions on their property to the relevant authorities. Their responses are summarised in Table 18.

Table 18: Would small landholders report outbreaks of diseases and pest incursions to the authorities (n=41)

Assessment of likelihood	No. Interviewees
Likely	16
Unlikely	12
Depends on type or knowledge level	11
Don't know	2

Responses to this question were relatively evenly distributed. Around a third of interviewees perceived that small landholders were likely to report, a third thought that small landholders were unlikely to report, and a quarter believed the likelihood of reporting depended on the type of small landholder and/or their knowledge level.

“If they knew what they were looking at [they would report it]. Yeah, I think that if you’ve only got five sheep and one of them is sick you’re going to take pretty good notice. If you’ve got any interest in them at all...I would think because... the average sort of hobby farmer, I guess it’s fair to say, wouldn’t be as astute as a professional farmer and they are probably not as knowledgeable about legislation and quarantine issues.” (Interview 28)

This contrasts somewhat with the research conducted by Sanson et al. (2004). They found that 96.2% of small landholders who participated in their survey responded that they would report a new exotic disease, pest or weed on their property. An explanation for this may be that although landholders may indicate that they would report outbreaks and incursions, in reality they may be less likely to do so (i.e. the difference in what they say they would do and what they actually do).

Interviewees discussed the reasons behind their assessment of whether small landholders would be more or less likely to report to authorities; these are presented in Tables 19 and 20.

Table 19: Rationale for reporting disease outbreaks and pest incursions to the authorities (n=28)

Reasons they would report	No. interviewees
Educated, motivated to do the right thing	10
Out of concern for their animals	5
Financial consequences	5
When not sure of something, confused	4
Can recognise outbreaks and incursions	3
Trust in govt, good relationship	1

The majority of responses indicate that small landholders on lifestyle blocks would report outbreaks and incursions because they are motivated to ‘do the right thing’. The following interviewee clearly distinguished this course of action from that of farmers on small landholdings:

“If they are properly educated in terms of, you know, it’s better to report something that turns out to be nothing more than a common pest or disease, than to harbour something that could have a major, major impact on the commercial industry etc. I don’t think that their mindset would preclude them from doing so. They are not in the same mindset as a commercial producer, in that, ‘I don’t want to tell anybody about a problem I have got on my property because I don’t want to be seen as the industry [dummy].’ If they are properly educated, then I believe that these people wouldn’t have any hesitation in making those reports... They really don’t have as much to lose as a commercial producer, in reporting a new pest or suspect pest.”

(Interview 1)

Table 20: Rationale for not reporting disease report outbreaks and pest incursions to the authorities (n=28)

Reasons they wouldn't report	No. Interviewees
Unaware, uneducated, unable to recognise	15
Fear/dislike of government, consequences	12
Don't know who to report to	2
Don't want to appear ignorant/inexperienced	1
Different understanding of risk	1
Too much trouble	1

Most responses suggest that the reason lifestylers on small landholdings were unlikely to report to the authorities was because they were uneducated about pests and diseases and wouldn't be able to recognise outbreaks and incursions on their property.

"I would think most, not likely. I would think they would not even be able to pick that it was an outbreak of a disease; they would most probably just think it was dying of natural causes and just get the animals disposed of." (Interview 42)

Some responses indicate that farmers on small landholdings would be reluctant to report incidences to the authorities because they were concerned about the consequences (e.g. removal of crops, financial implications), and/or because they disliked government.

"I give the instance of the western flower thrip, which was actually brought in by flower growers... They all went quiet, it wasn't until actually quarantine [AQIS] found the issue... When it was found on some flower grower's property they basically went to the wall. And when you're facing those sort of circumstances... it's not an invitation for them to sort of say 'Yeah, yeah, I've got western flower thrip, come and shut my business down'." (Interview 39)

Summary

The data suggest that some small landholders are likely to report disease outbreaks and pest incursions while others are less willing. The findings seem to indicate that lifestylers would be more willing than farmers to report outbreaks and incursions, assuming that they know what to look for and are motivated to report their observations. This suggests that education and awareness play an important role in this aspect of biosecurity. Further exploration in large-scale surveys of small landholders in peri-urban areas is required to determine whether they would or would not notify authorities about pests and diseases on their properties.

d) The best methods of communicating with small landholders

Interviewees were asked about the 'best' means of communicating biosecurity messages to small landholders in peri-urban areas. Both methods and approaches of communication were discussed. An extensive range of delivery methods were perceived by interviewees as the 'best' means of communicating with small landholders (Table 21).

A wide variety of delivery mechanisms were mentioned: field days to flyers, TV to DVDs, via the internet, publications and the post-office (Table 21). There were six clear themes of delivering

methods in the data. Half of these relied upon remote, indirect methods either in print or electronic media while the other half used face-to-face methods.

Table 21: Best methods for communicating biosecurity

Type	Method/channel	No. interviewees
Indirect (remote)		
Broadcast media	<ul style="list-style-type: none"> TV (local) (e.g. Landline or lifestyle shows) Websites (information, databases) Radio (local gardening shows etc.) DVDs 	20
Print media	<ul style="list-style-type: none"> Local papers Stock journal or similar Magazines Industry publications Specific small landholder publications 	17
Written materials	<ul style="list-style-type: none"> Flyers, fact sheets, ag notes, newsletters (e.g. distributed by government) Direct mail-out Rates notices Registration renewal notices Post offices 	13
	Total	50
Direct (in person)		
Demonstrative	<ul style="list-style-type: none"> Field days (stands at, or topic specific) Workshops (i.e. hands-on, interactive) Information nights 	16
Via specific agents	<ul style="list-style-type: none"> Rural merchants Chemical resellers (as agents for info/places to collect brochures etc.) Local council Real estate agents (info on land management and biosecurity) Vets Vendors (of stock), sale yards Rural Lands Protection Boards 	15
Groups and community gatherings	<ul style="list-style-type: none"> Clubs, associations, societies, groups - meetings, newsletters, websites Networks Local community get togethers, BBQs etc. Markets 	12
	Total	43

A number of different approaches were discussed by interviewees. However, many referred to face-to-face approaches (e.g. extension, workshops, field days) as the best means of communicating biosecurity messages to small landholders.

“Well, because you are dealing with a whole range of levels of understanding I think interactive techniques would be my preference, where you are face-to-face with them and you have a bit of theory and practice and just in general trying to follow some of the adult learning processes I guess. Because they come from usually a whole range of backgrounds and levels of knowledge - sending off literature or providing a lecture might not cover everyone.” (Interview 26)

“Yeah, I think with these people, and given their fear and scepticism, I think you’ve got to do it the old fashioned way. Actually go out there and do face-to-face. It’s a hard slog but to get their respect and to get their willingness to listen to you, you’ve got to go out there and put a face to the message that you’re trying to get across.” (Interview 4)

These comments about the benefits of face-to-face approaches are in line with the maxims proposed by the European Union Scientific Advice and Governance Unit – namely, to establish direct relationships with landholders, and to understand, listen to and engage their concerns (Karatzas, 2004).

Using an integrated approach with various combinations of communication methods was also referred to by interviewees. Francis (2002) recommended trialling novel methods of extension for small landholders, including radio. She also commented that extension officers need to focus on a range of topics relevant to small landholders rather than focussing on specialist topics.

Some interviewees commented that communicating with small landholders was difficult because of the diversity of landholders in peri-urban areas. If small landholders are from CALD backgrounds it appears to add language barriers as a distinct challenge:

“Communicating with these guys [small landholders from CALD backgrounds] in Sydney is extremely difficult and the first thing anybody needs to do is actually establish those contacts. They seem to be made and let go. It [requires] enormous amounts of energy. It would be good if... there were bi-lingual educators that were permanent.” (Interview 36)

The above factors highlight another issue raised in the data – the establishment of trust between small landholders and extension officers/educators through long-term relationships. Particularly for small landholders from CALD backgrounds, trust established through face-to-face contact was seen as paramount:

“[Regarding small landholders from CALD backgrounds], I can’t see any other way [apart from face-to-face approaches]. Part of my job is to try and communicate with these guys and I really can’t see any other way but one on one because they just don’t trust you unless you deal with them one on one. And that’s why it is such a big job.”
(Interview 15)

The issue of trust is also a prominent theme in the risk perception and communication literature, where trust placed in risk managers is affected by perceptions of competency, openness and empathy among other aspects (Frewer, 1999, Karatzas, 2004, Kasperson, 1992, Renn, 1998, Renn and Levine, 1991).

Summary

It is clear from these data that multiple methods from both direct and indirect sources are likely to be the best means of communicating with small landholders. Face-to-face delivery through a range of outlets and venues they are likely to attend in their local communities can be combined with indirect sources such as websites, television and information provided by governments. Specific messages for different types of small landholders will increase the success of the communication, particularly where landholders from CALD backgrounds are concerned.

4.6 Summary of findings

The findings presented in this report address some of the gaps in knowledge about small landholders in peri-urban areas of Australia and their potential biosecurity risk. Five main questions were addressed:

1. Who are small landholders in peri-urban Australia, and what are their motivations?
2. What are the land management practices and land uses of small landholders?
3. What knowledge do small landholders have about managing pests and diseases?
4. What are the potential risks posed by small landholders to Australia’s biosecurity?
5. What are some of the best methods to communicate with small landholders about biosecurity?

1) Who are peri-urban landholders?

Findings revealed that small landholders in peri-urban Australia fall into two broad types: lifestylers and farmers. These types were based on the variables of time spent on the landholding and landholders' source of income.

Interviewees thought of lifestylers as city dwellers wanting to live a rural lifestyle. They may live on their land full-time or part-time, and some are thought to commute to the city. Their motivations for having animals and plants appear largely to be based around the pursuit of hobbies, values and interests. Lifestylers are not considered to be interested in earning income off their land; hence it must be derived from other sources. There was a perception that lifestylers have an independent attitude and are willing to learn.

Farmers were thought to earn some or all of their income on-farm, lived part-time or full-time on their holdings and to be involved in producing animals and plants of specialist varieties. They usually farm intensively on their small block and may have multiple types of livestock and/or crops. These landholders are thought to be serious about their enterprises and in earning an income from their activities. They were believed to be interested in the health of their animals and plants because it could maximise their productivity.

Although these classifications are not new, this study indicates that these types are not static and that landholders can move from one type to another over time. Therefore, caution should be applied when 'pigeon holing' small landholders into these classifications as they may not be constant. However, typologies such as this provide a means of understanding such a diverse group of the population.

Consistent with other research, it was found that small landholders are not considered to be part of mainstream farming and industry groups. A possible explanation for this is that small landholders do not identify as farmers, and hence feel they don't belong in the same mainstream networks.

2) What are the land management practices and land uses of small landholders?

Small landholders in peri-urban Australia are undertaking a diverse range of activities and land uses on their properties. Lifestylers, who are perceived to conduct minimal or no commercial activities, keep diverse types and niche varieties of animals and plants for a range of personal and professional interests (i.e. hobbies, status symbols and pets).

The agricultural interests of farmers on small landholdings appear to be intensive, high-value and specialising in new and emerging industries (e.g. alpacas). As has been suggested by other researchers in this area, it appears that small landholders' contribution to Australian agriculture and the economy may be higher than previously thought. This topic is worthy of further investigation.

Small landholders access a wide range of outlets from which to source their stock. Acquaintances, friends and neighbours were perceived to play a large role here, which may be of concern from a biosecurity perspective. Similarly, there is a wide range of outlets where small landholders sell or trade animal and plant produce. Farmers' markets, direct sales to shops and restaurants, sale yards, and trade through neighbours, friends and acquaintances are the main destinations. From this, it is apparent that biosecurity education campaigns may need to be targeted at local communities in peri-urban areas.

3) What knowledge do small landholders have about managing pests and diseases?

In accordance with previous research, this study suggests that small landholders do not possess adequate knowledge of pests and diseases. It was noted however, that they are enthusiastic to learn, (actively conducting their own research through available sources) and are motivated to seek advice. It seems that knowledge levels may vary amongst different types of landholder (i.e. those already involved in farming will have higher biosecurity awareness). This could be explored in future research.

The data suggest that small landholders in peri-urban areas mostly rely on friends, family and neighbours to source information about how to manage their land. Government information sources were also mentioned, however it was suggested that small landholders from CALD backgrounds were unlikely to contact government unless they already had an established relationship with one or more employees.

4) What are the potential risks posed by small landholders to Australia's biosecurity?

Interviewees considered that some small landholders do pose a potential risk to Australia's biosecurity, largely due to their lack of knowledge about, and awareness of, how to manage animal and plant pests and diseases. However, the data also suggest that small landholders pose no greater biosecurity risk than other segments of the population. In contradiction to prevalent stereotypes, small landholders from CALD backgrounds did not emerge as a higher risk group than landholders from English speaking backgrounds. Related to this, interviewees reported that small landholders would report disease outbreaks and pest incursions to the authorities if they knew what to look for.

This again highlights the role that education and awareness could play in reducing the risk to biosecurity.

Pests and diseases associated with small landholdings were categorised in two distinct groups of major and minor concern. The level of concern about small landholders' biosecurity practices and attitudes was high, however uncommon pests and diseases such as 'bird flu' or foot and mouth disease were not seen by interviewees as any more of an issue for peri-urban Australians than for the rest of the population.

5) How do you communicate with small landholders about biosecurity?

Direct and indirect communication methods were prevalent in the data, but it was acknowledged that multiple communication methods and approaches are likely to generate the best outcomes. Face-to-face delivery through a range of outlets, agents, workshops and venues in local communities was emphasised. However, print and electronic media such as websites, television and written information provided by governments was mentioned as equally important. Specific messages for different types of small landholders are likely to be needed. The timeliness of communicating and the style and type of government influence will also increase the success of biosecurity communication, particularly for landholders from CALD backgrounds.

5.0 Recommendations

5.1 Introduction

The findings of this project will be used to design coordinated approaches to understanding and communicating biosecurity risks to small landholders in peri-urban Australia. This research will also aid future policy and education/awareness work in this area. The following recommendations are made in the context of the questions addressed by this research and are based upon an assessment of the policy options available to PIAPH.

Furthermore, this report has addressed some gaps in knowledge about small landholders in Australia and biosecurity. However, further research is necessary to build on these findings. Importantly, it should be acknowledged that these findings are based on the *perceptions of others about landholders*.

The following recommendations are grouped around two themes: understanding the audience and communicating effectively.

5.2 Understanding the audience

- **Avoid stigmatising small landholders**

Policy-makers are likely to be faced with significant challenges in explaining and communicating biosecurity risks to small landholders in peri-urban areas. It is important however, not to stigmatise small landholders. Research suggests that they make a significant contribution to Australian agriculture, and are integral members of peri-urban communities. Diseases such as avian influenza and foot and mouth disease were not seen as a risk particular to the small landholder population; rather it was perceived that small landholders pose the same risk as the rest of the Australian public.

- **Clarify the use of the term 'biosecurity'**

There is a need to establish a goal with a common interest for small landholders in peri-urban areas. The term 'biosecurity' may not be readily understood by small landholders. Information about pest and disease management is likely to be more familiar, but the link to biosecurity may not be established. It is recommended that the notion 'biosecurity' be explored in further research with small landholders (either focus groups or a survey). Further to this, the biosecurity message should not be communicated in isolation; rather it is recommended that it be integrated with messages about natural resource management (e.g. weeds, pasture management).

- **Tailor messages to different types of small landholders**

Communications need to focus on the different types of small landholders in peri-urban areas and their different land uses. Ideally, separate communications with distinct methods and styles need to be employed depending on the type of landholder (i.e. lifestylers or farmers). These messages will also need to be tailored taking into consideration landholders place in the time/income matrix.

For example, messages for small landholders in the lifestyle category could be couched in terms of care of animals and plants, sustainability and connection to the land. It is recommended that messages be conveyed in a positive manner rather than a punitive or negative one. The high levels of independence believed to be associated with lifestylers means that they may not respond well to messages they see as authoritarian.

Specific messages for small landholders in the farmer category could focus on improving their business (i.e. maximising profit, sustainability). Messages could also be closely aligned with natural resource management issues, particularly considering that the pests and diseases of concern associated with small landholders appear to be those that are already established in Australia.

For small landholders (who are either lifestylers or farmers) from CALD backgrounds, messages will need to be communicated in languages other than English.

ACTIONS FOR FURTHER RESEARCH

- Focus groups/demonstrations with small landholders to verify the typology of ‘lifestylers’ and ‘farmers’ and to test the term ‘biosecurity’ and the types of messages they respond to.
- A national, quantitative survey of a representative sample of small landholders in peri-urban Australia would provide useful baseline data that would address many of the gaps highlighted in this report (specific topics to be covered in the survey are presented in Appendix B). The survey could also collect information on communication methods and messages.

5.3 Communicating effectively

- **Improve the availability and accessibility of information and advice**

Small landholders are willing and motivated to seek information and advice on managing their property. Rather than simply transmitting information using a top-down approach based on a knowledge deficit model, a participatory approach is recommended. This can be achieved through improving the availability and accessibility of information and advice for small landholders. Given the types of small landholders and their different information seeking strategies, the type of information and the style of delivery need to be tailored to lifestylers and farmers.

- **Use a combination of direct and indirect communication methods**

A combination of two main methods are recommended for communicating with small landholders: direct (i.e. face-to-face) and indirect. Direct methods include field days, extension officers and workshops. Suitable peri-urban communities (i.e. those with a high proportion of new landholders and/or small landholders of various types) would need to be identified for the deployment of direct methods. The use of these methods will increase the trust and credibility of the message and provide an opportunity to develop long-term relationships – essential aspects of risk communication recommended in the literature.

Indirect methods include broadcast media, electronic and print sources such as television and radio, websites, and flyers and fact sheets (distributed via clubs and specialist grower groups, vets, rural suppliers and chemical resellers etc.). These can be used to ensure the delivery of a consistent message from credible sources.

A national website for biosecurity would be a cost-effective means of providing information about good biosecurity practice for small landholders. As well as providing information, the website could offer communication channels (for each state and territory) for enquiries about biosecurity and for reporting potential biosecurity risks. This two-way exchange of information would provide small landholders with an avenue for reporting their concerns and engage them in this issue.

There is a need to establish all interested organisations and potential audiences in relation to biosecurity and to define clear roles for government agencies. In particular, the Primary Industries Health Committee could play a role in coordinating a whole-of-government approach. Although it may not play a large role in the delivery of face-to-face communications activities, PIAPH needs to actively support these efforts nationally and within the states and territories.

There are likely to be other researchers and research groups around Australia that are interested in continuing to work on the topic of small landholders in peri-urban areas, particularly from an NRM perspective. It would be beneficial to pool the resources of state/territory and Federal agencies in furthering research in this area. A national arrangement to maximise knowledge and resources is likely to be the most efficient means of progressing research on this topic.

ACTIONS FOR IMPROVING COMMUNICATION

- Establish a national biosecurity website to create a portal for small landholders to access and report information and concerns. Research on this topic could also be available on the website for all interested parties to access.
- Update the stocktake of biosecurity communications and activities undertaken by DAFF in 2005. Updating the stocktake will establish what messages are being communicated to whom, and how. The stocktake should encompass all communications/activities at all levels of government (local, state/territory, Federal) as well industries (e.g. recreational, primary production, real estate).
- Establish a whole-of-government biosecurity network. The instalment of biosecurity coordination officers in each state and territory will create a national network and enable better communication and coordination of biosecurity activities within these jurisdictions as well as at a Federal level.

5.4 Roles of key players

A national approach to biosecurity education and awareness campaigns with defined roles and responsibilities for government jurisdictions and industry needs to be developed. The stocktake recommended above will provide a useful indication of what activities are being undertaken by governments and industries across Australia. This will not only highlight any gaps, but will also provide a means of benchmarking activities in this area. The Federal government could use this information to better coordinate its own activities with those of state and local governments.

Related to this, it is suggested that institutional arrangements to provide support to new ‘sunrise’ or niche industries be established. For example, funding a specific association for small landholders in new or niche industries that provides them with access to information and potential government contacts.

There are a number of agencies who have a role in communicating biosecurity messages to small landholders. The two main approaches recommended here (i.e. direct and indirect) can be used to

guide the roles of some of these agencies. Direct approaches need support from the Federal Government, but these may largely be implemented and managed by the states and territories. The Federal government has a larger role in communicating using indirect methods and in coordinating a national approach.

5.5 Conclusion

This project addressed some of the gaps in knowledge about small landholders in peri-urban Australia and biosecurity. Some assessment of the potential risks posed by these landholders has been made. It was found that small landholders in peri-urban Australia fall into two broad types: lifestylers and farmers. It was discovered that these types are not static and that landholders can move from one category to another over time. It was perceived that small landholders are enthusiastic to learn and motivated to seek advice, but that the knowledge levels of different types may vary. Small landholders' knowledge about land management was one of the main reasons they were considered to pose a risk to Australia's biosecurity. Aside from this, it was believed that small landholders pose no greater biosecurity risk than any other segment of the population. Contradictory to some stereotypes, small landholders from culturally and linguistically diverse backgrounds did not emerge as a higher risk group than those from English speaking backgrounds.

Appendix A

Interview Questions – BRS Peri-urban Biosecurity Project

Date:.....

Interview No.:.....

Interviewee:.....

Location:.....

Start time:

Finish time:.....

Interviewer:.....

NOTE: intro to be stated similar to fact sheet – need to also ask permission to record.

Profile/practices/motivations/contact

1. Describe the people you believe live on or manage small landholdings in peri-urban Australia.
2. Could you describe the types of activities you believe they conduct on their land/property? E.g. grow vegetables/crops, raise chickens/pigs.
3. Why do you believe they do these types of activities? E.g. for self-sufficiency, income, interest/enjoyment.
4. What sorts of networks or groups do you believe these types of landholders might belong to? E.g. clubs, Landcare groups, growers networks?
5. a) Do you have any contact with small landholders in peri-urban areas? If yes, please describe the type of contact you have.

b) If yes, how often would you interact with individual landholders of this type? i.e. on average, daily, weekly, monthly?

c) If yes, why do you think they come to you/contact you?

Amplification

6. Where do you believe small landholders in peri-urban areas source their animals and plants (stock, seeds, cuttings etc.) from?

7. Where do they sell/trade any produce/animal products produced on their land at markets, abattoirs, retail outlets, clubs etc? i.e. Actual locations.
8. Can you give an indication of how often you believe small landholders might attend these types of events?

Communication

9. Based on your experience, describe how this type of landholder might manage the health of their animals, plants, crops?
10. Where do you think small landholders in peri-urban areas get information on how to manage their plants and animals from?
11. What do you feel are the most appropriate ways to communicate information about animal and plant pests and diseases to small landholders? E.g. websites, extension officers, etc.
12. Do you think they are likely to report outbreaks of pests and diseases to the relevant authorities?
13. In your opinion, how do you think this type of landholder views government agencies like AQIS/Q DPI [whatever government agency is relevant]?

Biosecurity

14. Do you feel they have adequate knowledge of animal and plant pests and diseases relevant to their property? Please explain, provide e.g.'s
15. Based on your experience, do you think small landholders are likely to import any animal or plant material? Could you provide any examples?
16. Are there any specific pests and diseases that you are concerned about that are likely to be associated with small landholders in peri-urban areas? Please describe.
17. a) What is your understanding of the term 'biosecurity'? Please describe what it means to you.

b) As a professional, what do you see as your role in maintaining Australia's biosecurity?

Risks

18. Do you feel small landholders in peri-urban areas pose a biosecurity risk to Australian Agriculture? Please provide e.g.s

Other

19. Any other questions, comments you would like to make?
20. Do you know of any small landholders in peri-urban areas, or others who have contact with this type of landholder, who might be interested in participating in this research?

Appendix B

Topics and approaches for future survey research

Both qualitative (i.e. depth) and quantitative (i.e. breadth) techniques could be used to verify and expand the findings presented here. However, for the best value, national data from a large scale quantitative survey would contribute much to our understanding of small landholders and biosecurity. A survey would ideally gather further data on:

Who small landholders in peri-urban areas are

- demographics such as age, gender, marital status, socio-economic status
- household members
- employment (off-farm)
- education
- membership of clubs, societies and associations
- time lived on their land
- farming background/history
- location of primary residence
- values, attitudes
- motivations.

The survey could test the typology developed in this project and determine whether the types developed reflect the proportions of small landholder types in the total peri-urban population. To achieve this, landholders could be asked to classify themselves.

Land uses and land management practices

The diversity and extent of the land uses of small landholders in peri-urban areas needs to be confirmed, as well as further information obtained about their land management practices. In particular, further data on small landholders' knowledge and management of pests and diseases, and what outlets are used for animal and plant products (and the extent to which small landholders use these outlets). The following could be included:

- size of small landholding
- stock and plant numbers
- where animals and plants sourced from
- capital investment in production

- income earned from activities (i.e. on-farm income)
- assessment of current agricultural production, anticipated future production
- farm labour (paid and unpaid)
- other land uses
- future land uses
- farming style (if any) e.g. organic
- slaughtering and consumption of own produce
- outlets produce sold, traded
- vegetation management i.e. revegetation
- chemical and fertiliser use
- concerns about pests and diseases
- pest and disease management
- sources of information about pests and diseases
- where observations of pests and diseases reported to (if anywhere)
- what information on land management, pests and diseases small landholders would like to receive
- how they would like to receive information.

A survey instrument developed and tested in New Zealand by the Ministry of Agriculture (Sanson et al. 2004) covers many of these topics and could be used as a basis for further work. The landholder surveys conducted by the BRS may also be a useful platform (e.g. Byron 2004). Furthermore, new data will be available from the 2006 census conducted by the ABS.

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