# Estimating the economic impact of hunting in Victoria in 2013

Department of Environment and Primary Industries

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**DEPI**

# Estimating the economic impact of hunting in Victoria in 2013

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# Table of Contents

# Executive Summary

## Introduction

This report summarises the results of research into the economic impact of hunting. The study was commissioned by the Victorian Department of Environment and Primary Industries (DEPI) and undertaken by RMCG, EconSearch and DBM Consultants.

Hunting expenditure is influenced by hunter effort, which in turn is influenced by seasonal conditions. The research investigates hunting-related expenditure in 2013, which was an average year in terms of game species populations and hunter success, and thus is also likely to be an average year for expenditure.

Through the course of the project, data was also collected on the social impact of hunting. While there is some analysis in this report, detailed analysis of the social data was not within the scope of this project and there are opportunities for further analysis at a later date.

## Survey method

A survey was used to gather statistically significant information about hunters' expenditure patterns.

The survey focussed on hunters: those who have a firearms licence for the purpose of "recreation", with the primary interest being game hunters, as the expenditure of this group is of interest to government policy makers. Primary producers and wildlife controllers who are not game hunters or who hold a firearms licence as part of a business requirement to reduce pest populations were excluded from the research. This survey covered all hunting in Victoria, regardless of the residency of the hunter; hunting by Victorians in other states or overseas was not covered.

The game licence database and hunting association memberships were used as sampling frames for the research. This provided good coverage of the population of game licence holders. Non-game licence holders were under-represented, but this was acceptable, given that the main focus of the research was on game hunting.

1,000 responses were gathered for the survey, with surveys conducted online and over the phone. Invitations to complete the online survey were emailed to game licence holders and association members.

Email addresses and phone numbers are not available for all game licence holders on the database. Those licence holders with email addresses and phone numbers are younger than the overall population. This is a potential source of bias.

## Survey design and structure

The design of the survey was informed by interviews with hunting associations, as well as other, similar expenditure surveys on recreational fishing and tourism.

A list of possible expenditure items related to hunting was created and categorised into on-trip and off-trip expenditure. For items such as vehicles, boats, clothing etc. that could be used for other purposes, respondents were asked the proportion of that item used for hunting.

Respondents were asked about the total number of trips in Victoria for the year. The survey also asked them about their expenditure on one hunting trip. The selection of that trip was guided by two imperatives: reducing recall bias and ensuring a sufficient number of responses for expenditure relating to each target animal. Ideally, each respondent would be asked about their most recent trip,

and this was the case for 55% of respondents. The remainder of respondents were asked about their most recent trip for a particular animal group, in order to ensure there was sufficient data to estimate expenditure related to each animal group.

## Method used for the economic modelling

The approach used for economic modelling was an extended input-output model known as the RISE model (Regional Industry Structure and Employment). This method is suitable for estimating the economic contribution of an activity to a regional economy but, in itself, is not a direct policy or investment evaluation tool.

In order to prepare the survey data for modelling, the following processes were undertaken:

- data cleaning and adjustment from “purchasers’ prices” to “basic values”
- sorting and attributing expenditure data by animal group and, for each animal group, by on-trip and off-trip categories
- extrapolating the sample data to the population, by using multiplication factors for the characteristics: age, animal group, hunting activity level and hunting association membership
- sorting the data spatially, by town, Local Government Area (LGA) and Regional Development Victoria (RDV) region.

The results were calculated for ABS local government areas, with a composite region created for Melbourne. Town estimates also were created by allocating economic impact to towns in proportion to expenditure estimates.

Due to the small number of responses from non-game licence holders (71) in relation to the non-game licence population (87,000), expenditure data from this population were considered too unreliable to use as input data for the economic impact model, and these data were not analysed and are not presented in this report. As such this report presents expenditure data related to game licence holders only.

## Economic impact of hunting in Victoria

The total expenditure for hunting game animals was estimated to be $282 million. When pest hunting by game licence holders is included the estimate is $417 million. 42% was on off-trip expenditure items and 58% on on-trip expenditure items. 40% of expenditure occurred in metropolitan local government areas (LGAs) and 60% in regional Victoria.

Direct Gross State Product (GSP) impact of game hunting by game-licence holders in 2013 (including game animal groups, deer, duck and quail) was estimated to be $118 million, with flow-on effects of $177 million, giving a total contribution to gross state product of $295 million. There were an estimated 1,115 jobs (full-time equivalent) generated directly by hunting-related expenditure with a further 1,268 jobs stemming from flow-on employment, giving a total employment impact of 2,382 jobs. When pest hunting (by game licence holders) is included, that is, to give the economic impact of all hunting by game licence holders, the direct impact is $177 million, flow-on impact of $262 million, with a total impact of $439 million.

In terms of direct GSP impact of the different animal groups, pest animal hunting is the most significant ($59 million), followed by deer ($57 million), duck ($43 million), and quail ($18 million).

With a GSP of $439 million including flow-on effects, the economic impact of hunting activity by game licence holders was estimated to make up 0.13% of the Victorian economy. Hunting activity is concentrated in certain areas, with the highest concentration of hunting being Mansfield local

government area (LGA) where hunting accounts for 2.5% of the LGA's economy. Hunting was also economically significant in Murrindindi and Gannawarra LGAs where it makes up 1.2% and 1.6% of their economies respectively.

Total hunting-related expenditure in top 20 towns was estimated to be $135 million, which accounts for 54 per cent of total non-metropolitan game hunting-related expenditure ($250 million).

A large proportion of economic activity occurs in the Melbourne region. Among the Regional Development Victoria (RDV) regions, the largest impacts were estimated for the Gippsland Region where hunting expenditure of $76 million generated direct Gross Regional Product (GRP) of $28 million and direct full-time equivalent (FTE) employment of 267.

## Comparison with other estimates of hunting expenditure

The estimate of expenditure related to game hunting of $282m is significantly higher than a previous estimate derived from the 2006/07 mail survey of hunters conducted by DEPI which, when inflated to 2013 dollars and the 2013 population of game licence holders, would be $130 million. The method used for the respective surveys differs markedly, the main difference being that the 2006/07 survey, having limited space, asked hunters to estimate their average annual expenditure in one question, whereas this survey was dedicated to expenditure and was able to separate out the various components of expenditure into number of trips, expenditure per trip and expenditure categories. This reduces the possibility of recall bias, and the risk that hunters will omit their expenditure on certain items. Additionally, the 2006/07 survey was conducted in a year with no duck season, requiring hunters to recall their duck hunting expenditure from greater than one year previously. There are thus strong reasons to believe that the 2006/07 survey produced an underestimate of hunter expenditure.

## Future data collection

It is recommended that future surveys concentrate on specific animal groups and be conducted soon after the completion of the hunting season. Collecting game licence holders' email addresses would facilitate the collection of data in the future.

This research focuses on game hunters; future research on pest hunting could be undertaken with access to the firearms licence database.

# 1 Introduction

**Key points**

This report summarises the results of research into the economic impact of hunting. The study was commissioned by the Victorian Department of Environment and Primary Industries (DEPI) and undertaken by RMCG, EconSearch and DBM Consultants.

Hunting expenditure is influenced by hunter effort, which in turn is influenced by seasonal conditions. The research investigates hunting-related expenditure in 2013, which was an average year in terms of game species populations and hunter success, and thus is also likely to be an average year for expenditure.

Through the course of the project, data was also collected on the social impact of hunting. While there is some analysis in this report, detailed analysis of the social data was not within the scope of this project and there are opportunities for further analysis at a later date.

## 1.1 This report

Hunting and game management activities generate a diverse range of benefits. Many countries provide for sustainable and regulated hunting tourism, with associated economic benefits.

Hunting supports businesses and jobs directly related to the manufacture and sale of hunting and outdoor products and services. This includes businesses relating to firearms and ammunition, safety equipment, fuel, accommodation (caravan parks, hotels and motels), camping and hunting equipment, and cafés and other food businesses. Hunting also supports a number of specialist businesses including private game bird farms, private hunting tour operators, and taxidermists.

This report summarises the results of research into the economic impact of hunting in Victoria. The research provides information about the expenditure patterns of hunting in Victoria, gathered through a survey of hunters, and the consequent economic impact of that expenditure, modelled using the Regional Industry Structure & Employment (RISE) economic model developed by EconSearch.

The study was commissioned by the Victorian Department of Environment and Primary Industries (DEPI) and undertaken by RMCG, EconSearch and DBM Consultants.

The data set generated by the survey accompanies this report and was provided to DEPI for use in further analysis and modelling. This report does not give any background on hunting in Victoria, apart from where this information was used to design the survey. This was not the intent of the research and it is understood that DEPI already has comprehensive information of this nature.

Through the course of the project, data was also collected on the social impact of hunting. While there is some analysis in this report, detailed analysis of the social data was not within the scope of this project and there are opportunities for further analysis at a later date.

## 1.2 Acknowledgements

RMCG, EconSearch and DBM gratefully acknowledge the assistance provided by the following :

- Field and Game Australia, Sporting Shooters' Association Australia, Australian Deer Association and the Victorian Hound Hunting Association, for facilitating the distribution of the survey to their members and providing background information about the nature of hunting expenditure;
- Hunting businesses, for providing information about their industries;
- DEPI staff, for their contribution to the project overall;
- Survey participants.

## 1.3 The 2013 hunting season

It is important to recognise that hunter effort is influenced by environmental conditions. Where environmental conditions provide good habitat, encourage breeding and provide for healthy populations of game species, hunters often will exhibit a higher rate of success. Under such conditions, there is likely to be a higher number of hunters active in the field and greater economic impacts.

Other natural factors also can aid the success of a hunter and encourage more days in the field. Deer often move outside their normal range as a result of floods, fires or other natural events. This may provide hunters with an opportunity for a higher rate of success.

There is often a lag between the impact of environmental conditions and response in hunting effort.

Duck hunting is particularly sensitive to climatic fluctuations. Since 2000, 11 duck hunting seasons have been modified with three of these being completely cancelled. This has a significant impact on duck hunters and their expenditure, especially when consecutive seasons are cancelled.

2013 saw a return to 'normal' conditions after three historically wet years. Game birds dropped from record numbers down towards long-term median levels. Although the success of game bird hunters was still good, it was below the levels recorded in the previous years with fewer hunter days in the field. It could be reasonable to assume that associated spending was also lower. Generally speaking, game bird hunters spent less time hunting and took fewer birds when compared with 2011. On the other hand, deer hunting effort was relatively stable over the period. This is illustrated by Table 1-1.

**Table 1-1: Hunting effort in Victoria 2011 and 2013**

| | 2011 | 2013 | Change |
|---|---|---|---|
| Days per hunter | | | |
| Duck | 4.5 | 3.7 | -18% |
| Quail | 14.5 | 0.8 | -94% |
| Deer | 6.8 | 6.4 | -6% |
| Animals per hunter | | | |
| Duck | 26.0 | 17.2 | -34% |
| Quail | 26.0 | 6.7 | -74% |
| Deer | 2.0 | 2.1 | 7% |

# 2 Survey method

**Key points**

A survey was used to gather statistically significant information about hunters' expenditure patterns.

The survey focussed on hunters: those who have a firearms licence for the purpose of "recreation", with the primary interest being game hunters, as the expenditure of this group is of interest to government policy makers. Primary producers and wildlife controllers who are not game hunters or who hold a firearms licence as part of a business requirement to reduce pest populations were excluded from the research. This survey covered all hunting in Victoria, regardless of the residency of the hunter; hunting by Victorians in other states or overseas was not covered.

The game licence database and hunting association memberships were used as sampling frames for the research. This provided good coverage of the population of game licence holders. Non-game licence holders were under-represented, but this was acceptable, given that the main focus of the research was on game hunting.

1,000 responses were gathered for the survey, with surveys conducted online and over the phone. Invitations to complete the online survey were emailed to game licence holders and association members.

Email addresses and phone numbers are not available for all game licence holders on the database. Those licence holders with email addresses and phone numbers are younger than the overall population. This is a potential source of bias.

## 2.1 Objectives of the survey

A survey was conducted to collect information about hunters' expenditure patterns. A survey was used (rather than interviews, for instance) as the intent of the project was to gather statistically significant information about the expenditure patterns of hunters in Victoria.

The primary objective of the survey was to collect robust information about hunting-related expenditure that then could be used to model the economic impact of recreational hunting in Victoria. To that end, the survey focussed on estimating two variables in particular: the total hunting expenditure in Victoria, and hunting expenditure in regions where hunting is a common recreational activity. The aim was to collect information of sufficient quality to be relied upon for policy making.

In addition to those variables, the survey also aimed to gather information about the impact of shocks to hunting that may affect opportunities to hunting (such as regulatory change, or climatic variation); the health and well-being benefits of hunting to individuals and communities; and the demographic profile of hunters.

## 2.2 Scope of this research

### 2.2.1 Hunters and other firearms licence holders

This research focused on "hunters"; those who have a firearms licence for the purpose of recreation. The research does not focus on farmers and wildlife controllers who have a

firearms licence as part of a commercial or business requirement to reduce pest populations. This section of the report explains the reason for this focus.

The overall intent of the project was to determine the contribution from hunting to the Victorian economy to inform the government's policy and operations. Hunters can be categorised into two groups:

- those who hunt game animals[1] and require a game licence (and may also hunt pest animals)
- those who do not hold a game licence and hunt exclusively non-game, introduced species, such as rabbits, foxes, pigs and so on.

Hunters create an economic benefit by purchasing hunting equipment and spending money while hunting in regional Victoria. The economic benefit of hunting is akin to tourism expenditure. Government can influence the expenditure of hunters through policy, and it is appropriate that their expenditure be included in the research and to estimate the economic impact of game hunting.

By contrast, while substantial economic value also may be created through the hunting of pest species in Victoria, this economic activity has less policy relevance because pest species are not actively managed for the purpose of hunting.

Other significant groups of firearms licence holders who undertake activities similar to hunters include:

- primary producers who shoot animals that threaten agricultural production, and
- professional wildlife controllers who are employed by Parks Victoria or local councils to control species that are environmental pests.

The economic impact of shooting by primary producers and professional wildlife controllers is of a different nature to that performed by hunters. This economic benefit is more appropriately expressed as the benefit of feral animal control, being a reduction of crop and livestock losses to producers, and the environmental benefits of reduced feral animal populations. Accordingly, these firearms licence holders were deemed to be out of scope for this research.

### 2.2.2 Residency of hunter

Victoria is open to hunting by residents of other states and international visitors who hold a valid Victorian game licence. It is also possible for Victorians to hunt in other states and countries. The primary aim of this research was to determine the economic impact of hunting in Victoria, particularly the economic impact in selected regional areas. For this purpose, we were interested in hunting in Victoria by hunters of any origin; the important factors are the level and destination of expenditure associated with hunting.

Because the primary focus of the survey was the economic impact of hunting within Victoria, particularly the geographic distribution of that impact, hunting outside Victoria by Victorians was out of the scope of the survey. This activity effectively represents an import into the

[1] Eight species of native duck, one species of native quail, a number of introduced game bird species and six species of introduced deer have been declared 'game' (under the *Wildlife Act 1975*) and have an open season.

Victorian economy,[2] and may be of policy and regulatory interest to the Victorian Government, and thus a worthwhile subject for future research.

## 2.3 Sampling frame

The majority of Victorian hunters have a firearms licence for the declared purpose of "recreational hunting".[3] Despite this, there is no channel to contact firearms licence holders directly, as the personal details on the firearms licence database are held confidential. Without being able to use the firearms licence database, it was necessary to look to different methods to contact respondents. These were provided by DEPI's game licence database and by hunting associations. Game licence holders agree at the time of purchasing their licence to being contacted for the purposes of research. During pre-survey interviews with hunting associations they agreed to facilitate distribution of the survey for the purpose of this research.

Victoria Police provided summary data of the numbers of firearms licence holders according to the 'genuine reason' provided for owning that firearm. This data show that there are 131,104 firearms licence holders who have indicated "recreational hunting" as their primary reason to own a firearm. This included anyone who held a firearm and hunted pest animals or game on private or public land.

There are 44,684 game licence holders in the DEPI game licence database.[4] The four major hunting associations collectively have approximately 53,000 members, most of whom are game hunters.

There was a small population of hunters who were not included in the 131,104 firearms licence holders – bow and crossbow hunters, who were not required to obtain a firearms licence. Some bow or crossbow hunters hunt game animals and therefore will have a game licence.

The relationship between the three populations (i.e., "hunting" firearms licence holders, hunting association members and game licence holders) is shown in Figure 2-1.

[2] Expenditure within Victoria will also have a (smaller) import component.
[3] Those who hunt with a bow or crossbow do not require a firearms licence.
[4] As at November 2013.

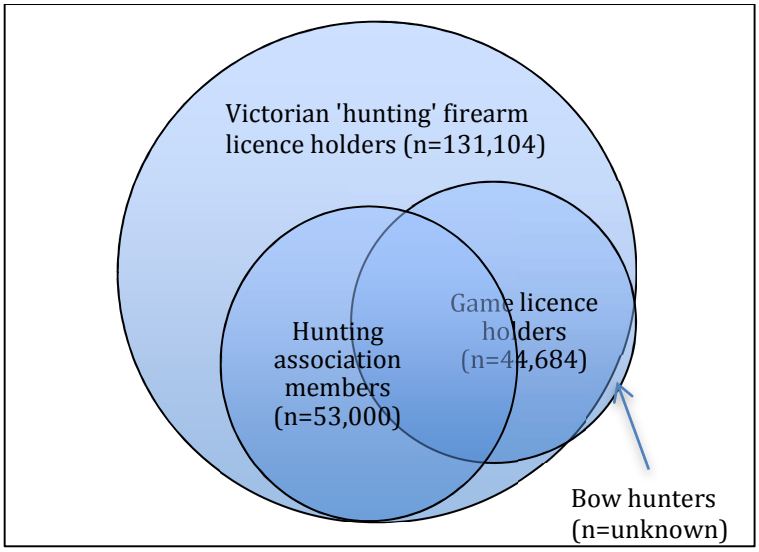


**Figure 2-1: Sampling frame for the survey**

Using the game licence database and hunting association memberships provides good coverage of the population of game licence holders. Reliance on these databases would mean limited coverage of hunters who do not have a game licence, and who hunt exclusively pest animals, but this is not problematic because the focus of the research is game hunters.

Interstate game hunters were sampled through the game licence database – interstate game hunters are required to obtain a Victorian game licence – as well as through hunting associations, which have national membership.

It is theoretically possible that an international hunter may be a member of a hunting association or have their email address registered on the game licence database and thus be included in the survey data, but the survey did not pick up any international hunters. However, the expenditure of international hunters was investigated through semi-structured interviews with hunting guides. Many international hunters hunt with guides, as guides give them ready access to hunting grounds that they may not have access to because of a lack of knowledge or time.

## 2.4 Number of respondents

The number of respondents was set with the goal of attaining robust data on the economic impact of hunting in those local government areas (LGAs) where hunting contributes significantly to the local economy.

Prior to the survey being implemented, it was difficult to know precisely what the target level of respondents should be, due to uncertainties regarding the geographic spread of trips. It was estimated that 1,000 responses would generate 800 trips across the 20 LGAs where 80 per cent of hunting occurs[5]. This would generate an average of 40 trips per LGA, and 10-15 in the least visited LGAs[6]. A target of 1,000 responses was set prior to survey implementation.

[5] Department of Environment and Primary Industries (various years) *Telephone survey of Victorian game licence holders* (unpublished data)
[6] DEPI (various years) *Telephone survey of Victorian game licence holders* (unpublished data)

## 2.5 Sampling process

### 2.5.1 Survey completion method

Online completion was preferred for its efficiency and was used as the primary method for the survey. The use of paper surveys was ruled out, as it could have delayed the project, given postage times and the need to separately type-set and print surveys.

Email addresses were available for a subset of the game licence database, and three of the hunting associations contacted had a readily accessible database of members' email addresses (Sporting Shooters Association of Australia, Field and Game Australia and the Australian Deer Association).

Telephone, or CATI (computer-assisted telephone interviewing) surveys also were used to contact game licence holders without a recorded email address, and to correct any bias associated with those members for whom an email address has been recorded.

The response numbers are shown in Table 2-1.

**Table 2-1: Survey response numbers**

| | Completion method | Respondents | Invites[7] |
|---|---|---|---|
| Game licence holders | Online | 206 | 765 |
| Hunting association members | Online | 525 | 3,459[8] |
| Game licence holders | Telephone | 263 | 532 |
| Total | | 994 | 4,756 |

A total of 44 completed survey responses were not used in the final data set. Seven of these were removed as they were duplicate responses or had internal inconsistencies in the responses. An additional 37 responses were not required.

Further investigation into survey data revealed six responses from hunters who live in Victoria but had not hunted in Victoria in the last 12 months and had hunted elsewhere (i.e., interstate). These responses were excluded from further analysis, as hunting outside Victoria by Victorians is outside of the scope of this study.

### 2.5.2 Sampling method and bias

Only 2% of game licence holders had an email address recorded in the game licence database. A potential problem with email notification, therefore, was that it may have been a unrepresentative selection of game licence holders. Email addresses on the game licence database were gathered through online contact with game licence holders; when an email address was supplied as a possible contact method, the address was recorded against that person's details on the licence holder database. This does not provide strong grounds for a conclusion that the population of licence holders with a recorded email address was

[7] For the phone survey this figure includes those cases where the respondent was reached (and either accepted the interview or refused, language barrier, abandoned, appointment), and excludes those where the respondent was unreachable (that is, answering machine, engaged, no answer). For the online survey, this figure excluded bounced emails. The exact number of bounced invitations from emails sent by hunting associations is not known thus a 10% bounce rate has been assumed.

[8] These is uncertainty regarding this figure, and therefore the total invites.

significantly different to the population without an email address. In terms of their observable characteristics, the population with email addresses was slightly younger (43 years old) than those without (45 years old). Any bias created by using email as the contact method was also reduced by supplementing the online survey with a telephone survey of those without email addresses, as well as weighting the data, as described in Section 4.4.1.

Telephone numbers were available for 67% (30,087) of licence holders on the database. As with the email sample there was a difference in average age between the two groups, with those for whom a telephone number was recorded being younger (43 years old) than those without (54 years old).

### 2.5.3 Increasing response rates

Response rates to the survey were maximised through the following devices:

- sending the invitation to complete the survey (for the hunting association member sample) from a trusted source – in this case hunting associations
- keeping the invitation email short
- sending the email invitations in batches, across different days, during peak email usage times
- sending reminder emails
- personalising the emails, through the use of a mail merge
- conducting telephone interviews across different days and times
- ensuring the survey was smooth-flowing, and reducing cognitive load, as much as possible. More salient questions were placed at the start of the survey as the perceived salience of the survey also assists in maximising response rates. Open-ended questions were not used.

### 2.5.4 Excess online responses

The email invitation was designed to minimise responses that exceeded the target of 735 online respondents, by sending the invitation in two batches. The first batch was issued to estimate response rates, with the number of recipients for the second batch set by that initial estimate, to achieve the desired number of responses.

This method was preferred over simply closing the survey once the desired number of responses was received.

# 3 Survey design and structure

**Key points**

The design of the survey was informed by interviews with hunting associations, as well as other, similar expenditure surveys on recreational fishing and tourism.

A list of possible expenditure items related to hunting was created and categorised into on-trip and off-trip expenditure. For items such as vehicles, boats, clothing etc. that could be used for other purposes, respondents were asked the proportion of that item used for hunting.

Respondents were asked about the total number of trips in Victoria for the year. The survey also asked them about their expenditure on one hunting trip. The selection of that trip was guided by two imperatives: reducing recall bias and ensuring a sufficient number of responses for expenditure relating to each target animal. Ideally, each respondent would be asked about their most recent trip, and this was the case for 55% of respondents. The remainder of respondents were asked about their most recent trip for a particular animal group, in order to ensure there was sufficient data to estimate expenditure related to each animal group.

## 3.1 Introduction

### 3.1.1 Intent of the survey

As with the method used to elicit survey responses, the design of the survey was driven by the overall intent: to capture information about the overall size and geographic distribution of the economic impact of hunting in Victoria.

The survey instrument is at Appendix 7.

### 3.1.2 Pre-survey research

To inform the design of the survey, the research team interviewed representatives from four hunting associations: Field and Game Australia, Sporting Shooters' Association Australia, Australian Deer Association and the Victorian Hound Hunting Association, as well as DEPI staff. The project team is grateful to those who assisted with the design of the survey. The survey also drew upon the design of other surveys:

- Recreational fishing survey, conducted by Fisheries Research and Development Corporation[9]
- National Visitor Survey, conducted by Tourism Research Australia[10]

[9] Fisheries Research and Development Corporation (2012) *Survey of the Social Aspects of Recreational Fishing in South Australia, 2012*
[10] Tourism Research Australia (2013) *National Visitors Survey*

## 3.2 Hunting expenditure

### 3.2.1 Game hunting methods

The methods and equipment that game hunters use will influence their expenditure. The majority of duck hunters wade, while others use boats or hunt from the shore or on dry land. Many duck hunters use gun dogs to locate and retrieve downed birds.

Deer are hunted primarily using two methods: stalking, where the hunter tracks the deer using signs such as scats, hoof imprints and tree rubs; and hound hunting, specific to Sambar Deer, where a team of hunters is positioned strategically around an area where scent-trailing hounds are used to trail and flush deer towards the hunters.

Stubble Quail and introduced game birds are hunted by either 'walking up', where hunters flush quail by walking through areas where they expect to encounter birds, or through the use of gundogs, to locate and flush birds, and to locate and retrieve downed birds.

### 3.2.2 Expenditure categories

Hunting expenditure was broadly categorised into two groups: off-trip expenditure (items purchased prior to going on a hunting trip) and on-trip expenditure (items purchased while on a hunting trip). This was also consistent with the categorisation of tourism expenditure in the National Visitor Survey.[11]

Hunting expenditure can be further categorised into expenditure on items that are used specifically for hunting, such as firearms, and items that could be used for other activities, such as vehicles.

This created four categories for expenditure, as shown in Table 3-1.

[11] http://www.tra.gov.au/aboutus/national-visitor-survey.html

**Table 3-1: Expenditure categorisation**

| | Off-trip expenditure | On-trip expenditure |
|---|---|---|
| **Hunting specific expenditure** | ▪ Firearms, bows and other firearm equipment<br>▪ Ammunition<br>▪ Licenses (game, firearm)<br>▪ Hunting dog expenses (e.g. dog purchases, training, food, veterinary expenses, registrations etc.)<br>▪ Training to support your hunting activities (e.g. target practice)<br>▪ Hunting club memberships<br>▪ Hunting clothing | ▪ Ammunition<br>▪ Hunting tours/package tour<br>▪ Other hunting equipment (e.g. decoys, clothing) |
| **General expenditure** | ▪ General hunting equipment (incl. knives, binoculars and safety equipment)<br>▪ Vehicles (e.g. purchased to enable hunting)<br>▪ Vehicle equipment/accessories<br>▪ Vehicle maintenance<br>▪ Boats<br>▪ Boat equipment/accessories<br>▪ Boat maintenance<br>▪ Camping equipment<br>▪ Photography equipment | ▪ Fuel<br>▪ Vehicle hire<br>▪ Vehicle repairs<br>▪ Long-distance transport (e.g. airline, train, coach fares)<br>▪ Taxis<br>▪ Accommodation<br>▪ Takeaways & restaurant meals<br>▪ Groceries etc. for self-catering at your accommodation<br>▪ Drinks, alcohol (not already reported above) for consumption at your accommodation |

Respondents were asked separately about their off-trip and on-trip expenditure. For on-trip expenditure respondents were asked about expenditure on one trip they undertook in the last 12 months.

For off-trip expenditure, respondents were asked about their entire off-trip expenditure for the last 12 months. Ideally, respondents would be asked about a shorter period to minimise recall bias. However, it is likely that off-trip expenditure has systematic seasonal fluctuations, increasing before and during the duck hunting season, for instance.

For the general expenditure, it was necessary to enquire about the proportion of that expenditure that was used for hunting.

## 3.3 Attaining a representative sample of target animal groups

To reduce recall error, where the accuracy of memory fades with time, the survey would ideally have targeted expenditure information from the respondent's last trip. However, because hunting activity is seasonal, such an approach may have meant that trips targeting certain animals would be under-represented in the data. This is particularly the case for duck and quail hunting trips, with the season for these animals ending in June, and this research being carried out in November. The most recent trip of many duck and quail hunters would have actually been hunting other animals, such as deer or pest animals. But it is important to have a sufficient sample for trips relating to each animal, as expenditure will differ according

to the target animal, with different animals located in different areas of the state, and the hunting techniques and expenses differing between animals.

As the survey progressed, the number of responses for different animals was monitored, with the number of responses for some animals being boosted by asking about a respondent's most recent trip *for a particular target animal.* For example, if the number of duck-related trips was lagging behind the target response rate relative to other hunted animals, a respondent who had a duck and deer licence was asked about his or her most recent duck hunting trip, which may not have been their most recent hunting trip. For 55% of survey respondents, the trip they were questioned about was their most recent trip.

Around 6 out of 10 hunters have a licence to hunt deer, duck and quail (an individual can be licensed to hunt more than one animal). However, DEPI's fortnightly telephone survey shows that hunters are roughly twice as likely to hunt deer or duck than quail. On this basis, it was assumed that the relative frequency of hunting of each of the three animals was approximately 2:2:1 for deer : duck : quail. This estimate is shown in Table 3-2.

**Table 3-2: Estimated hunting frequency by game animal groups**

| | Licence holders | Proportion of total | Likelihood of having hunted[12] | Implied hunting frequency |
|---|---|---|---|---|
| Deer | 27,186 | 61% | 23% | 38% |
| Duck | 25,317 | 57% | 25% | 39% |
| Quail | 28,245 | 63% | 13% | 23% |

These data allowed the survey data to be weighted. It also gave an indication of the desired response quantity for each animal, with the proportion of responses targeted so that the response from the survey approximated these proportions.

[12] As per the fortnightly telephone survey

# 4 Method used for the economic modelling

**Key points**

The approach used for economic modelling was an extended input-output model known as the RISE model (Regional Industry Structure and Employment). This method is suitable for estimating the economic contribution of an activity to a regional economy but, in itself, is not a direct policy or investment evaluation tool.

In order to prepare the survey data for modelling, the following processes were undertaken:

- data cleaning and adjustment from "purchasers' prices" to "basic values"
- sorting and attributing expenditure data by animal group and, for each animal group, by on-trip and off-trip categories
- extrapolating the sample data to the population, by using multiplication factors for the characteristics: age, animal group, hunting activity level and hunting association membership
- sorting the data spatially, by town, Local Government Area (LGA) and Regional Development Victoria (RDV) region.

The results were calculated for ABS local government areas, with a composite region created for Melbourne. Town estimates were also created by allocating economic impact to towns in proportion to expenditure estimates.

Due to the small number of responses from non-game licence holders (71) in relation to the non-game licence population (87,000), expenditure data from this population were considered too unreliable to use as input data for the economic impact model, and these data were not analysed and are not presented in this report. As such this report presents expenditure data related to game licence holders only.

## 4.1 General approach to economic impact assessment

The dominant framework for economic evaluation is based on cost benefit analysis, which is well suited to aiding decisions about whether a particular initiative or option to deliver an initiative is the better alternative over other options or 'doing nothing'.

This study is an economic impact assessment. Impact assessments are complimentary to evaluations, but not substitutable.[13] Economic impact analysis is concerned with measuring the impact or effect of a given stimulus on the economy in economic terms. Statements of impact assess the impacts associated with an initiative, and propose mitigation measures or, as in the case of this study, estimate the impacts of an existing activity. Unlike evaluations, their role is not to substantiate whether a particular activity, initiative or option to deliver an initiative is the better alternative over other options or 'doing nothing'.

Economic impact statements that are based on analyses such as input-output analysis should not be used as a sole justification for a particular course of action. They do not provide evaluative direction in terms of cost versus benefit; rather, they should be used as an input in an evaluation study. Techniques such as cost benefit analysis, which express the relationship between the benefits to society and the costs incurred as a result of the action, are more appropriate for providing information about return on investment, project viability and net benefit to society.

[13] See page 16 *Guidelines for the Evaluation of Public Sector Initiatives* and page 21 *Preparing Cabinet Submissions*

In contrast to cost benefit analysis, impact analysis provides information on the distribution of benefits and costs rather than providing an assessment of economic benefits required to justify a project. Importantly, techniques to measure economic impact, such as input-output analysis, do not consider explicitly the alternative uses of resources in the project and associated activities. Indeed, a particularly inefficient use of funds may show a greater impact due to its inefficiency.

In principle there can be net economic benefits attributable to employment distribution, flow-on effects and the regional incidence of economic impacts - benefits that normally would not be captured in a standard cost benefit analysis. For these reasons an impact analysis can be worthwhile in providing information that is complementary to a cost benefit analysis and thereby forms a component of a broader economic and social assessment.

The estimates of economic impact presented in this report are based on the use of an extension of the conventional input-output method. Over the past decade EconSearch has developed an extended input-output model known as the RISE model (Regional Industry Structure & Employment). These extensions have included the addition of population and unemployment "sectors", as well as capacity to analyse productivity and price change effects.

The RISE model provides a comprehensive economic framework that is extremely useful in the resource planning process, particularly for regional economic impact analysis. Recent applications of the model by EconSearch include assessment of seasonal and area closures for commercial and recreational fishing (EconSearch 2013b), marine park impact assessments (EconSearch 2012a), irrigation infrastructure investment impact assessments (EconSearch 2013c) and operational analysis of regional transport infrastructure (EconSearch 2012b).

The indicators used in impact analysis typically include expenditure, employment, household income and gross state/regional product (GSP/GRP) and these indicators are used in this report. Definitions of these indicators are provided in Section 4.3 below.

## 4.2 The RISE economic impact model

Input-output (I-O) models are widely used to assess the economic impact, including employment and gross regional product, of various economic policy instruments, such as infrastructure projects and programs. I-O models are available at the national, state and regional levels. The RISE model of the Victorian and regional economies, constructed by EconSearch (2013a), has the I-O model as its core. The RISE model is used within DEPI and models for Victoria, a selection of local government areas (LGA) and the Regional Development Victoria (RDV) regions were used in this assessment.

Using the RISE model (and input-output analysis in general) for estimation of regional economic impacts requires a great deal of information. The analyst needs to know the magnitude of various expenditures and where they occur (in this case, gathered from the survey described in Section 3). Also needed is information on how the sectors receiving this expenditure share their expenditures among the various sectors from whom they buy, and so on, for the further expenditure rounds.

In applying the RISE model to economic impact analysis, the standard procedure is to use survey data to determine the direct expenditures only. No attempt is made to pursue such inquiries on expenditure in subsequent rounds, not even, for example, to trace the effects in the regional economy on household expenditures by accommodation business employees on food, clothing, entertainment, and so on, as it is impracticable to measure these effects for an individual case.

The RISE model instead is based on a set of assumptions about constant and uniform proportions of expenditure. If households in general in the regional economy spend, for example, 13.3 per cent of their income on food, it is assumed that those working in accommodation establishments do likewise. Indeed, the effects of all expenditure rounds after the direct expenditure are calculated by using such standard proportions (i.e., multiplier calculations). Once a RISE model has been compiled, as they have been for Victoria, all non-metropolitan LGAs and RDV regions, simple mathematical procedures can be applied to derive multipliers for each sector in the economy.

The RISE model provides industry multipliers (in terms of employment, gross regional product (GRP) and household income), which are applied directly to expenditure estimates to formulate impact estimates. This approach makes implicit and generally simplifying assumptions about the operation of the economy but it has the benefit of being relatively simple and transparent.

## 4.3 Estimation of economic effects – key concepts

The primary focus in this report is on the concept of economic activity resulting from expenditure by hunters. The key economic activity indicators considered in this analysis are *expenditure, gross state/regional product*, *employment* and *household income*.

*Expenditure*: Expenditure is purely a measure of how much hunters spend, while hunting and at other times of the year. As some of the goods and services that hunters purchase are imported, or have an imported component, it is necessary to remove this expenditure to determine the local economic impact.

*Gross regional/state product (GRP/GSP)*: GRP/GSP is a measure of the contribution of an activity to the regional economy. GRP/GSP is measured as value of expenditure less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as the sum of household income, 'gross operating surplus and gross mixed income net of payments to owner managers' and 'taxes less subsidies on products and production'. It represents payments to the primary inputs of production (labour, capital and land). Using GRP as a measure of economic impact avoids the problem of double counting that may arise from using value of expenditure for this purpose.

*Employment*: Employment numbers usually are reported in full time equivalent (FTE) units. FTE is a way to measure a worker's involvement in a project. An FTE of 1.0 means that the person is equivalent to a full-time worker, while an FTE of 0.5 signals that the worker is only half-time. Typically, different scales are used to calibrate this number, depending on the type of industry and scope of the analysis, but the basic calculation is the total hours worked divided by average annual hours worked in full-time jobs.

*Household income*: Household income is a component of GRP/GSP and is a measure of wages and salaries paid in cash and in-kind, drawings by owner operators and other payments to labour including overtime payments, employer's superannuation contributions and income tax, but excluding payroll tax.

## 4.4 Data and assumptions

### 4.4.1 Processing the survey data

To estimate total annual expenditure by LGA (input data for economic impact model) from the survey commissioned for this project, the following data processing steps were undertaken:

1. data adjustment;
2. estimation of (on-trip and off-trip) expenditure of the survey sample by animal group (deer, duck, quail and non-indigenous gamebirds, pest animals (by game hunters), pest animals (by non-game hunters); and
3. extrapolation of expenditure from the survey sample to the population.

These steps are explained more fully below.

**Step 1: Data adjustment**

The following adjustments were made to the base data:

- Removal of six respondents' data that did not fit the analytical framework. These respondents lived in Victoria, did not hold a game hunting licence, and had hunted outside Victoria, but not within Victoria, in the last 12 months. It was assumed that their expenditures (being off-trip expenditures on hunting equipment) were not as a result of hunting in Victoria.
- Data cleaning. There were two instances where respondents gave inconsistent responses, where it was possible to identify and correct these instances without compromising the data. The first instance was where some respondents in choosing the location of their expenditure from five options (Melbourne, another town/city in Victoria other than Melbourne, interstate, overseas, unsure) chose "another town" and then, when asked to identify the location in Victoria, chose Melbourne. The data were cleaned by reallocating the misplaced Melbourne data from the regions to Melbourne. The second instance was where some respondents, in choosing the animals or ways in which they have been licensed to hunt in Victoria (S4a in the survey instrument, Appendix 7), identified the animal groups they hunted rather than all the animal groups they were endorsed to hunt (e.g. a licenced duck hunter will also be endorsed to hunt stubble quail and non-indigenous gamebirds). These data were adjusted according to the licence types.
- Data ranges converted to data values. There were a number of instances where the responses were given as ranges, where a value was required for the analysis. These instances were: Q4 (number of hunting trips per animal), Q18 (trip expenditure), Q21 (off-trip expenditure) and Q22 (proportion of expenditure accounted for by hunting) in the survey instrument (Appendix 7).

For Q4 and Q22 mid-point values were used to represent the data range. For Q18 (13 individual questions) and Q21 (18 individual questions) data values were estimated by fitting a polynomial function to the frequency distribution of responses for each individual question. The estimated polynomial function was used to calculate the data value for the range where the number of non-zero responses was sufficient (generally >100). Where the data allows (i.e. sufficient observations) it was thought that this method gives a better indication of what the real weighted average might be for the range than the crude mid-point. Under this method the estimated data point for a particular data range takes account of the number of responses for each data range (seven for most questions) and will reflect any tendency toward lower or upper values in the data range. For questions where the number of non-zero responses was not sufficient, the mid-point value was used.

**Step 2: Estimation of expenditure by animal group**

The estimation of on-trip expenditure is described below.

Survey data were collected about respondents' last trip expenditures, what animal group was mainly hunted on that trip and when that trip occurred. Data were also collected on the total number of hunting trips taken in Victoria in the last 12 months and the breakdown of those trips by main animal hunted. Expenditure data, from respondents' last trips, was extrapolated to all the trips respondents took, by animal group, in the last 12 months. Expenditures were adjusted using factors derived from average trip expenditure by animal group by time period from DEPI's 2012/13 phone survey of Victorian game licence holders.[14] Expenditures were excluded where they occurred outside Victoria.

Estimation of off-trip expenditure involved the following procedure.

Respondents' off-trip expenditure was distributed evenly[15] across the animal groups they were endorsed to hunt. Expenditure on items used for purposes other than hunting was adjusted by the proportion of use on hunting, as indicated by respondents (Q22 of the survey instrument, Appendix 7). Expenditures were excluded where they occurred outside Victoria.

Off-trip expenditure was apportioned to game species only, as it was assumed that equipment purchases were for the purpose of game hunting, with pest hunting being an opportunistic activity that capitalised on the existing equipment.

**Step 3: Extrapolation of expenditure from the sample to the population**

*Game hunters*

Information regarding the characteristics of the game hunting population was drawn from an extract of the Victorian game licence database provided by DEPI for this project. The data were analysed to estimate the number of game licence holders in each licence category for each age group as enumerated in the survey (see S2 of the survey instrument, Appendix 7). The game-hunting population was further split into active (i.e., have hunted in the last 12

[14] Data from the phone survey of Victorian Game Licence Holders for the 2013 season (duck and quail) or the 2012/13 season (deer) provided by DEPI for this project.

[15] Except expenditure categories 12 to 14, which related to boat expenditures. These expenditures were allocated to the duck animal group only.

months) and non-active hunters (i.e., have not hunted in the last 12 months). The estimates of the proportion of active hunters for each animal group reported in Game Victoria's (2011) annual mail survey of hunters were used to estimate the numbers of active and inactive hunters in the population.[16] The same estimates were calculated for the survey sample.

Analysis of the survey data found that respondents who indicated they were members of a hunting association were on average likely to have much higher expenditures than respondents who indicated that they were not members of a hunting association. Due to the manner in which this survey was conducted, this survey had a higher proportion of respondents who were members of hunting associations than was reported[17] in DEPI (2011).

Multiplication factors were determined for licence type by age group for each cohort of hunters with game licences (i.e., by animal group, active/inactive in the last 12 months and by hunting association membership), and applied to the sample data to estimate the total expenditure by the game hunting population.

To illustrate the adjustment process, the average expenditure by association membership cohort is provided in Table 4-1. As noted earlier, it was estimated that approximately 53 per cent[18] of licensed game hunters are members of a hunting association, whereas 91 per cent of those responding to this question in the survey (65 per cent of the total game hunting sample) indicated they held membership of at least one association. Association members revealed an average level of expenditure ($12,317) more than double that of non-member respondents ($5,030). Not all respondents indicated whether or not they hold membership of an association (28 per cent of the total game hunting sample) and the average expenditure for this group ($10,353) was slightly above the average overall ($9,307). The average for all game hunters has been weighted to take account of this member/non-member sample bias.

**Table 4-1: Average expenditure by hunting association membership**

| | Survey responses | Average expenditure/person/annum ($) | | |
|---|---|---|---|---|
| | (no.) | On Trip | Off Trip | Total |
| Association members | 600 | 6,911 | 5,405 | 12,317 |
| Association non-members | 61 | 2,823 | 2,208 | 5,030 |
| Association membership unknown | 262 | 6,317 | 4,036 | 10,353 |
| **All game hunters (scaled to population)** | | **5,367** | **3,940** | **9,307** |

Another bias evident in the sample is in the composition of active and inactive game hunters. It was estimated that approximately 63 per cent of licensed game hunters are active,[19] whereas almost 94 per cent of survey respondents indicated they had taken at least one game hunting trip in the 12 months prior to the survey. The average expenditures by active

[16] DEPI (2011) reported 87.2% of hunters licensed to hunt duck actively hunted during the 2011 duck season, 40.85 % of hunters licensed to hunt quail actively hunted during the 2011 quail season and 75.9% of hunters licensed to hunt deer actively hunted during the survey period of 1 July 2010 to 30 June 2011. Based on survey results for the three years to 2010/11, the overall proportion of active game hunters is 63%. The survey for the current study found that 94.9% of respondents who could hunt duck hunted in the past 12 months, 94.7% of respondents who could hunt quail hunted in the past 12 months and 94.2 and 99.9 per cent of respondents who could hunt deer by stalking or with hounds respectively hunted in the past 12 months.

[17] DEPI (2011) reported 55% of respondents were members of one or more hunting associations during 2010/11. The survey for the current study found that 65 per cent of respondents were members of one or more hunting associations, 7 per cent were not members of a hunting association and 28 per cent of respondents' hunting association membership was unknown.

[18] Average of 2008/09. 2009/10 and 2010/11 estimates of hunting association membership reported in DEPI (2011).

[19] Based on survey results (DEPI, 2011) for the three years to 2010/11.

and inactive members are illustrated in Table 4-2. While average annual expenditure by active game hunters ($13,542) is well above that of inactive hunters ($2,095), the average expenditure by inactive hunters is still significant. The average for all game hunters ($9,307) has been weighted to take account of this active/inactive sample bias.

**Table 4-2: Average expenditure by active and inactive game hunters**

| | Survey responses | Average expenditure/person/annum ($) | | |
|---|---|---|---|---|
| | (no.) | On Trip | Off Trip | Total |
| Active hunters | 865 | 8,518 | 5,024 | 13,542 |
| Inactive hunters | 58 | 0 | 2,095 | 2,095 |
| **All game hunters (scaled to population)** | | **5,367** | **3,940** | **9,307** |

*Non-game hunters*

Seventy-one respondents to the survey were members of a hunting association but did not hold a game licence (non-game hunters). The model allows this group to be analysed separately. Sample to population multiplication factors were determined, based on the following assumptions:

- There are approximately 87,000 non-game hunters in Victoria (i.e., 131,000 hunting firearms licences holders less approximately 44,000 licensed game hunters).
- Approximately 63 per cent are active (assuming the level of pest hunting activity is the same between the game hunting population as the non-game hunters' population).
- The age distribution of non-game hunters is the same as that of game-hunters.

However, because the non-game hunting sample (71) was very small in comparison with the non-game hunting population (87,000), the total expenditure data for the non-game hunting population were considered too unreliable to use as input data for the economic impact model, and these data were not analysed and are not presented in this report.

### 4.4.2 Geography used for the analysis

This analysis required estimation of economic impacts for the top 20 regions by expenditure by animal group in Victoria. A composite region for Melbourne was used that covered the metropolitan local government areas (LGAs) as detailed in Table 4-3. The remaining 19 regions were chosen out of the 48 non-metropolitan LGAs and were selected based on the estimated total expenditure occurring in that LGA from the survey for the current study. The selected regions (Melbourne and the non-metropolitan LGAs) for each animal group are detailed in Table 4-4.

The Melbourne region plus ten LGAs (Baw Baw, East Gippsland, Greater Bendigo, Greater Geelong, Greater Shepparton, Latrobe, Mansfield, Mitchell, Wellington and Wodonga) were common to each of the lists in Table 4-4. A further 25 LGAs were included on at least one of the lists. Horsham and Loddon, for example, were included only on the duck list whereas Ballarat, Wangaratta and Warrnambool were included on all lists except that for pest animals.

For each animal group the top 20 regions by expenditure accounted for the majority of total expenditure for the animal group. As noted earlier, the expenditure for pest animals was comprised of on-trip expenditure only as it was not possible to attribute off-trip expenditure to

this group. For pest animals the top 20 regions accounted for 88 per cent of total expenditure. For deer the corresponding figure was 96 per cent, for duck it was 93 per cent and for quail 96 per cent. Overall the top 20 regions accounted for 91 per cent of total expenditure.

**Table 4-3: Melbourne region defined by LGA**

| Region Name | LGA |
|---|---|
| Melbourne | Banyule (C) |
| | Bayside (C) |
| | Boroondara (C) |
| | Brimbank (C) |
| | Cardinia (S) |
| | Casey (C) |
| | Darebin (C) |
| | Frankston (C) |
| | Glen Eira (C) |
| | Greater Dandenong (C) |
| | Hobsons Bay (C) |
| | Hume (C) |
| | Kingston (C) |
| | Knox (C) |
| | Manningham (C) |
| | Maribyrnong (C) |
| | Maroondah (C) |
| | Melbourne (C) |
| | Melton (S) |
| | Monash (C) |
| | Moonee Valley (C) |
| | Moreland (C) |
| | Mornington Peninsula (S) |
| | Nillumbik (S) |
| | Port Phillip (C) |
| | Stonnington (C) |
| | Whitehorse (C) |
| | Whittlesea (C) |
| | Wyndham (C) |
| | Yarra (C) |
| | Yarra Ranges (S) |

Note: C = city and S = shire.

**Table 4-4: High expenditure LGAs [a] selected for the analysis, by animal group**

| Deer | Duck | Quail | Pest Animal | Total |
|---|---|---|---|---|
| Alpine | Ballarat | Ballarat | Baw Baw | Alpine |
| Ballarat | Baw Baw | Bass Coast | Campaspe | Ballarat |
| Bass Coast | Buloke | Buloke | East Gippsland | Baw Baw |
| Baw Baw | Campaspe | Campaspe | Gannawarra | Campaspe |
| Benalla | Colac-Otway | Colac-Otway | Golden Plains | East Gippsland |
| East Gippsland | East Gippsland | East Gippsland | Greater Bendigo | Gannawarra |
| Gannawarra | Gannawarra | Gannawarra | Greater Geelong | Golden Plains |
| Greater Bendigo | Greater Bendigo | Greater Bendigo | Greater Shepparton | Greater Bendigo |
| Greater Geelong | Greater Geelong | Greater Geelong | Latrobe | Greater Geelong |
| Greater Shepparton | Greater Shepparton | Greater Shepparton | Macedon Ranges | Greater Shepparton |
| Latrobe | Horsham | Horsham | Mansfield | Latrobe |
| Mansfield | Latrobe | Latrobe | Melbourne | Macedon Ranges |
| Melbourne | Loddon | Melbourne | Mildura | Mansfield |
| Mitchell | Melbourne | Mildura | Mitchell | Melbourne |
| Murrindindi | Mitchell | Mitchell | Moira | Mildura |
| Towong | Moira | Southern Grampians | Moorabool | Mitchell |
| Wangaratta | Swan Hill | Wangaratta | Murrindindi | Murrindindi |
| Warrnambool | Wangaratta | Wellington | Southern Grampians | Wangaratta |
| Wellington | Wellington | Wodonga | Wellington | Wellington |
| Wodonga | Wodonga | Yarriambiack | Wodonga | Wodonga |

[a] Includes Melbourne region as defined in Table 4-3.

### 4.4.3 Final demand profile

The following method and data sources were used to estimate a profile of expenditure by hunters in the regions for 2013. In economic modelling terms this expenditure by hunters is referred to as final demand. When the expenditure is disaggregated by industry sector (retail, restaurants, accommodation, etc.) it is referred to as a final demand profile. The approach outlined below was necessary to convert the processed expenditure data from the survey, which is recorded in "purchasers' prices", into a format that can be used in the economic modelling referred to as "basic prices". For modelling the economic impact of expenditure by hunters the data needs to be transformed to a final demand profile in basic prices.

A significant adjustment to the base data (i.e. the processed data as described in Section 4.4.1) was the conversion of the expenditure estimates from purchasers' (i.e., what hunters pay) to basic prices (i.e., what producers, service providers and other businesses receive). This involved the reallocation of net taxes (taxes minus subsidies) and marketing and transport margins to make the data consistent with accounting conventions used in the RISE model (see Section 4.2). Purchasers' to basic price ratios were derived from ABS (2013, Table 9). This process ensured that margins, such as retail and transport margins, are allocated to the appropriate sectors, taxes are properly identified and that regional imports are not included as part of the regional economic impact estimation process.

The final adjustment to the base data was the allocation of the expenditure data in basic prices to the relevant input-output sectors (75 intermediate sectors, other value added or imports) in which the expenditure occurred, thus compiling a profile of sales to final demand. This process was undertaken for each animal group (deer (stalking and hound), duck, quail

(stubble quail and non-indigenous game birds) and pest animals) and the results aggregated to form a single final demand profile by LGA.

### 4.4.4 Allocating economic impact to key towns

In the survey, location data were collected for each expenditure item. The locations were based on 2011 postcodes and locations (ABS 2012). This enabled expenditures to be allocated to LGA and RDV regions using ABS correspondences (ABS 2012). As discussed in Section 4.2, the economic impacts were modelled at the LGA and RDV region scale.

Economic impact models (RISE models) were available at the LGA level only, not at a town level. To estimate the economic impacts for the key towns, a simple two-step process was used. First, the expenditure in each town was calculated as a proportion of total expenditure in the LGA in which the town is located. Second, this calculated proportion was applied to the total economic impact (GRP and employment) calculated for that LGA to impute the economic impact at the town level.

Given this imputation process, the results presented in Section 5.1.2 (Expenditure by key towns) and 5.2.3 should be treated as indicative rather than precise estimates. Furthermore, the expenditure allocation process, necessitated by the questionnaire format, means that expenditure estimates for some locations, particularly for smaller towns, may be overstated. Expenditure on some on-trip items was attributed solely to the respondent's destination town which means for a small town destination there is a high likelihood that some of those items would be purchased in larger nearby centres with total expenditure in the smaller town thereby overstated.

# 5 Economic impact of hunting in Victoria

**Key points**

The total expenditure for hunting game animals was estimated to be $282 million. When pest hunting by game licence holders is included the estimate is $417 million. 42% was on off-trip expenditure items and 58% on on-trip expenditure items. 40% of expenditure occurred in metropolitan local government areas (LGAs) and 60% in regional Victoria.

Direct Gross State Product (GSP) impact of game hunting by game-licence holders in 2013 (including game animal groups, deer, duck and quail) was estimated to be $118 million, with flow-on effects of $177 million, giving a total contribution to gross state product of $295 million. There were an estimated 1,115 jobs (full-time equivalent) generated directly by hunting-related expenditure with a further 1,268 jobs stemming from flow-on employment, giving a total employment impact of 2,382 jobs. When pest hunting (by game licence holders) is included, that is, to give the economic impact of all hunting by game licence holders, the direct impact is $177 million, flow-on impact of $262 million, with a total impact of $439 million.

In terms of direct GSP impact of the different animal groups, pest animal hunting is the most significant ($59 million), followed by deer ($57 million), duck ($43 million), and quail ($18 million).

At $439 million including flow-on effects, the economic impact of hunting activity by game licence holders was estimated to make up 0.13% of the Victorian economy. Hunting activity is concentrated in certain areas, with the highest concentration of hunting being Mansfield local government area (LGA) where hunting accounts for 2.5% of the LGA's economy. Hunting was also economically significant in Murrindindi and Gannawarra LGAs where it makes up 1.2% and 1.6% of their economies respectively.

Total hunting-related expenditure by game licence holders in the top 20 towns was estimated to be $135 million, which accounts for 54 per cent of total non-metropolitan hunting-related expenditure by game licence holders ($250 million).

A large proportion of economic activity occurs in the Melbourne region. Among the RDV regions, the largest impacts were estimated for the Gippsland Region where hunting expenditure of $76 million generated direct Gross Regional Product (GRP) of $28 million and direct full-time equivalent (FTE) employment of 267.

The estimate of expenditure related to game hunting of $282m is significantly higher than a previous estimate derived from the 2006/07 mail survey of hunters conducted by DEPI which, when inflated to 2013 dollars and the 2013 population of game licence holders, would be $130 million. The method used for the respective surveys differs markedly, the main difference being that the 2006/07 survey, having limited space, asked hunters to estimate their average annual expenditure in one question, whereas this survey was dedicated to expenditure and was able to separate out the various components of expenditure into number of trips, expenditure per trip and expenditure categories. This reduces the possibility of recall bias, and the risk that hunters will omit their expenditure on certain items. Additionally, the 2006/07 survey was conducted in a year with no duck season, requiring hunters to recall their duck hunting expenditure from greater than one year previously.

## 5.1 Expenditure

### 5.1.1 Expenditure by on-trip and off-trip items

Details of total on-trip and off-trip expenditure in Victoria, by animal group, are provided in Table 5-1. Total expenditure across all animal groups was estimated to be $416.9 million, 58 per cent ($240.4m) of which was on on-trip items and 42 per cent ($176.5m) on off-trip items. Of the off-trip expenditure, the main categories were vehicles ($57.7m), firearms ($30.6m) and vehicle accessories ($14.2m). Fuel ($61.1m), ammunition ($34.0m), groceries ($33.1m) and other hunting equipment ($32.0m) were the main on-trip expenses.

**Table 5-1: Expenditure by on-trip and off-trip items, Victoria, by animal group ($m)**

| | Deer | Duck | Quail | Pest Animal | Total |
|---|---|---|---|---|---|
| **On-trip Expenditure** | | | | | |
| Fuel | 16.2 | 10.6 | 1.1 | 33.2 | 61.1 |
| Vehicle hire | 0.2 | 0.1 | 0.0 | 1.0 | 1.3 |
| Vehicle repairs | 4.3 | 1.7 | 0.1 | 7.6 | 13.7 |
| Long-distance transport | 0.1 | 0.1 | 0.0 | 0.1 | 0.3 |
| Taxis | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Accommodation | 3.0 | 2.4 | 0.3 | 8.0 | 13.7 |
| Takeaways & restaurant meals | 5.1 | 3.9 | 0.4 | 12.9 | 22.3 |
| Groceries etc. for self-catering | 7.7 | 6.7 | 0.5 | 18.1 | 33.1 |
| Drinks, alcohol (not reported above) | 5.3 | 5.3 | 0.4 | 10.8 | 21.9 |
| Ammunition | 5.1 | 8.1 | 0.7 | 20.2 | 34.0 |
| Hunting tours/package tour | 0.9 | 0.1 | 0.0 | 1.7 | 2.7 |
| Other hunting equipment | 6.1 | 6.3 | 0.5 | 19.2 | 32.0 |
| Other | 1.2 | 0.5 | 0.1 | 2.4 | 4.2 |
| **Total On-trip Expenditure** | **55.3** | **45.9** | **4.1** | **135.1** | **240.4** |
| **Off-trip Expenditure** | | | | | |
| Firearms, bows, other firearms | 16.5 | 7.8 | 6.4 | 0.0 | 30.6 |
| Ammunition | 3.8 | 4.1 | 4.9 | 0.0 | 12.8 |
| Licenses (game, firearm) | 2.2 | 1.6 | 2.6 | 0.0 | 6.4 |
| Hunting dog expenses | 3.0 | 2.0 | 2.0 | 0.0 | 7.1 |
| Training (hunting related) | 1.7 | 2.3 | 1.9 | 0.0 | 6.0 |
| Hunting club memberships | 1.1 | 0.7 | 0.6 | 0.0 | 2.4 |
| Hunting clothing | 2.6 | 1.6 | 1.3 | 0.0 | 5.5 |
| General hunting equipment | 4.3 | 1.4 | 1.1 | 0.0 | 6.8 |
| Vehicles (for hunting) | 29.3 | 14.2 | 14.2 | 0.0 | 57.7 |
| Vehicle equipment/accessories | 8.8 | 3.3 | 2.1 | 0.0 | 14.2 |
| Vehicle maintenance | 3.5 | 1.4 | 1.1 | 0.0 | 5.9 |
| Boats | 0.0 | 6.2 | 0.0 | 0.0 | 6.2 |
| Boat equipment/accessories | 0.0 | 2.3 | 0.0 | 0.0 | 2.3 |
| Boat maintenance | 0.0 | 2.1 | 0.0 | 0.0 | 2.1 |
| Camping equipment | 4.3 | 1.9 | 1.5 | 0.0 | 7.7 |
| Photography equipment | 1.2 | 0.4 | 0.4 | 0.0 | 2.0 |
| Other | 0.7 | 0.1 | 0.0 | 0.0 | 0.8 |
| **Total Off-trip Expenditure** | **83.0** | **53.5** | **40.0** | **0.0** | **176.5** |
| **Total Expenditure** | **138.3** | **99.4** | **44.1** | **135.1** | **416.9** |

As explained in Section 4.4.1 (Step 2), off-trip expenditure was apportioned to game species only, as it was assumed that equipment purchases were for the purpose of game hunting, with pest hunting being an opportunistic activity that capitalised on the existing equipment.

Alternative approaches to apportioning off-trip expenditures (e.g. allocating according to number of trips per main animal group hunted by the respondent) could not be applied consistently across both active and inactive hunters.

### 5.1.2 Expenditure by LGA

Details of expenditure by local government area (LGA) by animal group are provided in Table 5-2. Total expenditure across all LGAs was estimated to be $416.9 million, 40 per cent ($166.6m) of which was spent in the Melbourne region and 60 per cent ($250.3m) in the non-metropolitan LGAs. Of the non-metropolitan LGAs, the largest expenditures occurred in Wellington ($25.8m), Latrobe ($18.5m), Baw Baw ($16.8m), Greater Bendigo ($16.5m) and Mansfield ($14.6m).

Expenditure associated with deer hunting was estimated to be highest among the four animal groups ($138.3m), accounting for 33 per cent of total expenditure. 48 per cent was spent in the Melbourne region ($65.7m). Among the non-metropolitan LGAs, the largest expenditures occurred in Wellington ($9.0m), Mitchell ($8.1m), Mansfield ($7.5m), Latrobe ($6.6m) and Baw Baw ($5.1m).

Duck hunting accounts for 24 per cent or $99.4 million of total Victorian hunting expenditure. The Melbourne region accounted for 39 per cent of the total ($38.5m), followed by Greater Bendigo ($8.4m), Greater Geelong ($7.6m), Wellington ($7.5m), Latrobe ($4.8m) and Greater Shepparton ($4.6m).

Hunting quail and other indigenous game bird species accounts for 11 per cent of total expenditure ($44.1m). The Melbourne region accounted for 69 per cent of the total ($30.3m), followed by Latrobe ($2.3m), Greater Geelong ($2.1m), Greater Shepparton ($1.6m), Greater Bendigo ($1.6m) and Wellington ($0.6m).

Expenditure on hunting for pest animals comprised 32 per cent of the total ($135.1m), although this included on-trip expenses only and therefore was likely to understate the true figure. Unlike the other animal groups, expenditure on pest animal hunting in Melbourne accounted for only around one-quarter of the total pest hunting expenditure ($32.1m), as pest-hunting expenditure only included on-trip expenditure, a higher proportion of which was spent at the hunting destination than off-trip expenditure. Expenditure across the non-metropolitan LGAs was more evenly distributed than in the other animal groups with 7.5 per cent of the total in Baw Baw ($10.1m), 6.5 per cent in Wellington ($8.8m), 4.9 per cent in Mansfield ($6.6m), 4.5 per cent in Gannawarra ($6.1m) and 4.5 per cent in Macedon Ranges ($6.1m).

Aggregated across all animal groups, the Melbourne region and the 19 non-metropolitan LGAs where highest expenditure occurred accounted for 90 per cent of the total. The ten LGAs with the lowest expenditure (Mount Alexander, Central Goldfields, Surf Coast, West Wimmera, Hepburn, Pyrenees, Hindmarsh, Glenelg, Unincorporated Victoria and Queenscliffe) accounted for $2.9 million in hunting-related expenditure in aggregate, which is just 0.7 per cent of the total.

### Expenditure by key towns

Details of hunting expenditure by key non-metropolitan towns and regional cities for all animal groups are provided in Table 5-3. These data should be treated with caution as the expenditure allocation process, necessitated by the questionnaire format, means that expenditure estimates for some locations, particularly for smaller towns, may be overstated. Expenditure on some on-trip items (accommodation, groceries, etc.) was attributed solely to the respondent's destination town which means for a small town destination like Rosedale, for example, there is a high likelihood that some of those items would be purchased in larger nearby centres, such as Traralgon (25 km away) and Sale (30km), with total expenditure in Rosedale thereby overstated.

There were a total of 56 towns in which hunting expenditure was estimated to be $1 million or more. In three towns/cities, Traralgon, Rosedale and Mansfield expenditure was estimated to be more than $10 million. In a further eight towns/cities expenditure was estimated to be between $5 million and $10 million. Expenditure by town by individual animal groups is provided in Appendix 4.

**Table 5-2: Expenditure by LGAs and Melbourne region, by animal group ($m)**

| LGA | Deer | Duck | Quail | Pest Animals | Total |
|---|---|---|---|---|---|
| Alpine | 2.3 | 0.1 | 0.0 | 1.3 | 3.8 |
| Ararat | 0.1 | 0.4 | 0.1 | 0.5 | 1.1 |
| Ballarat | 2.7 | 1.2 | 0.4 | 0.3 | 4.7 |
| Bass Coast | 1.5 | 0.2 | 0.2 | 0.5 | 2.4 |
| Baw Baw | 5.1 | 1.5 | 0.1 | 10.1 | 16.8 |
| Benalla | 0.7 | 0.1 | 0.1 | 1.3 | 2.2 |
| Buloke | 0.1 | 0.9 | 0.5 | 1.3 | 2.7 |
| Campaspe | 0.2 | 1.4 | 0.3 | 4.0 | 5.9 |
| Central Goldfields | 0.1 | 0.2 | 0.1 | 0.2 | 0.5 |
| Colac-Otway | 0.3 | 2.0 | 0.3 | 0.5 | 3.1 |
| Corangamite | 0.6 | 0.2 | 0.1 | 0.1 | 0.9 |
| East Gippsland | 5.1 | 2.4 | 0.5 | 2.9 | 10.9 |
| Gannawarra | 0.8 | 3.3 | 0.2 | 6.1 | 10.4 |
| Glenelg | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| Golden Plains | 0.0 | 0.4 | 0.1 | 4.9 | 5.4 |
| Greater Bendigo | 0.9 | 8.4 | 1.6 | 5.6 | 16.5 |
| Greater Geelong | 1.6 | 7.6 | 2.1 | 2.1 | 13.5 |
| Greater Shepparton | 2.4 | 4.6 | 1.6 | 5.4 | 14.0 |
| Hepburn | 0.0 | 0.2 | 0.0 | 0.1 | 0.3 |
| Hindmarsh | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 |
| Horsham | 0.3 | 1.0 | 0.4 | 0.7 | 2.4 |
| Indigo | 0.6 | 0.1 | 0.0 | 0.1 | 0.7 |
| Latrobe | 6.6 | 4.8 | 2.3 | 4.9 | 18.5 |
| Loddon | 0.0 | 2.8 | 0.1 | 0.5 | 3.4 |
| Macedon Ranges | 0.5 | 0.2 | 0.1 | 6.1 | 6.8 |
| Mansfield | 7.5 | 0.4 | 0.1 | 6.6 | 14.6 |
| Melbourne | 65.7 | 38.5 | 30.3 | 32.1 | 166.6 |
| Mildura | 0.3 | 0.5 | 0.1 | 4.0 | 5.0 |
| Mitchell | 8.1 | 0.6 | 0.2 | 3.6 | 12.4 |
| Moira | 0.1 | 0.6 | 0.1 | 1.4 | 2.2 |
| Moorabool | 0.1 | 0.0 | 0.0 | 1.5 | 1.7 |
| Mount Alexander | 0.1 | 0.2 | 0.0 | 0.4 | 0.7 |
| Moyne | 0.0 | 0.4 | 0.0 | 0.3 | 0.7 |
| Murrindindi | 3.9 | 0.3 | 0.0 | 6.0 | 10.2 |
| Northern Grampians | 0.3 | 0.5 | 0.1 | 0.7 | 1.7 |
| Pyrenees | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 |
| Queenscliffe | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| South Gippsland | 0.5 | 0.2 | 0.0 | 0.9 | 1.6 |
| Southern Grampians | 0.7 | 0.5 | 0.2 | 1.6 | 3.0 |
| Strathbogie | 0.5 | 0.5 | 0.1 | 0.8 | 1.9 |
| Surf Coast | 0.0 | 0.2 | 0.1 | 0.2 | 0.5 |
| Swan Hill | 0.2 | 1.5 | 0.1 | 0.6 | 2.2 |
| Towong | 1.5 | 0.0 | 0.0 | 1.1 | 2.5 |
| Unincorporated Vic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Wangaratta | 2.3 | 1.6 | 0.5 | 1.3 | 5.7 |
| Warrnambool | 0.8 | 0.1 | 0.1 | 0.1 | 1.2 |
| Wellington | 9.0 | 7.5 | 0.6 | 8.8 | 25.8 |
| West Wimmera | 0.0 | 0.1 | 0.0 | 0.2 | 0.3 |
| Wodonga | 3.8 | 1.2 | 0.2 | 3.1 | 8.4 |
| Yarriambiack | 0.2 | 0.3 | 0.1 | 0.1 | 0.7 |
| **Total** | **138.3** | **99.4** | **44.1** | **135.1** | **416.9** |

**Table 5-3: Towns with hunting expenditure of $1 million or more, all animal group**

| Town | LGA | Expenditure ($m) | Percentage of LGA Total |
|---|---|---|---|
| TRARALGON | Latrobe (C) | 13.2 | 72% |
| ROSEDALE | Wellington (S) | 11.7 | 46% |
| MANSFIELD | Mansfield (S) | 10.9 | 75% |
| GEELONG | Greater Geelong (C) | 9.5 | 67% |
| KERANG | Gannawarra (S) | 8.9 | 88% |
| WODONGA | Wodonga (RC) | 8.4 | 99% |
| BARNADOWN | Greater Bendigo (C) | 8.1 | 47% |
| SHEPPARTON | Greater Shepparton (C) | 8.1 | 58% |
| ALEXANDRA | Murrindindi (S) | 6.3 | 63% |
| BAIRNSDALE | East Gippsland (S) | 5.6 | 51% |
| DRIFFIELD | Baw Baw (S) | 5.5 | 33% |
| WANGARATTA | Wangaratta (RC) | 4.7 | 82% |
| BALLARAT | Ballarat (C) | 4.6 | 90% |
| STRATHDALE | Greater Bendigo (C) | 4.6 | 27% |
| HILL END | Baw Baw (S) | 4.4 | 26% |
| SEYMOUR | Mitchell (S) | 4.3 | 35% |
| BEVERIDGE | Mitchell (S) | 4.2 | 34% |
| MERRINEE | Mildura (RC) | 4.0 | 80% |
| INVERLEIGH | Golden Plains (S) | 4.0 | 74% |
| MARYVALE | Latrobe (C) | 3.5 | 19% |
| COWA | Wellington (S) | 3.3 | 13% |
| ROCHESTER | Campaspe (S) | 3.3 | 57% |
| BENDIGO | Greater Bendigo (C) | 2.6 | 15% |
| LOCH SPORT | Wellington (S) | 2.3 | 9% |
| KIALLA | Greater Shepparton (C) | 2.3 | 16% |
| TAMLEUGH | Greater Shepparton (C) | 2.2 | 16% |
| ROMSEY | Macedon Ranges (S) | 2.2 | 34% |
| JALLUMBA | Horsham (RC) | 2.1 | 92% |
| GRITJURK | Southern Grampians (S) | 2.1 | 75% |
| KILMORE | Mitchell (S) | 2.1 | 17% |
| HIGHTON | Greater Geelong (C) | 2.1 | 15% |
| CULGOA | Buloke (S) | 2.0 | 84% |
| SWAN HILL PIONEER | Swan Hill (RC) | 2.0 | 94% |
| GLENMAGGIE | Wellington (S) | 1.8 | 7% |
| ERICA | Baw Baw (S) | 1.8 | 11% |
| BRIGHT | Alpine (S) | 1.7 | 46% |
| ECHUCA | Campaspe (S) | 1.6 | 27% |
| YEA | Murrindindi (S) | 1.6 | 16% |
| BARRAPORT | Loddon (S) | 1.5 | 45% |
| CHAPPLE VALE | Colac-Otway (S) | 1.5 | 46% |
| BENALLA | Benalla (RC) | 1.4 | 65% |
| LAKE TYERS | East Gippsland (S) | 1.4 | 13% |
| MOUNT ALFRED | Towong (S) | 1.4 | 55% |
| JACK RIVER | Wellington (S) | 1.3 | 5% |
| WOODEND | Macedon Ranges (S) | 1.3 | 20% |
| WARRAGUL | Baw Baw (S) | 1.3 | 8% |
| STRATFORD | Wellington (S) | 1.3 | 5% |
| LANCEFIELD | Macedon Ranges (S) | 1.2 | 19% |
| KYNETON | Macedon Ranges (S) | 1.2 | 19% |
| WARRNAMBOOL | Warrnambool (C) | 1.2 | 100% |
| YARRAM | Wellington (S) | 1.2 | 5% |
| ST ARNAUD | Northern Grampians (S) | 1.2 | 72% |
| BONNIE DOON | Mansfield (S) | 1.2 | 8% |
| BIDDLES BEACH | Colac-Otway (S) | 1.2 | 36% |
| PYRAMID HILL | Loddon (S) | 1.1 | 32% |
| MT BEAUTY | Alpine (S) | 1.0 | 26% |

### Expenditure by RDV regions

Details of expenditure by Regional Development Victoria (RDV) regions by animal group are provided in Table 5-4. As noted above, 40 per cent ($166.6m) of the total was spent in the Melbourne region and 60 per cent ($250.3m) in non-metropolitan Victoria. Among the RDV regions, the largest expenditures occurred in Gippsland ($76.0m), Loddon Mallee South ($27.9m), Central Hume ($26.3m), Loddon Mallee North ($26.2m), Lower Hume ($22.6m) and Goulburn Valley ($18.1m).

While the Gippsland RDV region accounted for the largest expenditure (outside Melbourne) across all animal groups, the region with the next largest expenditure was different for each animal group, namely Central Hume for deer ($12.8m), Lower Mallee South for duck ($11.7m), G21 for quail ($2.5m) and Loddon Mallee North for pest animals ($16.0m).

**Table 5-4: Expenditure by RDV regions, by animal group**

| RDV Region | Deer | Duck | Quail | Pest Animals | Total |
|---|---|---|---|---|---|
| Central Highlands | 3.0 | 2.2 | 0.6 | 7.6 | 13.4 |
| Central Hume | 12.8 | 2.3 | 0.7 | 10.5 | 26.3 |
| G21 | 2.0 | 9.8 | 2.5 | 2.8 | 17.2 |
| Gippsland | 27.9 | 16.4 | 3.7 | 28.0 | 76.0 |
| Goulburn Valley | 3.0 | 5.6 | 1.8 | 7.7 | 18.1 |
| Great South Coast | 2.1 | 1.2 | 0.5 | 2.1 | 5.8 |
| Loddon Mallee North | 1.5 | 7.5 | 1.1 | 16.0 | 26.2 |
| Loddon Mallee South | 1.6 | 11.7 | 1.8 | 12.8 | 27.9 |
| Lower Hume | 12.0 | 0.9 | 0.2 | 9.6 | 22.6 |
| Melbourne | 65.7 | 38.5 | 30.3 | 32.1 | 166.6 |
| Upper Hume | 5.9 | 1.3 | 0.2 | 4.3 | 11.6 |
| Wimmera Southern Mallee | 0.8 | 2.1 | 0.6 | 1.7 | 5.2 |
| **Total** | **138.3** | **99.4** | **44.1** | **135.1** | **416.9** |

## 5.2 Economic Impacts

The results presented below separate the estimated impacts into two categories; direct and flow-on impacts. The direct impacts are simply those associated with the direct expenditures. Typically these will include impacts (employment, GSP, etc.) in the retail sector (e.g. groceries, ammunition, fuel), accommodation businesses (e.g. hotels, motels, caravan parks) and manufacturing industry (e.g. hunting equipment and accessories). The flow-on impacts are the effects of all expenditure rounds after the direct expenditure, such as the employment and GSP in the businesses that support and supply the retail, accommodation and manufacturing companies. The flow-on impacts are the estimated multiplier effects.

### 5.2.1 Summary of economic impacts for Victoria

The economic impact of hunting in Victoria by licensed game hunters is summarised in Table 5-5. Expenditure reported in the first column of figures drives the outcomes reported under GRP and employment.

**Table 5-5: Summary economic impact of hunting, Victoria, by animal group, 2013**

| | Expenditure | | Gross State Product ($m) | | | Employment (fte) | | |
|---|---|---|---|---|---|---|---|---|
| Species | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total |
| Deer | 138.3 | 33% | 57.2 | 84.8 | 142.1 | 531 | 608 | 1,140 |
| Duck | 99.4 | 24% | 42.5 | 63.8 | 106.3 | 399 | 458 | 857 |
| Quail | 44.1 | 11% | 18.2 | 28.1 | 46.3 | 184 | 201 | 385 |
| **Game Hunting Sub-total** | **281.7** | **68%** | **118.0** | **176.7** | **294.7** | **1,115** | **1,268** | **2,382** |
| Pest Animals | 135.1 | 32% | 59.0 | 85.3 | 144.4 | 483 | 614 | 1,097 |
| **Total** | **416.9** | **100%** | **177.0** | **262.0** | **439.0** | **1,598** | **1,882** | **3,480** |

Direct GSP impact was estimated to be $177.0 million with flow-on impacts of $262.0 million giving a total contribution to GSP of $439.0 million. There were an estimated 1,598 FTE jobs generated directly by hunting-related expenditure with a further and 1,882 flow-on (FTE) jobs giving a total employment impact of 3,480 FTE jobs.

When pest hunting was removed from the analysis, leaving only expenditure relating to deer, duck and quail, the economic impact was estimated to be $294.7m, which included a direct impact of $118.0m and $176.7m flow-on effects. It was estimated that game hunting expenditure created 2,383 jobs in Victoria (full-time equivalent), 1,115 of which were as a direct result of hunting expenditure and 1,268 of which were as a result of flow-on effects.

### 5.2.2 Summary economic impact by key LGAs

The economic impact of game hunting by licensed game hunters by LGA is summarised in Table 5-7 for the 20 regions with the highest direct expenditure. These 20 regions accounted for 93 per cent of total expenditure.

Whilst the largest proportion of economic activity occurred in the Melbourne region, the impacts in many of the non-metropolitan LGAs were significant as well. For example, each of the four non-metropolitan LGAs with the highest expenditure had a direct employment impact in the range 38 to 47 FTE jobs and a direct GRP impact between $3.5 million and $6.3 million.

**Table 5-6: Summary economic impact of game hunting by LGA, 2013**

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | |
|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total |
| Melbourne | 134.5 | 48% | 54.5 | 77.1 | 131.6 | 521 | 526 | 1,046 |
| Wellington | 17.0 | 6% | 6.3 | 2.0 | 8.4 | 47 | 16 | 63 |
| Latrobe | 13.6 | 5% | 4.7 | 2.4 | 7.1 | 42 | 17 | 59 |
| Greater Geelong | 11.4 | 4% | 4.1 | 3.1 | 7.2 | 47 | 26 | 72 |
| Greater Bendigo | 10.9 | 4% | 3.5 | 2.5 | 6.0 | 38 | 22 | 60 |
| Mitchell | 8.9 | 3% | 2.7 | 1.2 | 3.9 | 29 | 11 | 40 |
| Greater Shepparton | 8.5 | 3% | 3.1 | 2.0 | 5.2 | 40 | 20 | 60 |
| East Gippsland | 8.0 | 3% | 3.0 | 1.4 | 4.4 | 33 | 14 | 47 |
| Mansfield | 8.0 | 3% | 2.9 | 1.2 | 4.1 | 37 | 12 | 49 |
| Baw Baw | 6.7 | 2% | 2.5 | 1.4 | 3.9 | 26 | 13 | 39 |
| Wodonga | 5.2 | 2% | 1.8 | 1.0 | 2.8 | 19 | 9 | 28 |
| Wangaratta | 4.4 | 2% | 1.4 | 0.8 | 2.3 | 16 | 8 | 25 |
| Ballarat | 4.3 | 2% | 1.4 | 1.1 | 2.5 | 16 | 9 | 25 |
| Gannawarra | 4.2 | 2% | 1.6 | 0.6 | 2.2 | 21 | 6 | 28 |
| Murrindindi | 4.2 | 1% | 1.8 | 0.6 | 2.4 | 19 | 6 | 24 |
| Loddon | 2.8 | 1% | 1.1 | 0.2 | 1.3 | 9 | 2 | 11 |
| Colac-Otway | 2.7 | 1% | 1.1 | 0.5 | 1.5 | 12 | 5 | 17 |
| Alpine | 2.5 | 1% | 0.9 | 0.4 | 1.3 | 10 | 4 | 13 |
| Bass Coast | 2.0 | 1% | 0.8 | 0.3 | 1.0 | 9 | 3 | 12 |
| Campaspe | 1.9 | 1% | 0.7 | 0.3 | 1.1 | 8 | 3 | 11 |
| Other [a] | 20.1 | 7% | 17.9 | 76.5 | 94.4 | 115 | 537 | 652 |
| **Total Victoria** | **281.7** | **100%** | **118.0** | **176.7** | **294.7** | **1,115** | **1,268** | **2,382** |

[a] 'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.

The direct GRP for game animal hunting is shown graphically in Figure 5-1, showing the concentration of the economic impact in the east of the state.

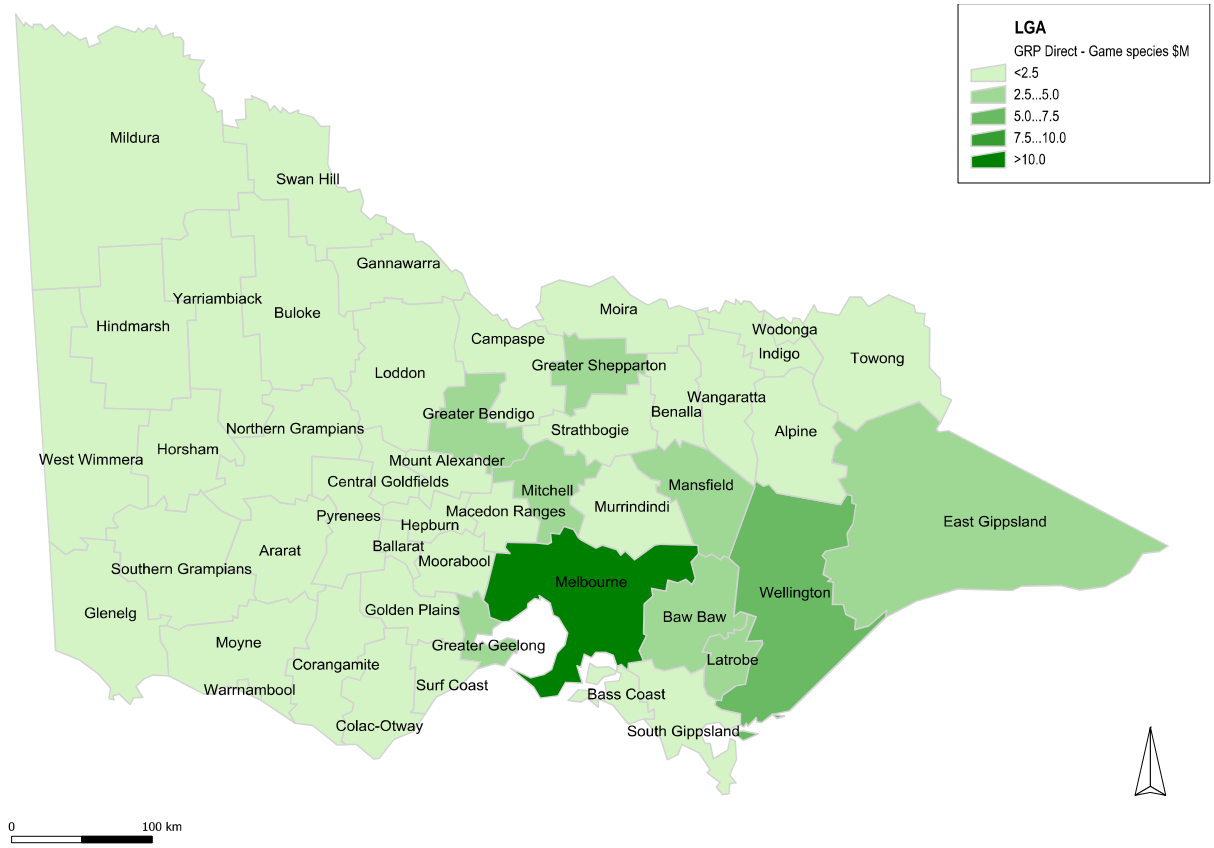


**Figure 5-1: Direct gross regional product by LGA, game animals, 2013**

The economic impact of hunting all animal groups (that is, including pest animals) by licensed game hunters by LGA is summarised in Table 5-7 for the 20 regions with the highest direct expenditure. These 20 regions accounted for 90 per cent of total expenditure.

Whilst the largest proportion of economic activity occurred in the Melbourne region, the impacts in many of the non-metropolitan LGAs were significant as well. For example, each of the seven non-metropolitan LGAs with the highest expenditure had a direct employment impact in the range 54 to 75 FTE jobs and a direct GRP impact between $4.9 million and $9.6 million.

**Table 5-7: Summary economic impact of hunting by LGA, all animal groups, 2013**

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | |
|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total |
| Melbourne | 166.6 | 40% | 68.4 | 93.4 | 161.8 | 622 | 636 | 1,258 |
| Wellington | 25.8 | 6% | 9.6 | 3.3 | 12.9 | 75 | 26 | 101 |
| Latrobe | 18.5 | 4% | 6.5 | 3.2 | 9.7 | 56 | 24 | 80 |
| Baw Baw | 16.8 | 4% | 6.2 | 3.8 | 10.0 | 72 | 34 | 106 |
| Greater Bendigo | 16.5 | 4% | 5.6 | 3.7 | 9.3 | 57 | 33 | 90 |
| Mansfield | 14.6 | 3% | 5.4 | 2.1 | 7.5 | 65 | 21 | 87 |
| Greater Shepparton | 14.0 | 3% | 5.1 | 3.2 | 8.3 | 64 | 31 | 95 |
| Greater Geelong | 13.5 | 3% | 4.9 | 3.6 | 8.5 | 54 | 30 | 83 |
| Mitchell | 12.4 | 3% | 4.0 | 1.8 | 5.8 | 42 | 16 | 58 |
| East Gippsland | 10.9 | 3% | 4.0 | 1.8 | 5.8 | 42 | 18 | 60 |
| Gannawarra | 10.4 | 2% | 4.1 | 1.6 | 5.6 | 56 | 17 | 73 |
| Murrindindi | 10.2 | 2% | 4.3 | 1.5 | 5.8 | 46 | 14 | 59 |
| Wodonga | 8.4 | 2% | 2.9 | 1.6 | 4.5 | 29 | 14 | 43 |
| Macedon Ranges | 6.8 | 2% | 2.6 | 1.8 | 4.4 | 19 | 13 | 33 |
| Campaspe | 5.9 | 1% | 2.1 | 0.9 | 3.0 | 22 | 9 | 30 |
| Wangaratta | 5.7 | 1% | 1.9 | 1.1 | 3.0 | 21 | 11 | 32 |
| Golden Plains | 5.4 | 1% | 1.9 | 0.6 | 2.5 | 18 | 5 | 23 |
| Mildura | 5.0 | 1% | 2.0 | 0.5 | 2.5 | 10 | 5 | 15 |
| Ballarat | 4.7 | 1% | 1.5 | 1.2 | 2.7 | 17 | 10 | 27 |
| Alpine | 3.8 | 1% | 1.4 | 0.5 | 2.0 | 14 | 5 | 19 |
| Other [a] | 41.2 | 10% | 32.6 | 130.8 | 163.4 | 196 | 911 | 1,108 |
| **Total Victoria** | **416.9** | **100%** | **177.0** | **262.0** | **439.0** | **1,598** | **1,882** | **3,480** |

[a] 'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.

Figure 5-2 displays the economic impact (direct effects) by LGA for all animals (including pest animals), showing that, apart from Melbourne, it was the LGAs in the east of Victoria that had the highest amounts of hunting expenditure.

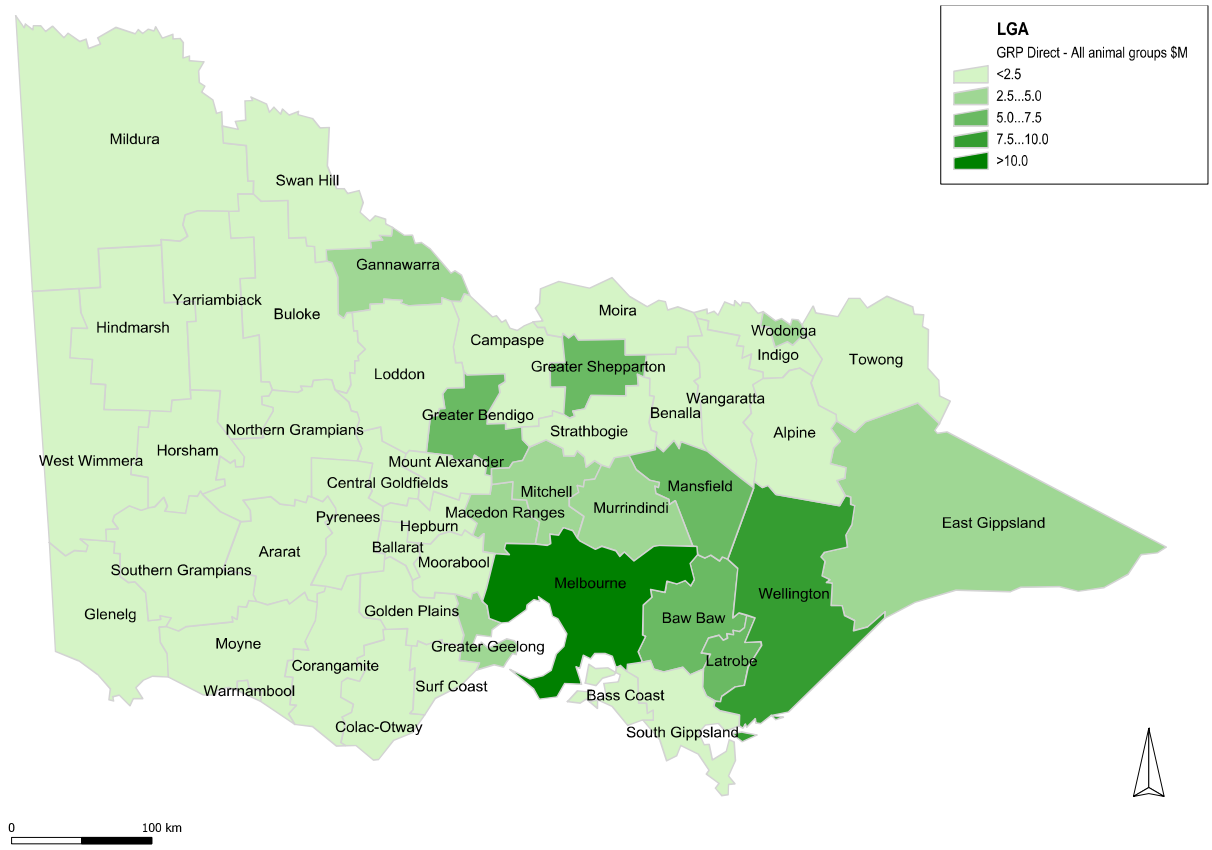


**Figure 5-2: Direct gross regional product by LGA, all animal groups, 2013**

The next four maps show the distribution of economic activity by animal group. Deer hunting activity was concentrated in the east of Victoria as shown in Figure 5-3.

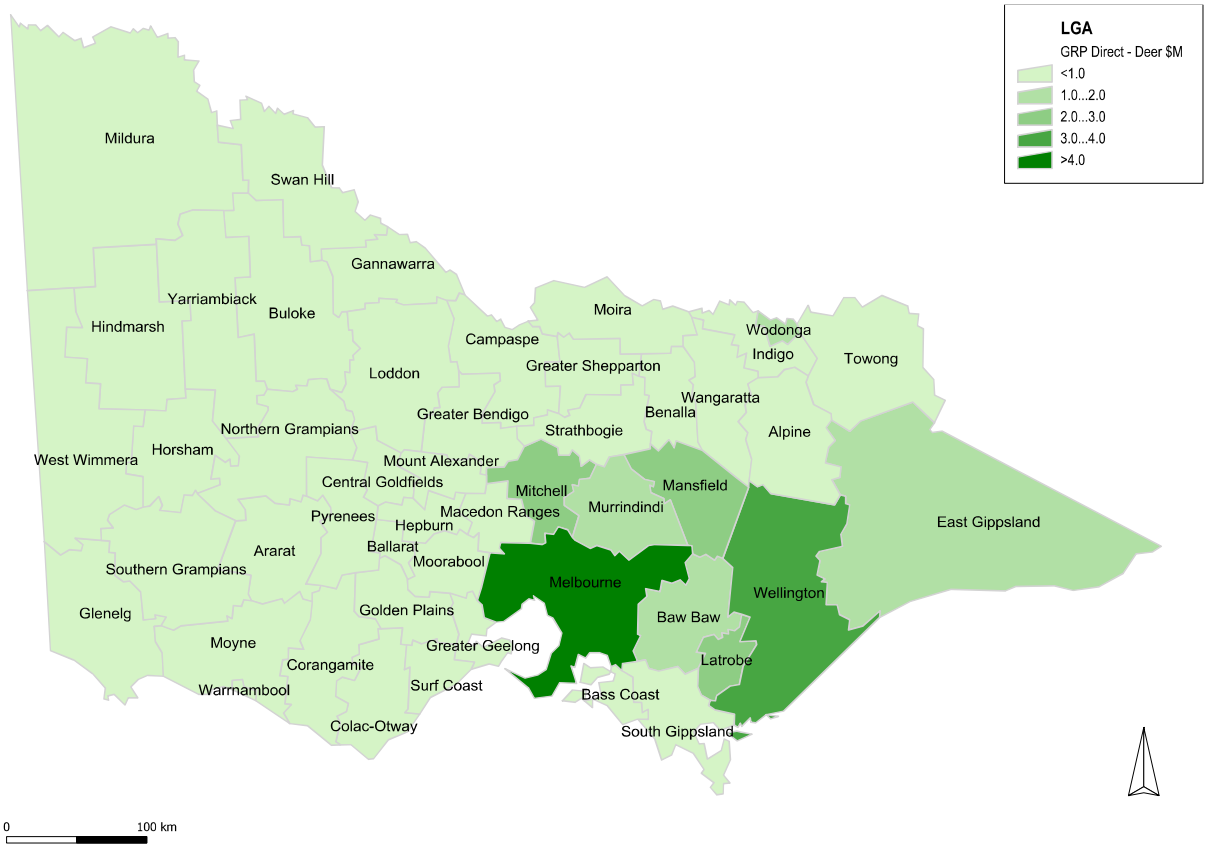


**Figure 5-3: Direct gross regional product by LGA, deer, 2013**

The economic impact of duck hunting activity was concentrated in the east of Victoria, as well as the LGAs of Gannawarra, Loddon and several regional centres as shown in Figure 5-4.

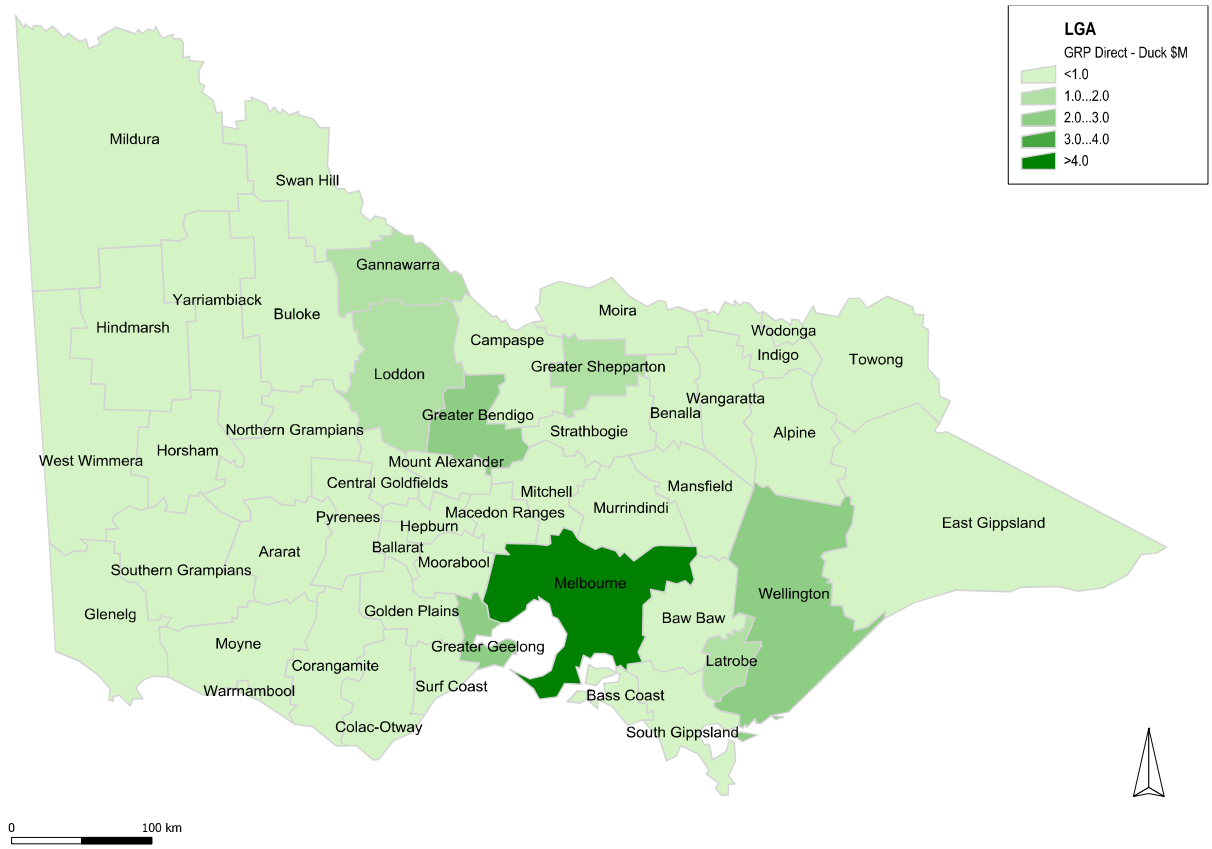


**Figure 5-4: Direct gross regional product by LGA, duck, 2013**

Unlike the other animal groups, the economic impact of quail hunting activity did not exceed $1m in any of the regional LGAs as shown in Figure 5-5.

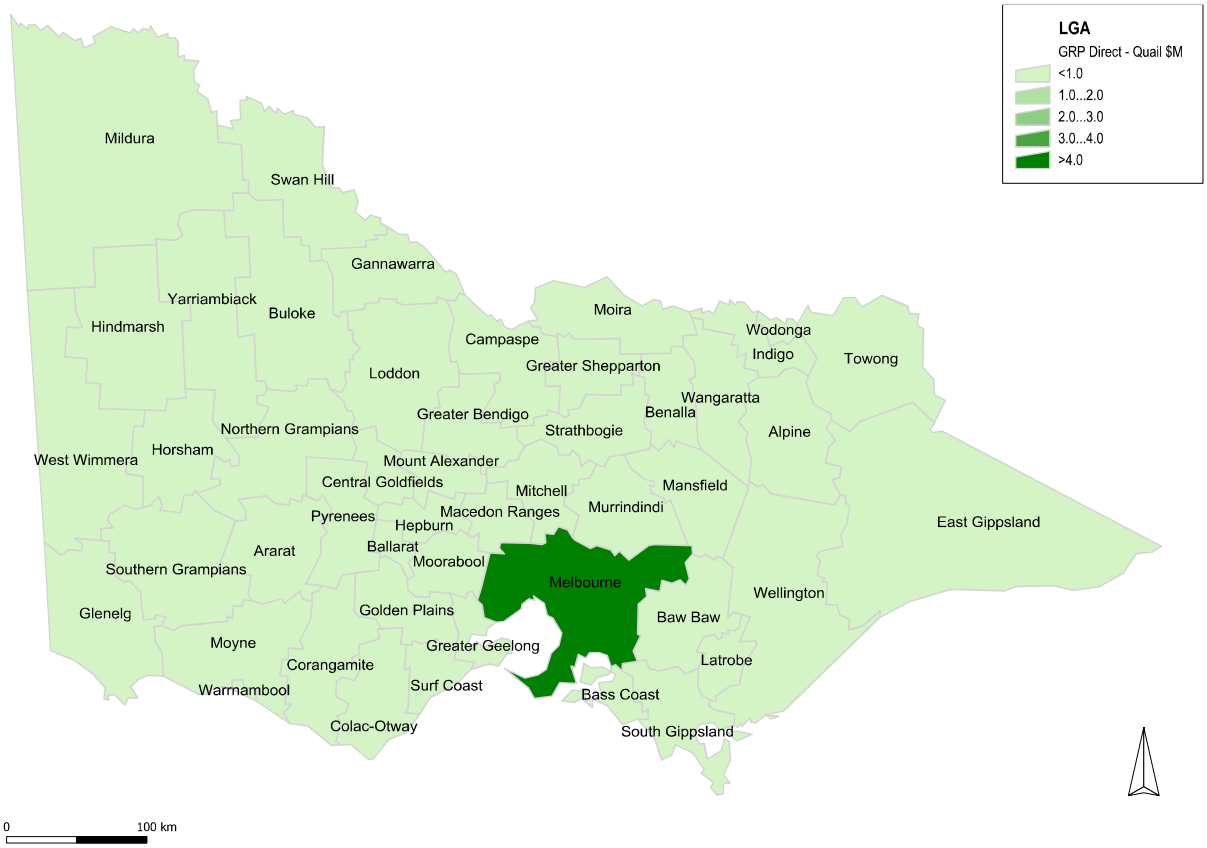


**Figure 5-5: Direct gross regional product by LGA, quail, 2013**

The economic impact of pest hunting activity was concentrated in, apart from Melbourne, the LGAs in the east of Victoria as shown in Figure 5-6.

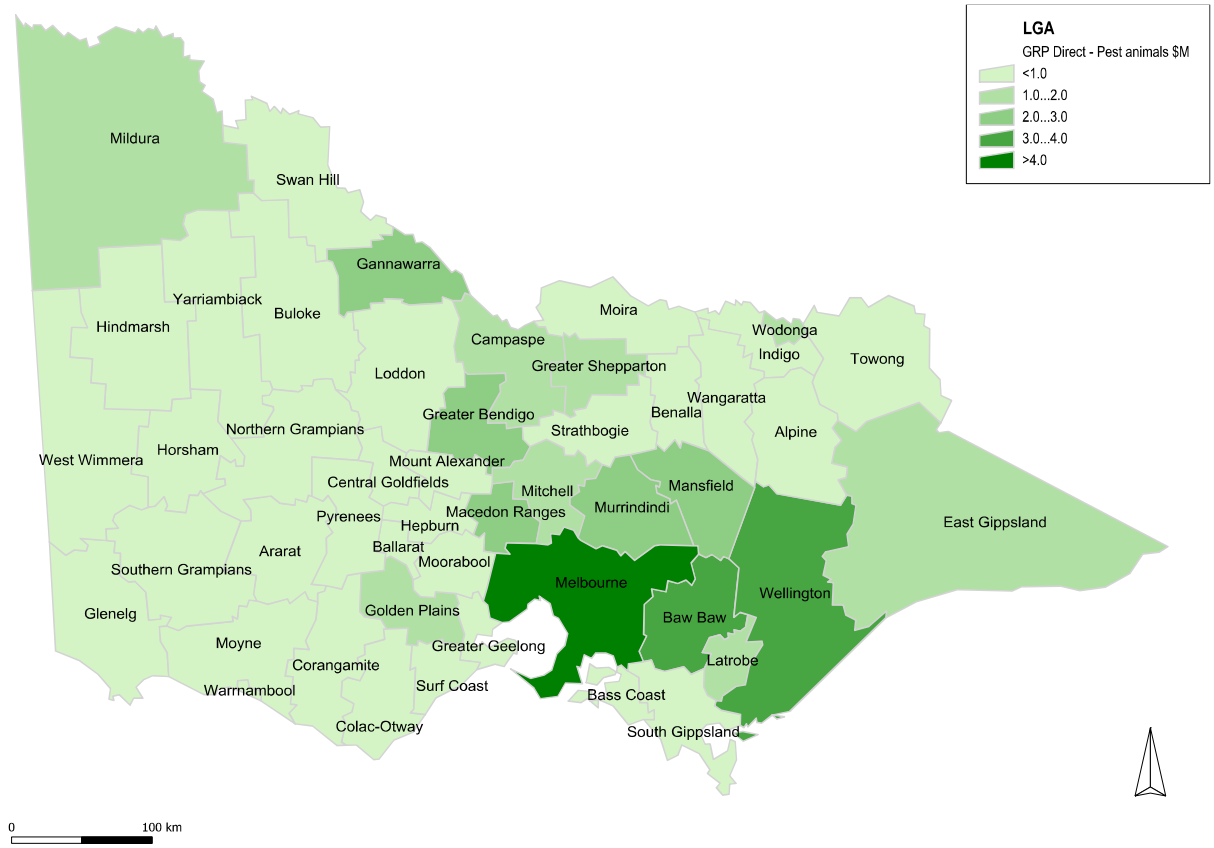


**Figure 5-6: Direct gross regional product by LGA, pest animals 2013**

Impacts by LGA in terms of total employment, household income and population are provided in Appendix 5 as are impacts across all indicators for individual animal groups.

At $439.0 million the economic impact of hunting activity by game licence holders was estimated to make up 0.13% of the Victorian economy. Hunting activity was concentrated in certain areas, with the highest concentration of hunting being Mansfield local government area (LGA) where hunting accounted for 2.5% of the LGA's economy. Hunting also was economically significant in Murrindindi and Gannawarra LGAs where it makes up 1.2% and 1.6% of their economies respectively. The regional distribution of employment is shown in Figure 5-7.

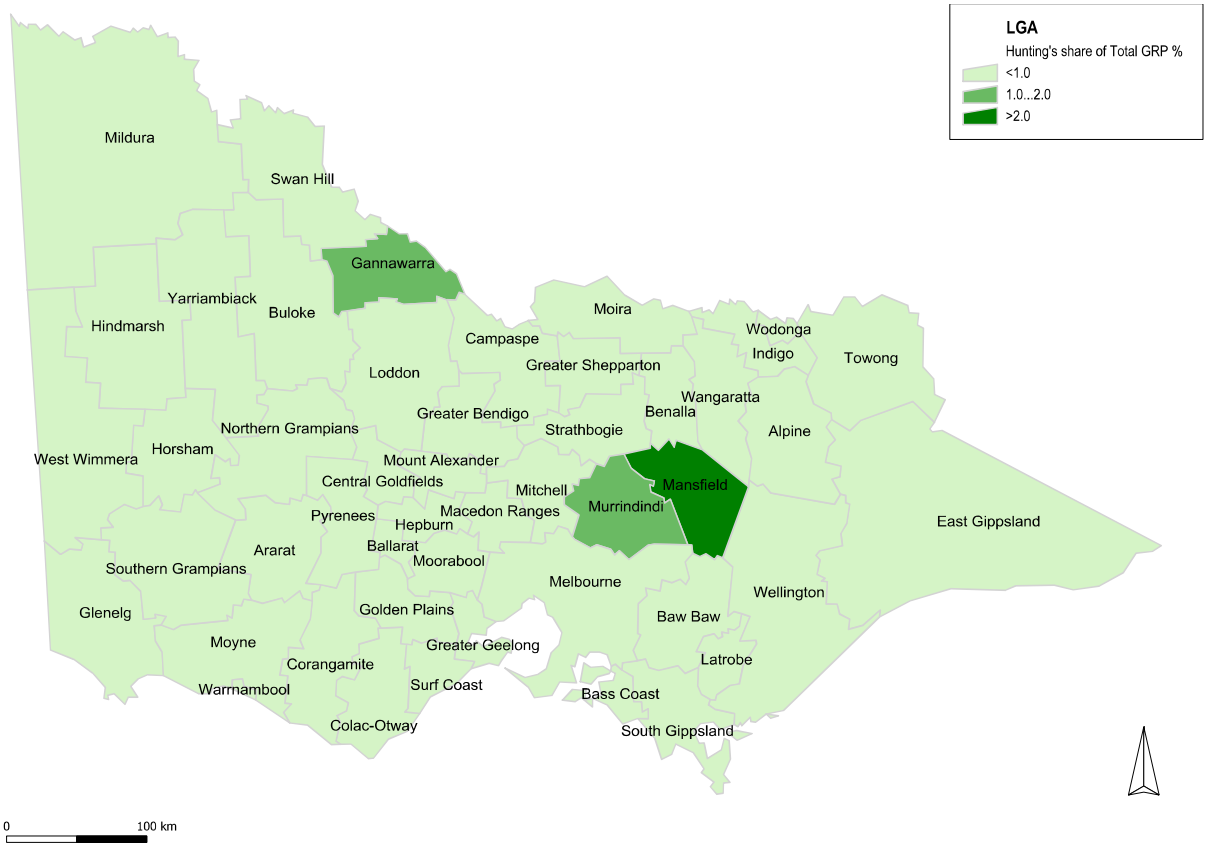


**Figure 5-7: Share of total GRP by LGA, all animal groups, 2013**

Appendix 5 provides more details on the LGA impacts expressed as a percentage of regional totals.

### 5.2.3 Summary economic impact by key towns

The economic impact of hunting by key towns is summarised in Table 5-8 for the 20 towns with the highest direct expenditure. Total hunting-related expenditure by game licence holders in these 20 towns was estimated to be $134.5 million, which accounted for 54 per cent of total non-metropolitan hunting-related expenditure by game licence holders ($250.3 million).

Each of the three towns with the highest expenditure (all above $10 million) had a direct employment impact in the range 34 to 49 FTE jobs and a direct GRP impact between $4.1 million and $4.7 million.

For example, Traralgon had a hunting expenditure of $13.2m, direct GRP of $4.7m, and direct employment impact of 41 FTE.

As explained in Section 4.4.4, the economic impact at the town level was imputed from LGA level estimates rather than directly modelled. The expenditure in each town was calculated as a proportion of total expenditure in the LGA in which the town is located and this proportion was applied to the total economic impact (GRP and employment) calculated for that LGA. Given this imputation process, the results presented should be treated as indicative rather than precise estimates and for smaller towns may overestimate the impact.

**Table 5-8: Summary economic impact of hunting by key towns, all animal groups, 2013**

| | | Expenditure | Gross Regional Product ($m) | | | Employment (fte) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Town | LGA | ($m) | Direct | Flow-on | Total | Direct | Share[a] | Flow-on | Total |
| TRARALGON | Latrobe (C) | 13.2 | 4.7 | 2.3 | 7.0 | 41 | 0.4% | 17 | 58 |
| ROSEDALE | Wellington (S) | 11.7 | 4.4 | 1.5 | 5.9 | 34 | 8.1% | 12 | 46 |
| MANSFIELD | Mansfield (S) | 10.9 | 4.1 | 1.6 | 5.7 | 49 | 3.8% | 16 | 65 |
| GEELONG | Greater Geelong (C) | 9.5 | 3.3 | 2.4 | 5.7 | 36 | 0.1% | 20 | 56 |
| KERANG | Gannawarra (S) | 8.9 | 3.6 | 1.4 | 5.0 | 49 | 4.0% | 15 | 64 |
| WODONGA | Wodonga (RC) | 8.4 | 2.9 | 1.6 | 4.5 | 29 | 0.2% | 14 | 43 |
| BARNADOWN | Greater Bendigo (C) | 8.1 | 2.6 | 1.8 | 4.4 | 27 | NA | 15 | 42 |
| SHEPPARTON | Greater Shepparton (C) | 8.1 | 2.9 | 1.8 | 4.8 | 37 | 0.2% | 18 | 55 |
| ALEXANDRA | Murrindindi (S) | 6.3 | 2.7 | 0.9 | 3.7 | 29 | 3.2% | 9 | 37 |
| BAIRNSDALE | East Gippsland (S) | 5.6 | 2.0 | 0.9 | 2.9 | 21 | 0.5% | 9 | 31 |
| DRIFFIELD | Baw Baw (S) | 5.5 | 2.0 | 1.3 | 3.3 | 24 | NA | 11 | 35 |
| WANGARATTA | Wangaratta (RC) | 4.7 | 1.6 | 0.9 | 2.4 | 17 | 0.3% | 9 | 26 |
| BALLARAT | Ballarat (C) | 4.6 | 1.4 | 1.1 | 2.4 | 16 | 0.0% | 9 | 25 |
| STRATHDALE | Greater Bendigo (C) | 4.6 | 1.5 | 1.0 | 2.5 | 15 | NA | 9 | 24 |
| HILL END | Baw Baw (S) | 4.4 | 1.6 | 1.0 | 2.6 | 19 | NA | 9 | 27 |
| SEYMOUR | Mitchell (S) | 4.3 | 1.4 | 0.6 | 2.0 | 15 | 0.7% | 6 | 20 |
| BEVERIDGE | Mitchell (S) | 4.2 | 1.3 | 0.6 | 1.9 | 14 | NA | 5 | 19 |
| MERRINEE | Mildura (RC) | 4.0 | 1.6 | 0.4 | 2.0 | 8 | NA | 4 | 12 |
| INVERLEIGH | Golden Plains (S) | 4.0 | 1.4 | 0.5 | 1.9 | 14 | 4.2% | 4 | 17 |
| MARYVALE | Latrobe (C) | 3.5 | 1.2 | 0.6 | 1.9 | 11 | NA | 5 | 15 |

[a] 'Share' represents the direct employment attributable to hunting as a percentage of total fte employment in the town.

Impacts by key towns in terms of total employment, household income and population are provided in Appendix 4 as are impacts across all indicators for individual animal groups.

### 5.2.4 Summary economic impact by RDV regions and Victoria

The economic impact of hunting by RDV is summarised in Table 5-9. As noted previously, the largest proportion of economic activity occurred in the Melbourne region. Among the RDV regions, the largest impacts were estimated for the Gippsland Region where hunting expenditure of $76.0 million generated total GRP of $42.2 million and total FTE employment of 389. The impacts in the other RDV regions were significant as well, with all regions except Great South Coast and Wimmera Southern Mallee having direct hunting expenditure of over $10 million.

Impacts by RDV in terms of total employment, household income and population are provided in Appendix 6, as are impacts across all indicators for individual animal groups.

**Table 5-9: Summary economic impact of hunting by RDV region, all animal groups, 2013**

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | |
|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total |
| Melbourne | 166.6 | 40% | 68.4 | 93.4 | 161.8 | 622 | 636 | 1,258 |
| Gippsland | 76.0 | 18% | 27.9 | 14.3 | 42.2 | 267 | 122 | 389 |
| Loddon Mallee South | 27.9 | 7% | 10.0 | 6.3 | 16.3 | 92 | 53 | 145 |
| Central Hume | 26.3 | 6% | 9.7 | 5.0 | 14.7 | 106 | 50 | 156 |
| Loddon Mallee North | 26.2 | 6% | 10.1 | 4.7 | 14.7 | 105 | 46 | 151 |
| Lower Hume | 22.6 | 5% | 8.2 | 3.5 | 11.7 | 89 | 31 | 120 |
| Goulburn Valley | 18.1 | 4% | 6.6 | 3.5 | 10.2 | 81 | 34 | 115 |
| G21 | 17.2 | 4% | 6.3 | 4.6 | 10.9 | 67 | 39 | 106 |
| Central Highlands | 13.4 | 3% | 4.6 | 3.0 | 7.7 | 48 | 27 | 75 |
| Upper Hume | 11.6 | 3% | 4.1 | 1.9 | 6.0 | 42 | 17 | 59 |
| Great South Coast | 5.8 | 1% | 2.2 | 1.0 | 3.2 | 25 | 9 | 35 |
| Wimmera Southern Mallee | 5.2 | 1% | 2.0 | 0.8 | 2.7 | 21 | 8 | 28 |
| **Total Victoria** [a] | **416.9** | **100%** | **177.0** | **262.0** | **439.0** | **1,598** | **1,882** | **3,480** |

[a] Total *flow-on* GRP and total *flow-on* employment estimates are greater than the sum of the individual regions because there are flow-on effects generated by each region that occur within Victoria but outside the region.

Figure 5-8 clearly shows that the non-metropolitan RDV region with the highest economic impact of game hunting was Gippsland.

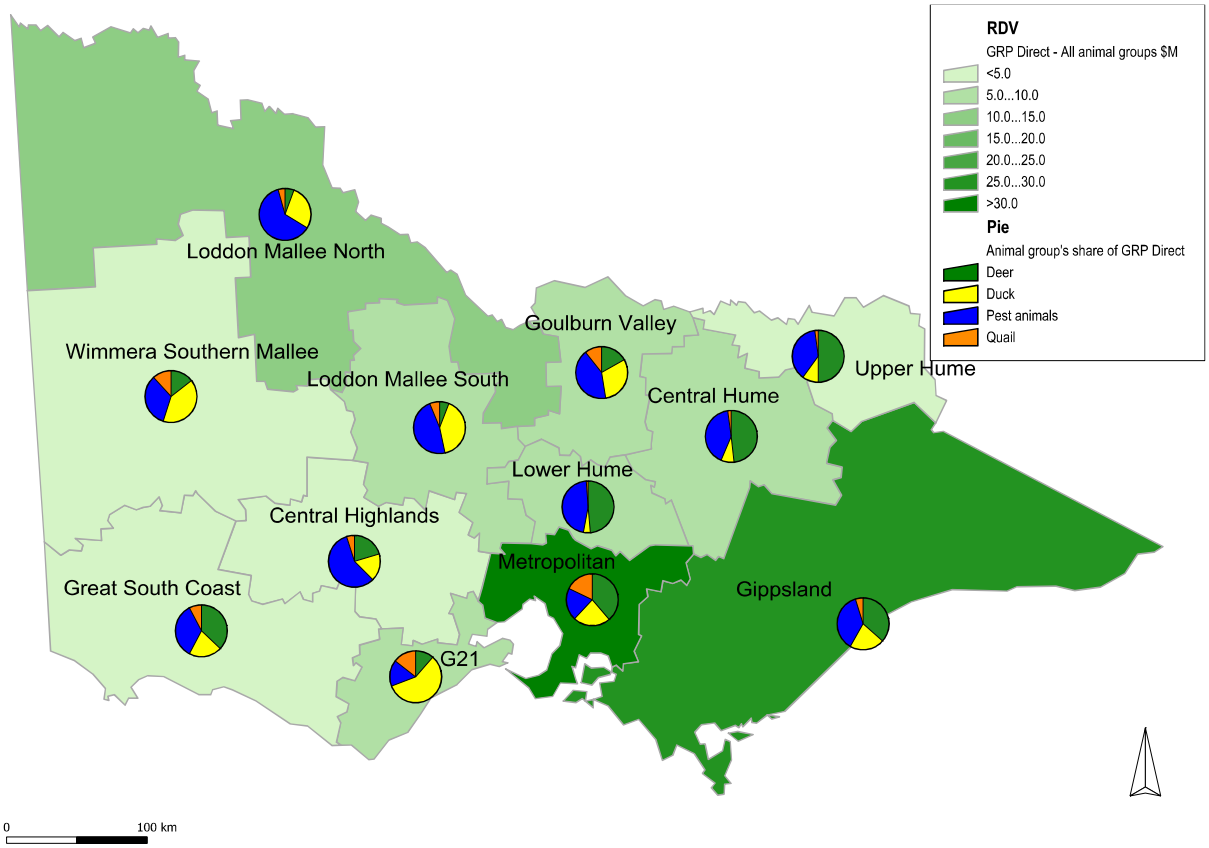


**Figure 5-8: Direct gross regional product by RDV region, all animal groups, 2013**

## 5.3 Comparison of hunting and tourism expenditure estimates

It is instructive to compare the contribution of hunting with the tourism industry, as measured by Tourism Research Australia (Tourism Victoria, 2013). The data collection methods used for the two estimates have much in common, the most significant difference being that Tourism Research Australia does not measure off-trip expenditures on equipment related to tourism, so it is necessary to remove off-trip expenditures for hunting also for comparability.

In this report we use expenditure estimates for the comparison. Tourism-related expenditure[20] in Victoria was estimated to be $15,414 million in 2011/12,[21] or $15,868 when inflated to 2013 dollars.[22] At $240 million, trip-related hunting expenditure is 1.5% of tourism expenditure.

[20] At basic prices.
[21] Tourism Research Australia (2013) *State Tourism Satellite Accounts 2011-12* (Tourism Research Australia: Canberra)
[22] The figure for expenditure was inflated to 2013 dollars by applying the increase in visitor expenditure in Victoria over 2013 to the 2011/12 estimates.

# 6 Comparison with other estimates of hunting expenditure

**Key points**

The estimate of expenditure related to game hunting of $282m is significantly higher than a previous estimate derived from the 2006/07 mail survey of hunters conducted by DEPI which, when inflated to 2013 dollars and the 2013 population of game licence holders, would be $130 million. The method used for the respective surveys differs markedly, the main difference being that the 2006/07 survey, having limited space, asked hunters to estimate their average annual expenditure in one question, whereas this survey was dedicated to expenditure and was able to separate out the various components of expenditure into number of trips, expenditure per trip and expenditure categories. This reduces the possibility of recall bias, and the risk that hunters will omit their expenditure on certain items. Additionally, the 2006/07 survey was conducted in a year with no duck season, requiring hunters to recall their duck hunting expenditure from greater than one year previously. There are thus strong reasons to believe that the 2006/07 survey produced an underestimate of hunter expenditure.

Game Victoria previously has gathered information about hunter expenditure through its 2006/07 hunter mail survey, an annual survey of 1,000 hunters. In the absence of a duck season in 2007 (cancelled due to environmental conditions), the section of the survey usually set aside for duck hunting was used to collect social and demographic information about Victorian game hunters. With limited space, one question was devoted to collecting information about hunters' annual expenditure. The question asked hunters to estimate their average annual hunting expenditure, on- and off-trip; for off-trip expenditure hunters were asked to only include items for which over 50% was used for hunting. Hunters were also asked to estimate expenditure as though there had been a duck hunting season.[23]

The mail survey found that, on average, hunters spend $2,396 per year. In years subsequent to the 2006/07, this per-hunter figure has been multiplied by the number of game licence holders to reach an expenditure estimate for all game licence holders. In 2011 this figure was calculated at $100 million, without inflating the per hunter estimate to 2011 dollars. If this estimate is updated for the number of game licence holders in 2013, and also inflated to 2013 dollars, the total expenditure would have been $130 million in 2013.

**Table 6-1: Estimates of hunter expenditure from the 2006/07 mail survey**

| | 2011 | 2013 |
|---|---|---|
| Expenditure per hunter | $2,396 | $2,904 |
| Game licence holders | 40,893 | 44,648 |
| Total | $98m | $130m |

This is substantially lower than the estimate of expenditure of $282 million reached through this research for hunting of game animals, deer, duck and quail.

It is possible that some of the difference may be real, in that expenditure per hunter has increased faster than inflation. However, there are also methodological differences between

[23] The exact wording of the question is as follows: "Please indicate your approximate **average annual expenditure** on all game hunting activities. Please calculate this on the basis that there was a duck season. You should include expenses on things such as Game Licences, Firearm Licences, firearms and ammunition, fuel, food, clothing, accessories etc. Please do not include purchases of major multi-use items, such as boats or vehicles, unless they are used for hunting for the majority of the time (greater than 50%)".

the two studies that would explain most of the difference between the two estimates, and (while there is no evidence that directly supports this claim) it is likely that most of the difference is caused by methodological changes. There are a number of reasons to believe that the 2006/07 survey produced an underestimate of hunter expenditure, due to the aggregation of expenditure categories, asking hunters to recall expenditure over a long period of time, surveying hunters in a year with no duck season and excluding equipment used less than 50% for hunting. These differences are outlined in Table 6-2.

**Table 6-2: Comparison of expenditure estimates from 2006/07 and this survey**

| Issue | 2006/07 hunter survey | This survey (2013) | Comment |
|---|---|---|---|
| On-trip expenditure - timescale | Asked respondents to recall trip expenditure for the entire year. | Asked respondents to recall expenditure on one trip. | Research on survey methods shows that as the period over which expenditure occurs increases, respondents are more likely to underestimate their expenditure (Crossley and Winter, 2012). For this reason, it is likely that asking respondents to recall their trip expenditure for an entire year is likely to underestimate expenditure, while asking about one trip only should yield a more accurate result. |
| On-trip expenditure – recall bias | Asked respondents to recall trip expenditure for the entire year. | For 55% of respondents, the trip asked about was their most recent trip. | Research shows that as the expenditure event in question becomes further in the past, the more likely that respondents will underestimate their expenditure (Comerford, Delaney and Harmon, 2009), therefore it is likely that the 2006/07 survey underestimated expenditure. |
| On-trip expenditure - cognitive load | Respondents are asked to recall on-trip expenditure for the entire year in one question | Respondents were asked separately about the number of trips undertaken in the past year and their on-trip expenditure from one trip. On-trip expenditure is then calculated from the two figures. | It would be difficult for respondents to accurately recall the number of trips and the expenditure for each trip, and then multiply the two together to calculate annual expenditure, as was the case with the 2006/07 survey. Seperating out the recall tasks is more likely to yield an accurate result. |

| Issue | 2006/07 hunter survey | This survey (2013) | Comment |
|---|---|---|---|
| Expenditure categories – disaggregating | Respondents were reminded of nine possible categories for hunting expenditure. However, they were asked to report their expenditure in one answer. | Respondents were asked to seperately estimate their expenditure for 16 off-trip and 12 on-trip expenditure categories. | There are several reasons why, prima facie, the 2013 survey estimates are more reliable:<br>▪ asking about each category separately ensures that respondents consider their expenditure in a wider range of categories. Research in survey methods shows that aggregating categories will result in incomplete reporting of expenditure, with disaggregated estimates being up to 30% higher (Crossley and Winter, 2012; Comerford, Delaney, Harmon, 2009).<br>▪ the list of expenditure categories in the 2006/07 survey was incomplete<br>▪ combining the categories into one question also requires respondents to accurately sum the expenditure items |
| Off-trip expenditure | Items used less than 50% for hunting were excluded. | All off-trip items were included, and calibarted according to the proportion they were used for hunting. | The method used in the 2013 is more accurate. The method used in 2006/07 will result in the exclusion of some items that are potentially large, such as vehicles, which are predominantly used for purposes other than hunting. |
| Weighting | The sample was not weighted. | The sample was weighted to the population by known characteristics. | Weighting will alter the estimates. It is not known how weighting the 2006/07 survey results would have affected the expenditure estimate as this would depend on how representative the sample was of the hunting population. |
| Year | The survey was carried out in 2006/07, a year in which there was no duck hunting season. | The survey was carried out in 2013, an average year for hunting effort. | The absence of duck hunting in 2006/07 could have biased downwards estimates from that year, despite hunters being asked to recall expenditure from previous years.<br>It is also possible that hunter expenditure has grown faster than inflation over the period. |

| Issue | 2006/07 hunter survey | This survey (2013) | Comment |
|---|---|---|---|
| Sampling and response method | The survey had 360 respondents. The survey was mailed to 1,000 respondents, and completed on paper. | The survey had 1,000 respondents. It was distributed via an email to licence holders and hunting association members for online completion and through telephone for licence holders. | Different survey response methods will have different biases. The more recent survey should be more representative of the population as it had a larger sample. It also has a wider variety of response methods. |

It is possible that respondents in 2013 'gamed' their responses: artificially inflated their responses to influence government policy. The wording in the recent survey was carefully chosen to avoid the link between the survey and government policy and any suggestion that a high expenditure estimate would be to the benefit of hunters. The possibility of gaming applies equally to both the 2013 and the 2006/07 survey, however the introduction to the 2006/07 survey ("Your information is important: data from this survey will help us manage Victoria's game species and improve your hunting experience") on face value appears to be more loaded than the introduction in the 2013 survey ("We are undertaking a survey to better understand the experiences of people who hunt game in Victoria."). There were no signs of gaming apparent to field researchers who worked on the 2013 survey.

# 7 Future data collection

**Key points**

It is recommended that future surveys concentrate on specific animal groups and be conducted soon after the completion of the hunting season. Collecting game licence holders' email addresses would facilitate the collection of data in the future.

This research focuses on game hunters; future research on pest hunting could be undertaken with access to the firearms licence database.

Due to the scope of information that was being collected, the survey instrument was relatively long (19 minutes when administered over the telephone). In particular, the targeting of all animal groups within the one survey made recall difficult for the many respondents who hunt across multiple animal groups. These difficulties were exacerbated by the seasonal nature of duck and quail hunting, particularly as the duck and quail hunting seasons finished in June, and the survey was conducted in November and December. It is recommended that future surveys concentrate on specific animal groups and that future duck and quail surveys be conducted soon after the completion of the hunting seasons.

There were three adjustments made to the sample to correct for known bias from the population, these being:

- age distribution
- active/inactive
- association membership

The age distribution in the survey sample was generally representative of the population, however the sample was biased with regard to the proportion of active and inactive hunters and the proportion of those with and without association membership. This bias could be greatly reduced if the sample frame were expanded to include a larger (more representative) proportion of association non-members. This would be facilitated by collecting email addresses of licence holders.

The target population for the survey was licensed game hunters, many of whom hunt for pest animals as well as game animals. While this activity was recorded and reported, there was no analysis or reporting of pest hunting by dedicated pest hunters, i.e., those with a firearms licence who indicate the purpose is 'hunting' but do not have a game hunting licence. Further analysis of pest hunting could be undertaken if access to the Victoria Police firearms licence database was granted.

This was a very detailed survey. It would be possible to update the estimates from this survey by applying the detailed estimates from this survey to a simpler survey, with periodical recalibration of the detailed estimates.

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# Appendix 1: Method for the estimation of social aspects of hunting

The intangible social benefits of hunting – defined as benefits that do not have a direct monetary value attached, although they may have significant indirect economic value – were examined in the survey in three ways. First, respondents were asked to directly identify key social benefits of hunting they experienced. Second, they were asked questions that helped identify whether these benefits are substitutable with either (i) alternative hunting experiences, or (ii) alternative outdoor recreation activities. This information can be used to predict likely social impacts of any potential changes in access to hunting. Third, the overall wellbeing of hunters was examined, to enable comparison of their wellbeing and that of the general population. The concepts measured in the survey are briefly described here; further detail is given when results are described and presented.

## Measuring benefits of hunting activities

The social benefits of hunting were measured by asking respondents to identify the top five benefits of hunting for them, from a list of pre-defined benefits. These benefits (for example, whether hunting made a person feel proud, helped them connect with nature, or provided them with opportunities to see friends or family) were selected based on work undertaken in previous studies that have examined how activities involving 'wildspace' recreation may benefit the people who take part in them (in particular, Pretty et al. 2005, Maller et al. 2008, Lovelock et al. 2011, and Schirmer et al. 2014).

## Measuring substitutability of hunting activities

While hunters may derive important social benefits from hunting, it is important to understand whether they can readily obtain similar benefits from alternative activities. This can help predict whether a hunter is likely to be adversely affected by a change in their ability to hunt, or whether they will switch to another activity that has similar benefits and consequently experience little impact from the change in their hunting. Hunters were asked a series of questions intended to identify (i) their attachment to specific locations and animal groups when hunting, and (ii) whether they take part in any of a number of alternative recreation activities, and how important these alternative activities are compared to hunting. The responses to these questions enable examination of the extent to which the benefits derived from hunting are dependent on specific forms or locations of hunting versus being able to be derived from a broader range of hunting activities; and the extent to which the benefits of hunting are interchangeable with other outdoor recreation activities.

## Measuring wellbeing of hunters

The overall health and wellbeing of hunters was examined using three measures:

- General health: The general health measure used in the survey instrument was a single question that asked respondents to rate their general health on a five point scale (excellent, very good, good, fair or poor). This question is commonly included on health surveys internationally and in Australia. While comparators for the Victorian population are not readily available, it is possible to derive them from data collected in the Household, Income and Labour Dynamics in Australia (HILDA) survey in future analyses.[24]
- Personal wellbeing: The Personal Wellbeing Index (PWI) was included in the survey instrument. The PWI is measured regularly in Australia through the 'Australian Unity Wellbeing Index' survey.

[24] The HILDA survey is a household-based panel study which began in 2001 designed and managed by the Melbourne Institute of Applied Economic and Social Research (University of Melbourne).

The PWI is calculated by asking participants how satisfied they are with different dimensions of their life, on a scale from 0 (completely dissatisfied) to 10 (completely satisfied). This measure was used as it has a highly robust theoretical basis, and the measures of subjective life satisfaction used have been shown in multiple studies to have strong correlation with objective measures of a person's health and wellbeing (Layard 2010; Oswald and Wu 2010). Additionally, it is regularly measured for the Victorian population, enabling comparison of the wellbeing of hunters with the wellbeing of the broader Victorian population.

- Social capital: Social capital is a key contributor to a person's wellbeing that may be influenced by hunting (for example, the activity of hunting may assist hunters to maintain and strengthen social ties with the other people they hunt with). A summary social capital index was developed based on a short set of standard social capital questions, which asked people about how positive they feel about their sense of belonging to their social groups and community. The index was calculated as the average score across all social capital items, measured from 1-7, after reversing one item to ensure it was scored in the same direction as the others.

## Analysis methods

The results for questions examining social benefits, substitutability and wellbeing were explored descriptively, meaning they present the responses received to each question without looking at how these responses varied depending on the type of hunting or hunter involved. These descriptive analyses are presented in Part 7. This was followed by undertaking an exploratory bivariate analysis to identify whether reasons for hunting varied based on three types of respondent characteristics: their hunting behaviour and spending; their socio-demographic characteristics; and their wellbeing and social capital. Bivariate analysis involves exploring the survey results to identify if two or more variables are significantly related to each other (in this case, characteristics of (i) hunters and their hunting activities were compared to (ii) their wellbeing and social capital). Bivariate analysis is typically the first stage of statistical analysis undertaken when examining social statistics, prior to more complex analysis such as regression modelling, factor analysis or structural equation modelling (Bryman, 2012). In this study, resources permitted only the first stage of exploratory bivariate analysis. Two bivariate analysis tests were used: Spearman's correlation, which identifies if two variables are significantly correlated with each other, and is used where both variables are ordinal or one is continuous and the other ordinal; and Kruskal–Wallis chi-square tests to identify significant differences between continuous variables for two or more independent groups. These are commonly used bivariate tests for exploring social data on natural resource related behaviour (see for example Schirmer et al. 2012). Results of bivariate analyses are presented only where they were significant, meaning that the test showed a probability value (p-value) of less than 0.05. This means that the relationship identified is highly unlikely to have occurred by random chance.

# Appendix 2: Results of the analysis of the social aspects of hunting

## Introduction

Many of the benefits hunters obtain from hunting are intangible, as is the case with many recreation activities. 'Intangible' is defined here as those benefits that do not have a direct monetary value attached, although they may have significant indirect economic value. For example, they may include enjoyment and relaxation associated with hunting, or the benefit achieved by taking part in culturally significant hunting activities. These intangible benefits can be difficult to measure. Consequently, studies examining the benefits of recreational activities such as hunting often focus solely on measuring the direct and indirect benefits of expenditure on the activity being studied.

In recent years a rapidly growing literature has argued for recognition of the intangible benefits of recreational activities, and has focused on improving the techniques used to measure these benefits. There are two important reasons for the greater recognition of intangible social benefits. Firstly, understanding these is essential to managing resources to maximise their benefits to society. If intangible social benefits are the motivator for recreational users of a resource, and that resource is being managed to benefit recreational users, then it is essential to understand how to manage the resource in such a way that intangible benefits are maximised (for further discussion of this, see Hine et al. 2009). Secondly, seemingly intangible social benefits can have tangible outcomes with measurable economic benefit. In particular, a growing literature is finding evidence that outdoor recreation has a substantial positive effect on the health and wellbeing of people who take part in it. This health and wellbeing benefit in turn has important economic benefits in the form of avoided health care costs; these economic benefits may be as large, or larger, than the value of direct economic spending on these outdoor activities (see for example Pretty 2005; Maller et al. 2008; Thompson et al. 2011).

The sections below first provide a brief overview of the socio-demographic characteristics of hunters. They then describe results from the three areas explored when examining social benefits of hunting – namely, the types of benefits (and costs) associated with hunting, the substitutability of hunting with other activities that may generate similar social benefit, and the wellbeing of hunters. This is followed by a brief outline of further analyses that can be conducted using these data. Detailed analysis of the social data was not within the scope of this project and there are opportunities for further analysis at a later date.

## Socio-demographic characteristics of hunters

The socio-demographic characteristics of hunters are briefly described below.

### Age

The age of respondents is shown in Figure A2- 1. This figure compares (i) the weighted data set, which was adjusted to reflect the distribution of ages in the game licence database and thus shows the actual age distribution of the hunting population, and (ii) the age of the people who responded to the survey using the unweighted data set. The remainder of data presented in this section was generated using the weighted data set, in which the sample achieved was adjusted to ensure it is representative of the age distribution of licenced game hunters in Victoria, and to exclude hunters who are not licenced for game (e.g. people who hunt pest animals, but do not hold a game licence, were excluded).

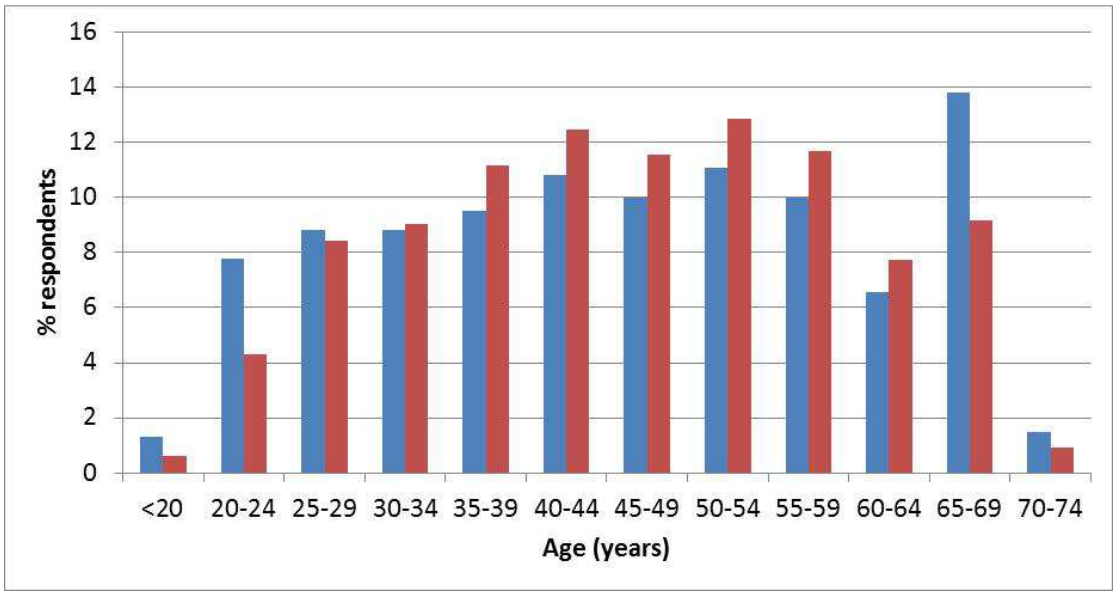


**Figure A2- 1: Age of licenced game hunters (blue) and survey respondents (red)**

### Gender

Of the respondents, 98.3% were male, and 1.7% female (weighted n = 923).

### Cultural background

Survey respondents were asked about their cultural background. In total (weighted n = 634):

- 2.6% of game hunters reported they were Indigenous (Aboriginal or Torres Strait Islander)
- 83.4% reported they were Australian born and were not Indigenous Australians
- 7.0% reported they were born overseas and had an English speaking background
- 6.0% reported they were born overseas and had a non-English speaking background
- 1.1% ticked the response ‘do not wish to answer’.

## Employment and study

The majority of hunters reported being in full-time paid work (69.6%), with the next largest group (17.3%) of respondents being retired. Less than 5% reported working part-time, working in a casual job, being unemployed, home duties, being a student, or having other employment or study status (Figure A2- 2).

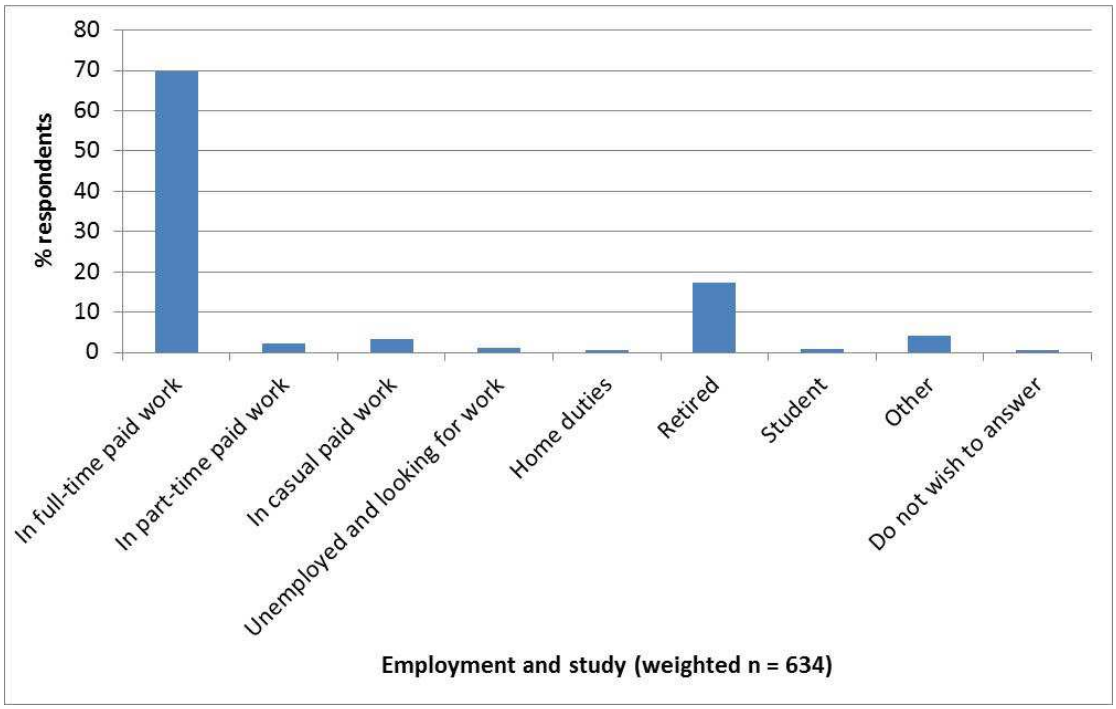


**Figure A2- 2: Employment / study status of survey respondents**

## Education

Survey participants were asked to indicate the highest level of formal education they had completed, shown in Figure A2- 3. The highest level of education completed varied across respondents; in total, 70.3% reported having some type of post-school qualification (certificate, diploma or university degree), while 28.8% had not completed a post-high school qualification.

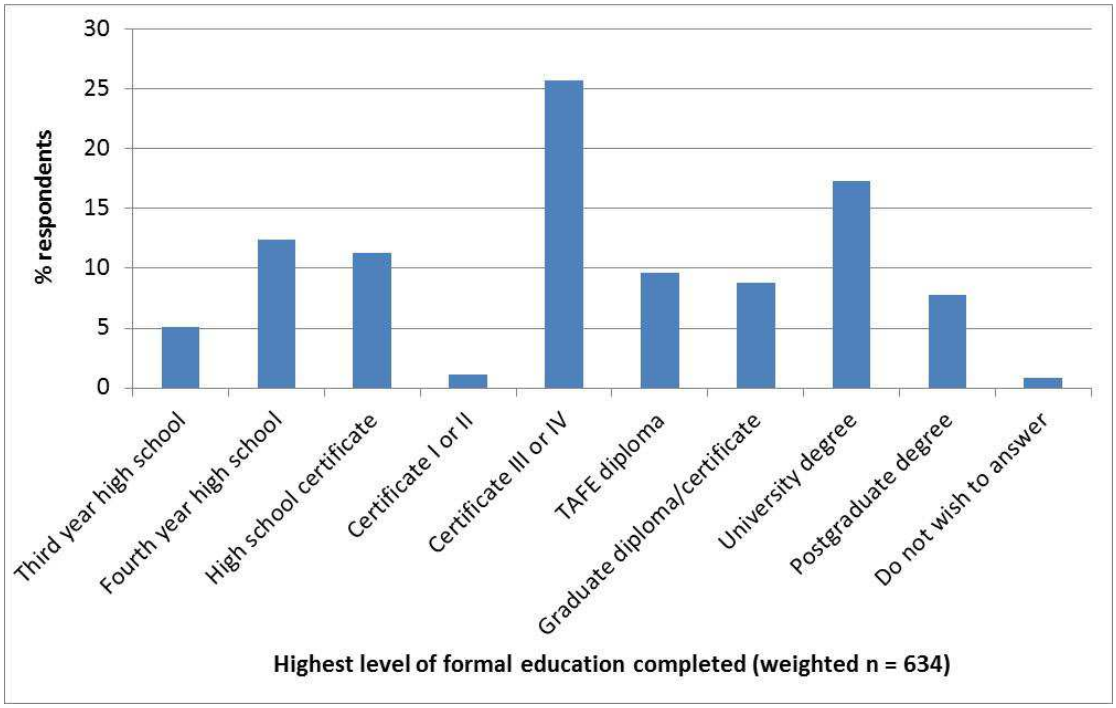


**Figure A2- 3: Highest level of formal education completed by game hunters**

## Living situation

The majority of hunters reported they are living in a household with a couple and children, with the largest proportion (46.6%) having children aged over 15 at home, while 35.0% had some children aged under 15. Relatively few respondents were single parents, lived alone, or lived in a group house (Figure A2- 4).

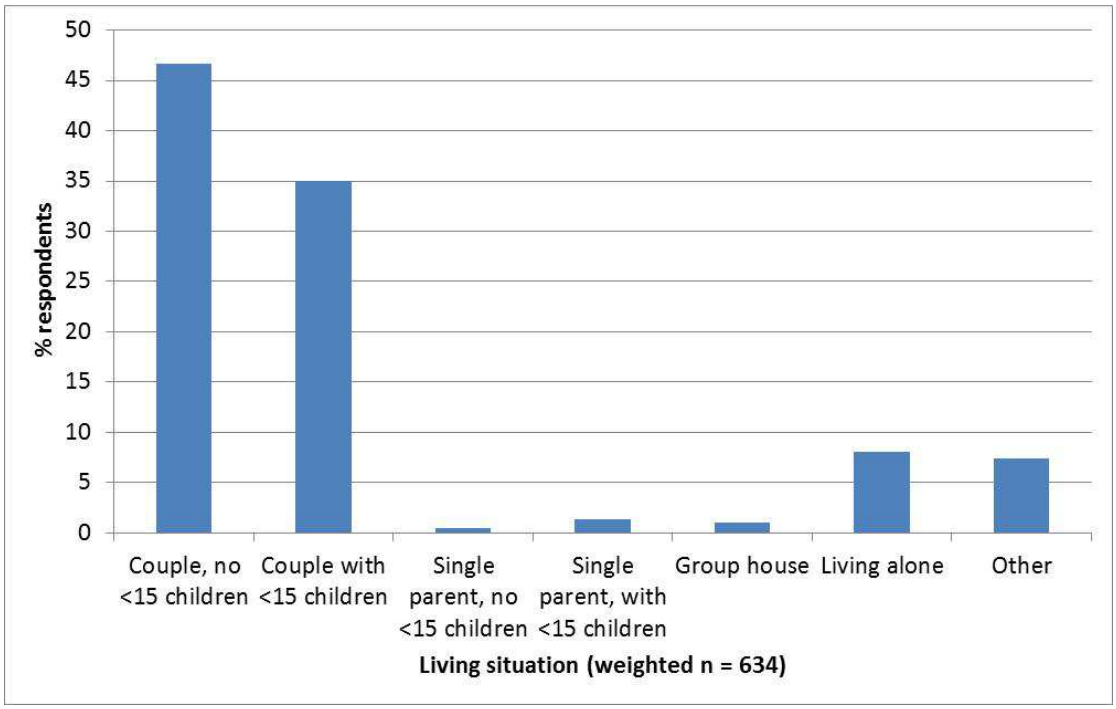


**Figure A2- 4: Living situation reported by survey respondents**

### Household income

Respondents were asked what their household income was in the previous 12 months. While household income is a sensitive question, 86.1% of respondents chose to answer the question. The majority reported a household income of $78,000 or greater (Figure A2- 5).

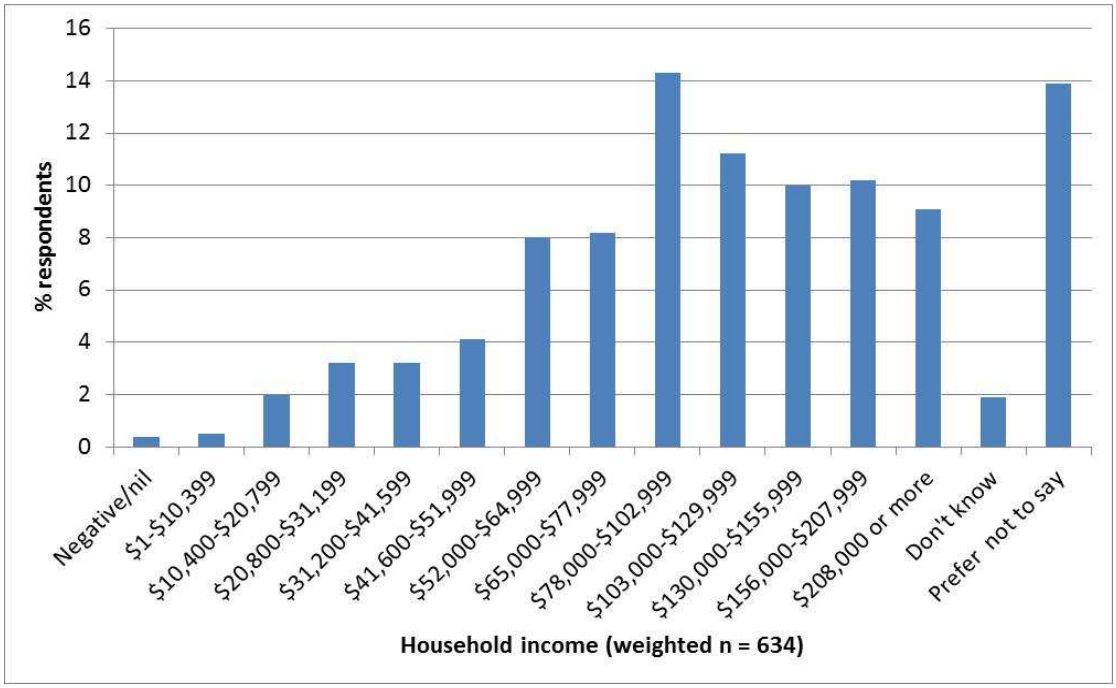


**Figure A2- 5: Household income reported by survey respondents**

## Social benefits of hunting

The social benefits most important to Victorian hunters were identified by (i) asking survey respondents to nominate the most important reasons they hunt from a list of 15 reasons (a maximum of five reasons could be nominated), each of which represented a different type of social benefit or utilitarian benefit; and (ii) asking survey respondents whether their hunting trips enable them to achieve any of a number of social outcomes known to be associated with enhanced health and wellbeing.

Figure A2- 6 shows the most important social benefits of hunting for Victorian hunters, ordered from most to least frequent. These data were generated using the weighted data set, and hence are representative of the population of hunters. The two reasons most frequently indicated for hunting were to obtain food (70.2% of hunters) and spend time outdoors (65.6% of hunters). The sport of hunting, and reducing pest animals were the next most common benefits, reported by 51.8% and 46.7% of hunters respectively. Less than 40% of respondents indicated each of the other reasons for hunting were important.

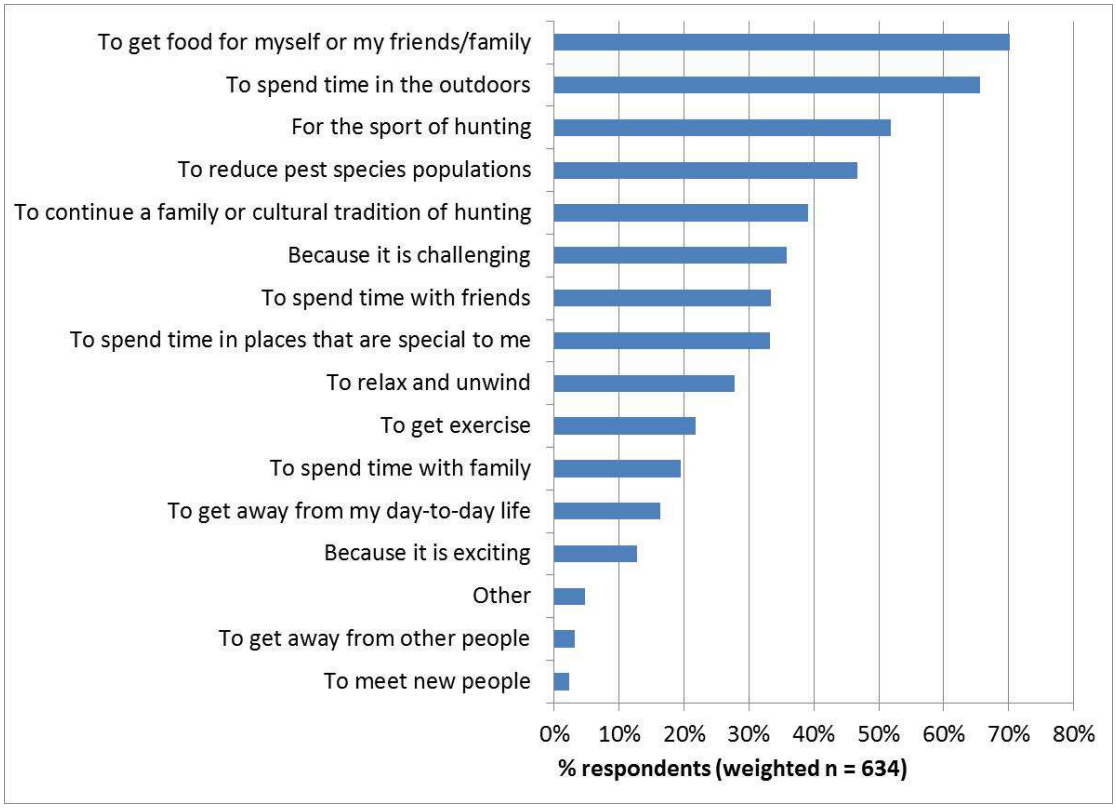


**Figure A2- 6: Most important reasons for hunting indicated by respondents, with up to 5 able to be selected (weighted data set)**

Figure A2- 7 summarises the social outcomes associated with hunting by survey respondents. Of the different types of social benefit hunting could lead to:

- Benefits associated with being outdoors and connecting to nature and special places were most commonly reported, with 92.4% of respondents reporting their hunting trips let them enjoy nature, 89.7% that they help them connect to special places, 89.6% that they let them connect to nature, and 87.1% that they help them spend more time outdoors than they would otherwise.
- Benefits associated with experiencing a break in routine were experienced by 88.9% of respondents.
- Benefits associated with strengthening social ties were mixed. In total, 86.5% reported that hunting enabled them to spend time with people who have a similar outlook, and 82.9% that it enabled them to spend time with friends, suggesting that hunting reinforces existing social ties with like-minded people. Fewer people (although still a majority) meet new people through their hunting (63.0%), or are able to strengthen ties with family members through this activity (57.5%).
- There appear to be benefits associated with feelings of self-efficacy and competency, both traits associated with more positive mental health: hunting led 80.2% of hunters to feel confident.

- 47.3% reported hunting helped them connect to their community.
- Views about the physical risk of hunting varied substantially for different hunters; 38.9% agreed that their hunting trips are physically risky, while 43.7% disagreed.

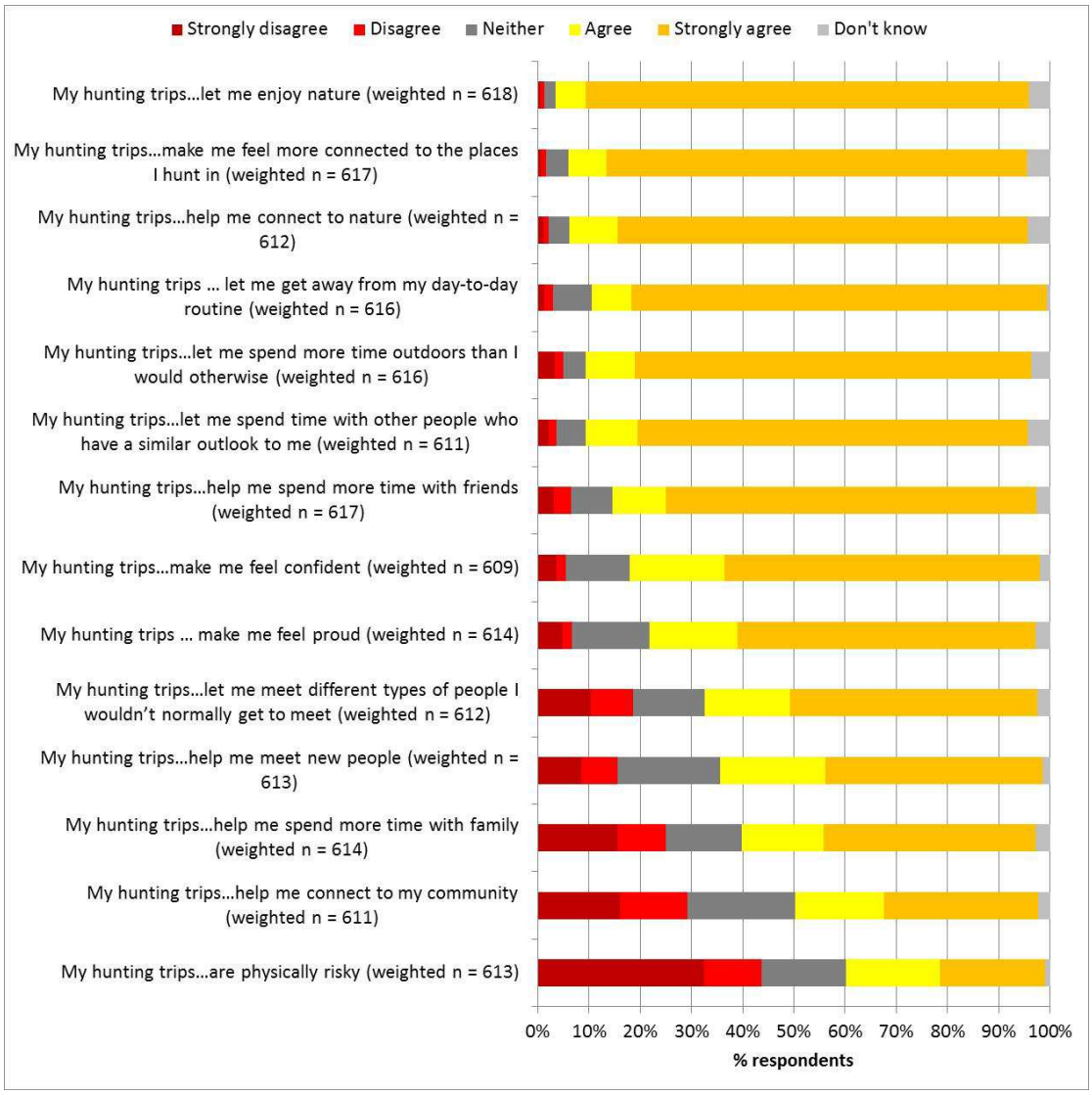


**Figure A2- 7: Social outcomes associated with hunting (weighted data set)**

## Substitutability of social benefits of hunting

Hunting has many social benefits, but these social benefits may not be exclusive to hunting, or to a person's current hunting practices. In other words, it is possible that a person may be able to derive the same social benefits they currently achieve through their hunting activities from alternative activities. This was assessed in the survey in two ways.

First, respondents were asked whether they undertake any of a number of outdoor activities that have some characteristics similar to hunting – for example, they may involve outdoor exercise, or may involve hunting for fish rather than game. If they undertook one or more of these alternative outdoor recreation activities, they were asked if these activities were less important, just as important, or more important than hunting. This was designed to help identify whether the social benefits of hunting are

substitutable by switching to other activities, or are unique to hunting. This information can be used to help estimate the severity of impact of any potential changes that may affect a person's ability to hunt.

Second, the survey examined whether current hunting practices were substitutable for other hunting practices, by asking questions that assessed whether hunters are readily able or willing to change their (i) target animal groups, (ii) hunting location, or (iii) timing of hunting. Similarly to questions on substitutability of hunting with other outdoor activities, this information helps isolate whether the social benefits of hunting are specific to particular forms of hunting, or can be derived from a wide range of hunting experiences.

Figure A2- 8 shows the proportion of hunters who also undertake other outdoor or potentially substitutable recreation activities. In total, 98.9% of hunters participate in at least one other outdoor recreation activity, with only 1.1% reporting they took part in none of the activities listed in Figure A2-8. The most common activities reported were camping and fishing, with 87.6% and 86.8% of hunters also taking part in these activities respectively. The next most common recreational activity was four wheel driving, with 66.0% of hunters reporting they do this. Less than 50% of hunters participate in bushwalking (42.7%), outdoor photography (37.8%), or bird or animal watching (32.2%). Less than 20% participate in skiing (17.1%), mountain biking (10.1%), horse riding (6.6%), or rock climbing (3.9%).

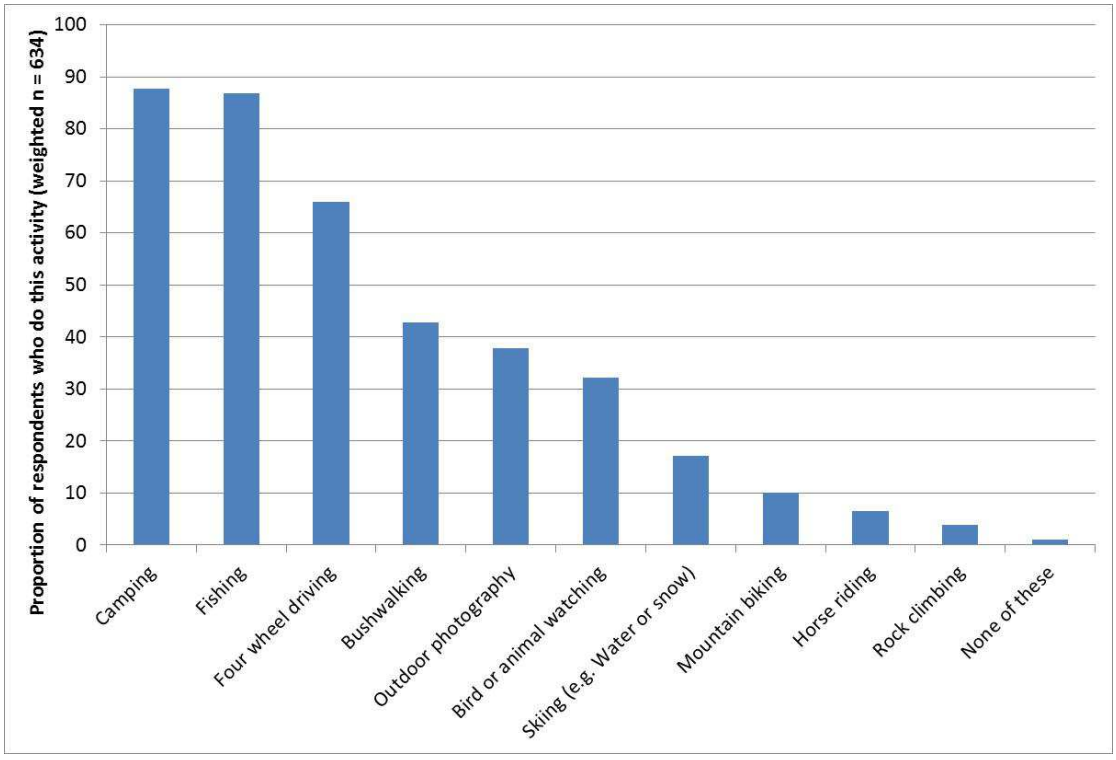


**Figure A2- 8: Proportion of hunters who also take part in other outdoor recreation activities**

Figure A2- 9 shows, for hunters who participated in each outdoor activity, the proportion who rated these as less, equally or more important than their hunting. While very few hunters rated their other outdoor activities more important than hunting, many rated them just as important as their hunting. This suggests some potential substitutability of hunting and other outdoor recreation activities. Activities of equal importance may provide equivalent social benefits and hence a decline in one may be able to be substituted for by increasing the other (although this is a generalisation that will not apply in all circumstances or to all hunters). In total, three outdoor recreation activities – camping, fishing, and bird and animal watching – were rated as 'just as' or 'more' important than hunting by

more than 50% of survey participants. Further work is needed to understand whether and when other outdoor activities may provide similar benefits to hunting, and whether stated opinions, such as those provided by survey respondents, are correlated with actual behaviour when there is a change in the availability of hunting opportunities.

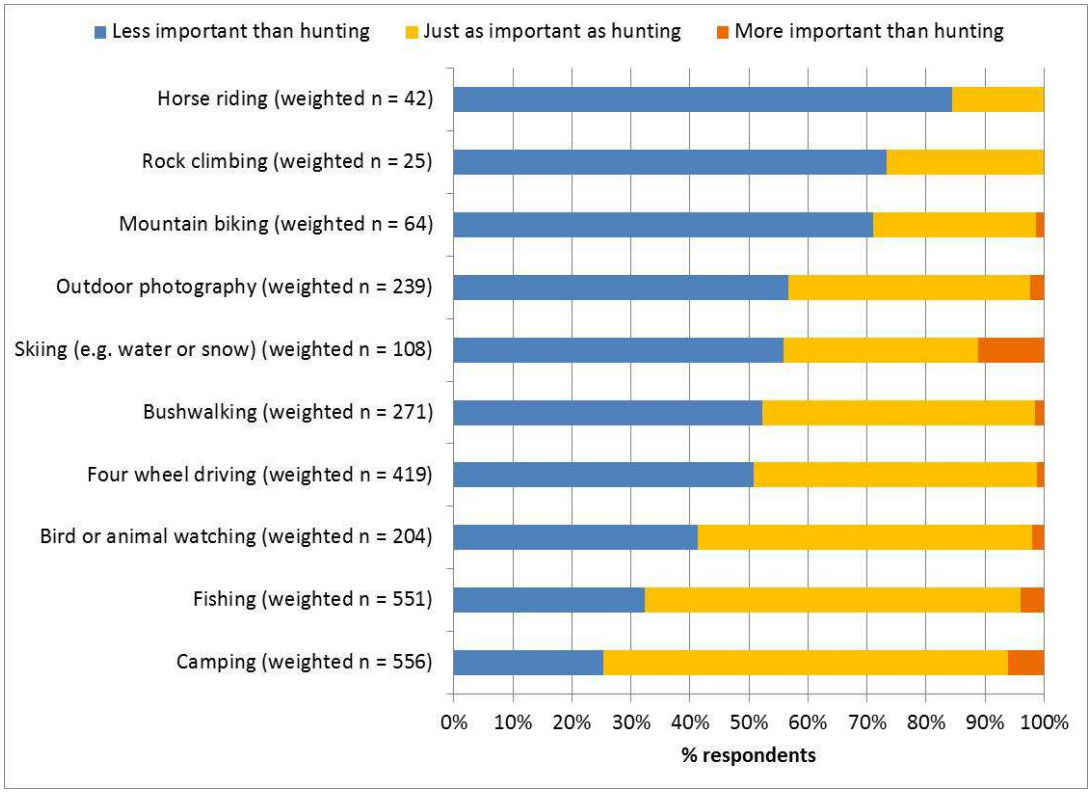


**Figure A2- 9: Importance of other outdoor recreation activities compared to hunting**

The hunting activities of different hunters vary substantially. It is important to explore whether hunters are particularly attached to hunting for specific animal groups, in specific locations, or at particular times of year. This enables a more thorough analysis of how hunters may respond to changes that affect any of these elements of hunting: for example, if it is no longer possible to hunt in their current hunting locations, are they likely to hunt in a new location, or to stop hunting altogether?

Figure A2- 10 presents results of several questions that explored whether hunters are particularly attached to hunting in specific places, for particular animal groups, or at specific times. The first four items examine attachment to place. In total, 64.0% of respondents reported that they usually hunt in the same places each season, only 39.3% that they regularly change where they go hunting, and 85.3% that the places they hunt are special to them. Despite this strong attachment to current hunting locations, a large majority – 82.1% – indicated they would change the place in which they hunt if they could no longer hunt where they currently do. This suggests that, despite having strong attachment to place when hunting, this attachment to place will not lead to a cessation of hunting if current hunting places were no longer available for hunting.

Attachment to hunting for particular animal groups appears somewhat higher: 82.7% of respondents usually hunt for the same type of game, but only 52.4% believe they would enjoy hunting for other animal groups as much as those they currently target, and 57.5% would switch to hunting for other animal groups if those they currently target were not available. This suggests that attachment to hunting for particular animal groups is greater than attachment to particular hunting locations, with

only 57.5% reporting they would switch to hunting for other animal groups if they could no longer hunt for their current target groups, compared to the 82.1% who would swap to hunting in a new location if their usual hunting locations were no longer available.

In terms of timing, only 17.2% indicate they primarily hunt on school holidays or public holidays, suggesting these do not act as constraints on hunting practices.

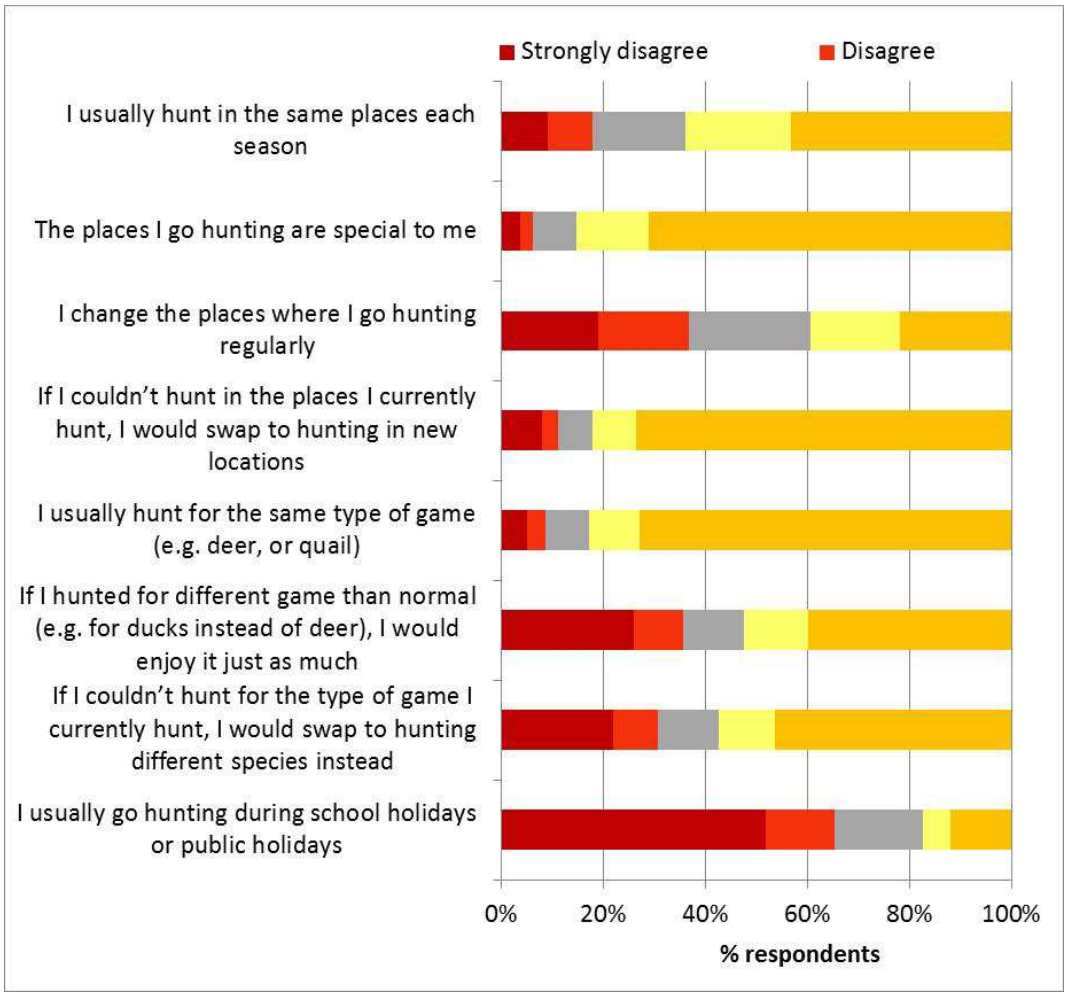


**Figure A2- 10: Attachment to different dimensions of current hunting experience (weight n = 634)**

## Wellbeing of hunters

The overall health and wellbeing of hunters was examined using three commonly used measures: general health, personal wellbeing – measured using the personal wellbeing index (PWI), and social capital, as described in the methods section of this report:

- General health: Of 701 respondents, 28.5% reported being in excellent health, 45.4% in very good health, 21.3% in good health, 3.9% in fair health and 0.9% in poor health.
- Personal wellbeing index (PWI): The average PWI score for people living in Victoria in 2012 was 76.6, while the longer-term average score for Victorians is 75.6 (Cummins 2013). When weighted,

the average for Victorian hunters in this survey was 75.2[25] (n=621). This finding suggests that hunters have similar wellbeing to the Victorian average.

There are two areas of potential bias in the measurement of wellbeing in the survey, however. First, respondents could choose not to complete the wellbeing related questions, and these questions were not included in the CATI survey. Of a total of 731 respondents who were given the option of answering the questions, 718 chose to, with a refusal rate of only 1.8%. This suggests that the level of wellbeing reported is not a consequence of those with higher or lower than average wellbeing opting not to answer these questions.

It is unlikely the bias is substantial enough to negate the difference observed: in other words, even if the survey respondents were biased towards those with higher wellbeing, it appears reasonable to conclude that Victorian hunters have similar wellbeing compared to the average Victorian.

In addition to the measures of general health and PWI, measures of social capital were included in the survey. These measures were included because social capital is a key contributor to a person's wellbeing that may be influenced by hunting (for example, the activity of hunting may assist hunters to maintain and strengthen social ties with the other people they hunt with). However, in this initial report these data are not presented in detail: instead, the social capital index is used only to identify whether social capital was significantly related to differences in the behaviour or characteristics of hunters (see below).

The relationship between the three measures of wellbeing and various aspects of hunting was explored through bivariate analyses, specifically through the Spearman correlation tests and Kruskal-Wallis H tests described in the methods section of this report. A large number of statistically significant relationships were identified, and the strongest of these are summarised below. While complex to explore, the large number of significant relationships identified suggest the following important findings:

- Different types of hunting are associated with different social benefits, and hence with differing wellbeing benefits. In particular, those who hunt for social reasons tend to have higher social capital, and often higher wellbeing.
- Further work could usefully be undertaken to fully statistically model when and what types of hunting are associated with greater wellbeing. This could for example identify different groups or clusters of hunters for whom hunting is more or less important to their wellbeing.

The bivariate analyses suggest that:

- **Frequency of hunting:** More frequent hunters have higher personal wellbeing (p=0.014), and higher social capital (p=0.003), but not significantly better general health, compared to those who hunt less frequently.
- **Hunting expenditure:** Hunters who spent larger amounts on hunting during the last 12 months had moderately personal wellbeing (p=0.010), and better general health, compared to those who spent less (p=0.000), but not significantly higher social capital.
- **Hunting motivations:** Hunters who hunt in order to get away from their day to day routine and those whose hunting makes them feel confident, have significantly higher personal wellbeing

[25] Note that this score was achieved after imputing an average value for one part of the personal wellbeing index to enable it to be compared to the data recorded for Victorians by Cummins 2013.

(p<0.000 in all cases) and social capital (p<0.000 in all cases), but not significantly better general health, than those who do not find these important benefits of their hunting.

- **Perception of risk:** Hunters who perceive their hunting activities as physically risky have significantly lower personal wellbeing (p-0.015) and social capital (p<0.000), but not significantly different general health, than those who do not find their hunting physically risky.
- **Connecting to places and nature:** Hunters who felt their hunting helped them connect to nature, enjoy nature, connect to special places and spend more time outdoors than they would otherwise have significantly personal wellbeing and social capital (p<0.000 in all but one case) but not significantly better general health, than those who do not find these important benefits of their hunting.
- **Connecting to people:** Hunters who felt their hunting helped increase their social capital through meeting new people, spending time with friends, connecting with their community, spending time with family, spending time with similar people, or meeting new people have significantly higher personal wellbeing (p<0.000 in all cases) and social capital (p<0.000 in all but one case), but not significantly better general health, than those who do not find these important benefits of their hunting.
- **Animal groups targeted:** Somewhat complex relationships were evident between attachment to particular target animal groups and wellbeing. Those who typically hunted for the same animal group (rather than a diversity of animal groups) had significantly higher social capital and personal wellbeing than those who hunted for a diversity of animal groups (p<0.000 in both cases).
- **Attachment to hunting in specific places:** Hunters with personal wellbeing and higher social capital were more likely to be willing to shift to hunt in new places compared to those with lower social capital (p=0.000).
- Most important reasons for hunting:
  - Hunters who listed relaxation and unwinding as one of their top five reasons for hunting were significantly more likely to have poor general health (p=0.005) than those who did not consider this one of their most important reasons for hunting.
  - Hunters who listed spending time with family as one of their top five reasons for hunting were significantly more likely to have good general health (p=0.004) than those who did not consider this one of their most important reasons for hunting.
  - Hunters who listed getting away from their day to day routine, and getting away from people, as one of their five most important reasons for hunting had significantly lower social capital compared to other respondents (p=0.020 and 0.000 respectively).
  - Hunters who listed continuing a culture or family tradition as one of their top reasons for hunting had significantly higher social capital (p=0.000) and personal wellbeing (p=0.003) than those who did not.
  - Hunters who listed exercise as one of their top reasons for hunting had significantly lower personal wellbeing (p=0.032) and general health (p=0.000) compared to other respondents.

## Hunting expenditure and hunter characteristics

A brief analysis was undertaken to identify whether the expenditure profile of hunters varies depending on the type of hunting they do. This was done with bivariate analyses comparing

expenditure intensity with various hunter characteristics. Expenditure intensity was based on the total amount reported spend on recurrent items during the past 12 months. Future analyses may be able to draw on more sophisticated expenditure variables estimating total expenditure per hunter in the past 12 months, but were not possible for this stage of the project. See Appendix 3 for the raw data from the analyses.

Hunters who spent more on hunting were more likely than those who spent less to:

- hunt more frequently. This was the strongest predictor of hunting expenditure, with a correlation of 0.477 ($p<0.000$).
- be younger ($p=0.002$)
- have higher household income ($p<0.000$)
- be a member of a hunting or shooting organisation ($p<0.000$)
- report that their hunting made them feel proud ($p<0.000$) and confident ($p=0.004$)
- report that hunting helped them connect to nature and special places (see Appendix 3 for details of significance of each individual finding related to this)
- report that hunting helped them meet new people, spend time with friends, connect with their community, spend time with family and spend time with people with similar outlooks ($p<0.000$ for all), and meet different people they might not have otherwise met ($p=0.005$).
- report that most of their hunting took place in school holidays or on public holidays ($p=0.000$), suggesting that while it is a subset of hunters who hunt in these times, they tend to be higher spending hunters.
- be more willing to swap the animal group they targeted, or the places they hunted in, if changes meant they could no longer hunt the same animal groups or locations they currently do ($p=0.002$ and $p=0.0027$).

## Further analysis

The analysis above highlights the complex social benefits of hunting. The results show that different hunters obtain different types of social benefit from hunting, and suggest that changes to hunting have potential to disrupt these benefits in some cases, while in others hunters are likely to be able to readily shift to new forms of hunting or outdoor recreation. There are clear linkages between taking part in hunting and a person's wellbeing: these are likely to have significant economic benefit in the form of reduced healthcare costs (as explained above).

However, this initial analysis does not fully identify which hunters prioritise which social benefits in what circumstances; or the pathways by which taking part in hunting leads to greater wellbeing. Further analyses of this dataset could examine the following, amongst others:

- segmentation profiling to identify different groups of hunters who have differing types of hunting behaviour, e.g. expenditure, hunting frequency, and animal groups targeted, and who achieves differing mixes of social benefits from hunting. Segmentation analysis is more sophisticated than the relatively simple bivariate analyses, as it can define groups of hunters who have unique sets of characteristics:
    - analysis by region, to identify whether social benefits differ depending on the region in which hunting occurs

- modelling of the likely pathways by which hunting influences a person's wellbeing, and the strength of these relationships. This can provide a more robust analysis of the likelihood that the higher wellbeing of hunters is in part due to their participation in hunting, and provide a basis for estimating the economic benefits of improved health resulting from hunting.
- modelling of likely behavioural responses of different types of hunters to different types of change in access to hunting.

# Appendix 3: Specialist hunting sectors

## Introduction

The purpose of this section of the report is to shed light on niche segments of hunting activity where, by its nature, the survey cannot provide adequate (or any) data. The business types interviewed were hunting guides, private game reserves and taxidermists.

Semi-structured interviews were conducted with a small number of participants from each industry, two hunting guides, two private game reserve owners and one taxidermist. An interview schedule is provided below.

These suggestions and conclusions were drawn from a small number of interviewees; they do not represent a comprehensive picture of the industry or a systematic consultation process. Recommendations made by interviewees have been documented as made by the interviewee; the recommendations have not been subjected to critical analysis or cross-checking with other sources.

## Summary

The three industries have several features in common. All three industries:

- are small, employing less than 20 people each
- sell the services to interstate and international visitors and thus effectively are exporters
- benefit from the unique hunting opportunities in Victoria, to hunt native waterfowl, and the species of deer extant in Victoria that are not available elsewhere
- see long-term future growth in their industry.

## Hunting guides

### Current state of the industry

The hunting guiding industry is currently small and limited to a handful of Victorian guides. Hunting guides are focussed on deer; there are no duck hunting guides that we are aware of. Most guides are part-time, with deer hunting conditions being most favourable in cooler months, when conditions are more comfortable, snakes are less prevalent, and deer tracks are easier to find. The work is physically demanding and skilled. The industry is fairly informal; for instance, it is only in the last few years that guides have started advertising their services. There are also a small number of interstate guides operating in Victoria, enabled by the off-season in other states coinciding with the hunting season in Victoria, but they are probably less numerous than Victorian guides.

Customers originate from Victoria (mostly Melbourne), interstate and overseas. Customers primarily are attracted to Victoria by the opportunity to hunt particular species of deer, in particular sambar and hog deer, for which there are limited hunting opportunities elsewhere in the world (there is limited availability in New Zealand and the United States). The primary target sought by customers of hunting guides is sambar deer, which are elusive, quiet and live in thick, relatively inaccessible forest. Hunting guides operate along the Great Dividing Range in the eastern half of Victoria on private and public land.

Hunting trips are typically multi-day, and customers will spend up to $10,000 per trip including taxidermy services.

### Industry trends and prospects

The market for hunting guides has grown over recent years and the guides interviewed believed that the industry had potential to grow further. The deer population has increased recently and thus the industry does not appear to be limited by opportunities to hunt, although one guide stated a preference to hunt away from other hunters, as other hunters can disturb game. Both guides interviewed reported that there is unmet demand for their services, with both turning away potential customers.

Both interviewees believe that more areas should be opened up for deer hunting, in order to allow more hunting opportunities, and to control deer populations. The US system of tendering out areas to hunting guides was seen to be a worthwhile idea. Bow-hunting could be permitted in areas where safety is a concern.

The interviewees stressed the tourism and export benefits of their operations and believed that the sector would benefit from more promotion of hunting opportunities to potential visitors.

### Threats and risks to the industry

Sambar deer are highly prized because they are difficult and challenging to locate and hunt. One guide believed that if deer numbers became too high, then the high-value markets (such as guiding) would suffer; if deer became too numerous they would lose their game animal status and be perceived as pests that should be eradicated.

Hunting's "social licence" depends on the perception that the safety of hunters and the public is not put at risk by hunting. A hunting-related accident would threaten the social licence under which hunting operates and for that reason, it is important that hunters are adequately trained to minimise the risk of an accident occurring.

## Private game reserves

### Current state of the industry

There are currently six game bird licences and four commercial operations in Victoria, one of these businesses also offers clay target shooting. The farms interviewed employed several workers on a seasonal basis.

Game bird farms primarily cater to interstate (particularly New South Wales and Queensland) and overseas visitors, with visitors originating from areas where it is not possible to hunt game birds (for instance, it is not possible to hunt quail in New South Wales or Queensland).

The industry is subject to climatic conditions, with the supply of birds varying from year to year; the supply of birds declined during the drought.

### Industry trends and prospects

Private game-bird hunting suffered a decline in the last few years, primarily as a result of the drought, which caused a shortage in the supply of birds. Despite this, the business owners interviewed believed that the long-term prospects for private game-bird hunting were good. They consider that a reduction in public hunting areas, decreasing opportunities to hunt duck and quail on private land (due to worries about accidents and liability), opposition to hunting by activists, and increasingly strict regulation of hunters will eventually increase the popularity of hunting on private land. This move to hunting on private game reserves has already occurred internationally.

One interviewee suggested that the industry could benefit from more promotion and marketing.

## Taxidermy

### Current state of the industry

There are 33 taxidermist licence holders in Victoria,[26] with two large operators, which have several employees. While hunters are the primary source of business for taxidermists, they also provide natural history exhibits for museums, visitor centres and so on. The Victorian taxidermy industry is capable of producing detailed, specialised work for high-value customers.

The industry is partly exposed to international supply, as Victorian hunters who are returning from trips elsewhere may have their taxidermy done in that location, and international hunters may also choose to have their animals prepared in Australia or in their home country (or in a third location).

### Industry trends and prospects

The taxidermy industry is growing with the growth in game hunting generally. It is also growing independently of the growth in hunting due to the growing popularity of taxidermy and wildlife collecting itself. As a result of this growth, the number of home-run operators is increasing, and the size of the large operators is also growing incrementally.

### Threats and risks to the industry

At present, the industry is lightly regulated, with operators required only to pay a licence fee: there is no requirement for taxidermists to produce work to a certain standard or quality. It is thought by some operators that this lack of regulation, combined with the presence of part-time operators who could have a limited investment in the industry, could mean that poor work is produced that may injure the reputation of the entire Victorian industry.

There are elements of taxidermy work that are not perceptible to the consumer on purchase, in particular the longevity of a piece of work. Some customers, particularly those with a limited contact with suppliers, such as international or interstate hunters, rely heavily on the reputation of the industry as a whole when making a purchase.

For this reason, it is believed that industry reputation is important, particular for customers who are not able to assess the quality of a particular business. This is particularly true of international or interstate customers. Because of this, some taxidermists believe there is an argument for an accreditation (or

[26] Department of Sustainability and Environment (2013) *Wildlife regulations 2013: Regulatory Impact Statement* (Victorian Government: Melbourne)

equivalent) scheme that would assess a minimum level of competence, particularly to ensure that works are properly preserved.

### Opportunities

Hunting by international hunters has recently been facilitated with the introduction of the special licence categories that avoid the need for rigorous testing granted the hunter is accompanied by a licensed hunter. It is believed that this could create further demand for Victorian taxidermists, particularly if they are well-recognised overseas and can facilitate the movement of animals through border controls.

## Guide to the interviews for the specialised hunting sectors

The information for this section was garnered through semi-structured interviews with industry participants. The following is an outline of the interview structure:

- Type of business – services offered
- Location of business and industry
- Where are customers from?
- Typical spend by a single customer
- Are there any high-value customers?
- Employment
- How many such companies are there?
- Has the industry been expanding or contracting?
- Future expansion of the industry? What would it take for the industry to expand?
- Policy barriers to expansion?

# Appendix 4: Hunting expenditure[27] and economic impact by town and by animal group

**Table A4- 1: Towns with deer hunting expenditure of $0.5 million or more**

| Town | LGA | Expenditure ($m) | Percentage of LGA Total |
|---|---|---|---|
| MANSFIELD | Mansfield (S) | 5.2 | 70% |
| BEVERIDGE | Mitchell (S) | 4.2 | 51% |
| TRARALGON | Latrobe (C) | 3.8 | 58% |
| WODONGA | Wodonga (RC) | 3.8 | 99% |
| SALE | Wellington (S) | 2.9 | 33% |
| BAIRNSDALE | East Gippsland (S) | 2.5 | 50% |
| BALLARAT | Ballarat (C) | 2.5 | 82% |
| ALEXANDRA | Murrindindi (S) | 2.5 | 63% |
| SEYMOUR | Mitchell (S) | 2.1 | 26% |
| SHEPPARTON | Greater Shepparton (C) | 2.1 | 86% |
| DARGO | Wellington (S) | 2.1 | 23% |
| WANGARATTA | Wangaratta (RC) | 1.8 | 78% |
| DROUIN | Baw Baw (S) | 1.6 | 31% |
| GEELONG | Greater Geelong (C) | 1.4 | 86% |
| KILMORE | Mitchell (S) | 1.4 | 18% |
| TOONGABBIE | Latrobe (C) | 1.4 | 21% |
| MAFFRA | Wellington (S) | 1.2 | 14% |
| LICOLA | Wellington (S) | 1.1 | 13% |
| MORWELL | Latrobe (C) | 0.9 | 14% |
| WARRNAMBOOL | Warrnambool (C) | 0.9 | 100% |
| BENDIGO | Greater Bendigo (C) | 0.8 | 86% |
| KERANG | Gannawarra (S) | 0.8 | 99% |
| MITTA MITTA | Towong (S) | 0.8 | 55% |
| MYRTLEFORD | Alpine (S) | 0.8 | 35% |
| BRIGHT | Alpine (S) | 0.8 | 35% |
| COWES | Bass Coast (S) | 0.8 | 50% |
| JAMIESON | Mansfield (S) | 0.7 | 9% |
| WILLOW GROVE | Baw Baw (S) | 0.6 | 12% |
| EILDON | Murrindindi (S) | 0.6 | 15% |
| ERICA | Baw Baw (S) | 0.6 | 11% |
| ORBOST | East Gippsland (S) | 0.6 | 11% |
| WIMBLEDON HEIGHTS | Bass Coast (S) | 0.6 | 37% |
| TIMBOON | Corangamite (S) | 0.5 | 94% |
| HAMILTON | Southern Grampians (S) | 0.5 | 83% |
| HEYFIELD | Wellington (S) | 0.5 | 6% |

[27] Includes trip and non-trip expenditures

**Table A4- 2: Towns with duck hunting expenditure of $0.5 million or more**

| Town | LGA | Expenditure ($m) | Percentage of LGA Total |
|---|---|---|---|
| ROSEDALE | Wellington (S) | 5.4 | 73% |
| GEELONG | Greater Geelong (C) | 4.9 | 64% |
| BARNADOWN | Greater Bendigo (C) | 4.5 | 54% |
| TRARALGON | Latrobe (C) | 3.6 | 76% |
| SHEPPARTON | Greater Shepparton (C) | 3.0 | 65% |
| KERANG | Gannawarra (S) | 2.9 | 91% |
| HIGHTON | Greater Geelong (C) | 1.9 | 24% |
| BAIRNSDALE | East Gippsland (S) | 1.8 | 76% |
| STRATHDALE | Greater Bendigo (C) | 1.7 | 20% |
| BENDIGO | Greater Bendigo (C) | 1.5 | 18% |
| WANGARATTA | Wangaratta (RC) | 1.5 | 94% |
| BARRAPORT | Loddon (S) | 1.5 | 54% |
| SWAN HILL PIONEER | Swan Hill (RC) | 1.3 | 97% |
| WODONGA | Wodonga (RC) | 1.2 | 100% |
| BIDDLES BEACH | Colac-Otway (S) | 1.2 | 58% |
| BALLARAT | Ballarat (C) | 1.1 | 91% |
| PYRAMID HILL | Loddon (S) | 1.0 | 38% |
| JALLUMBA | Horsham (RC) | 0.9 | 92% |
| MARYVALE | Latrobe (C) | 0.8 | 16% |
| CULGOA | Buloke (S) | 0.8 | 91% |
| TAMLEUGH | Greater Shepparton (C) | 0.7 | 15% |
| CHAPPLE VALE | Colac-Otway (S) | 0.6 | 30% |
| ERICA | Baw Baw (S) | 0.5 | 38% |
| ECHUCA | Campaspe (S) | 0.5 | 38% |
| ROCHESTER | Campaspe (S) | 0.5 | 38% |
| SEYMOUR | Mitchell (S) | 0.5 | 84% |

**Table A4- 3: Towns with quail hunting expenditure of $0.5 million or more**

| Town | LGA | Expenditure ($m) | Percentage of LGA Total |
|---|---|---|---|
| GEELONG | Greater Geelong (C) | 2.4 | 93% |
| BARNADOWN | Greater Bendigo (C) | 1.6 | 74% |
| SHEPPARTON | Greater Shepparton (C) | 1.5 | 95% |
| MARYVALE | Latrobe (C) | 1.4 | 72% |
| ROSEDALE | Wellington (S) | 0.7 | 88% |
| BAIRNSDALE | East Gippsland (S) | 0.6 | 88% |
| WANGARATTA | Wangaratta (RC) | 0.6 | 96% |
| BALLARAT | Ballarat (C) | 0.5 | 99% |
| TRARALGON | Latrobe (C) | 0.5 | 26% |

**Table A4- 4: Towns with pest animal hunting expenditure of $0.5 million or more**

| Town | LGA | Expenditure ($m) | Percentage of LGA Total |
|---|---|---|---|
| MANSFIELD | Mansfield (S) | 5.3 | 80% |
| KERANG | Gannawarra (S) | 5.0 | 85% |
| HILL END | Baw Baw (S) | 3.9 | 39% |
| TRARALGON | Latrobe (C) | 3.9 | 80% |
| ALEXANDRA | Murrindindi (S) | 3.9 | 66% |
| DRIFFIELD | Baw Baw (S) | 3.9 | 38% |
| INVERLEIGH | Golden Plains (S) | 3.6 | 74% |
| MERRINEE | Mildura (RC) | 3.2 | 79% |
| WODONGA | Wodonga (RC) | 3.1 | 99% |
| STRATHDALE | Greater Bendigo (C) | 2.8 | 50% |
| ROCHESTER | Campaspe (S) | 2.8 | 70% |
| ROSEDALE | Wellington (S) | 2.6 | 30% |
| ROMSEY | Macedon Ranges (S) | 1.9 | 34% |
| KIALLA | Greater Shepparton (C) | 1.9 | 35% |
| SEYMOUR | Mitchell (S) | 1.6 | 45% |
| TAMLEUGH | Greater Shepparton (C) | 1.5 | 28% |
| SHEPPARTON | Greater Shepparton (C) | 1.5 | 28% |
| COWA | Wellington (S) | 1.3 | 15% |
| YEA | Murrindindi (S) | 1.2 | 21% |
| WOODEND | Macedon Ranges (S) | 1.2 | 21% |
| GRITJURK | Southern Grampians (S) | 1.2 | 78% |
| LANCEFIELD | Macedon Ranges (S) | 1.2 | 21% |
| BARNADOWN | Greater Bendigo (C) | 1.2 | 21% |
| GLENMAGGIE | Wellington (S) | 1.1 | 13% |
| STRATFORD | Wellington (S) | 1.0 | 12% |
| BENALLA | Benalla (RC) | 1.0 | 80% |
| LOCH SPORT | Wellington (S) | 0.9 | 11% |
| WANGARATTA | Wangaratta (RC) | 0.9 | 67% |
| BRIGHT | Alpine (S) | 0.9 | 64% |
| LAKE TYERS | East Gippsland (S) | 0.9 | 30% |
| KYNETON | Macedon Ranges (S) | 0.8 | 15% |
| BONNIE DOON | Mansfield (S) | 0.8 | 13% |
| CULGOA | Buloke (S) | 0.8 | 78% |
| BACCHUS MARSH | Moorabool (S) | 0.8 | 53% |
| TELFORD | Moira (S) | 0.8 | 55% |
| ECHUCA | Campaspe (S) | 0.7 | 18% |
| GEELONG | Greater Geelong (C) | 0.7 | 31% |
| BAIRNSDALE | East Gippsland (S) | 0.7 | 23% |
| YARRAM | Wellington (S) | 0.6 | 7% |
| CLIFTON SPRINGS | Greater Geelong (C) | 0.6 | 30% |
| ERICA | Baw Baw (S) | 0.6 | 6% |
| MEREDITH | Golden Plains (S) | 0.6 | 12% |
| KARADOC | Mildura (RC) | 0.6 | 15% |
| KILMORE | Mitchell (S) | 0.6 | 17% |
| JALLUMBA | Horsham (RC) | 0.6 | 86% |
| MOUNT ALFRED | Towong (S) | 0.6 | 56% |
| TRAWOOL | Mitchell (S) | 0.6 | 16% |
| STEIGLITZ | Golden Plains (S) | 0.6 | 11% |
| BENDIGO | Greater Bendigo (C) | 0.5 | 10% |
| BEREMBOKE | Moorabool (S) | 0.5 | 34% |

## Table A4- 5: Economic impact of hunting by key towns, all animal groups, 2013

| | | Expenditure | Gross Regional Product ($m) | | | Employment (fte) | | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Town | LGA | ($m) | Direct | Flow-on | Total | Direct | Share[a] | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| TRARALGON | Latrobe (C) | 13.2 | 4.7 | 2.3 | 7.0 | 41 | 0.4% | 17 | 58 | 50 | 20 | 70 | 2.6 | 1.3 | 3.9 | 96 |
| ROSEDALE | Wellington (S) | 11.7 | 4.4 | 1.5 | 5.9 | 34 | 8.1% | 12 | 46 | 39 | 13 | 52 | 2.0 | 0.8 | 2.9 | 89 |
| MANSFIELD | Mansfield (S) | 10.9 | 4.1 | 1.6 | 5.7 | 49 | 3.8% | 16 | 65 | 56 | 18 | 74 | 2.1 | 0.9 | 3.0 | 106 |
| GEELONG | Greater Geelong (C) | 9.5 | 3.3 | 2.4 | 5.7 | 36 | 0.1% | 20 | 56 | 42 | 22 | 64 | 2.0 | 1.4 | 3.4 | 111 |
| KERANG | Gannawarra (S) | 8.9 | 3.6 | 1.4 | 5.0 | 49 | 4.0% | 15 | 64 | 51 | 16 | 67 | 1.9 | 0.7 | 2.7 | 129 |
| WODONGA | Wodonga (RC) | 8.4 | 2.9 | 1.6 | 4.5 | 29 | 0.2% | 14 | 43 | 33 | 15 | 47 | 1.6 | 0.9 | 2.5 | 96 |
| BARNADOWN | Greater Bendigo (C) | 8.1 | 2.6 | 1.8 | 4.4 | 27 | NA | 15 | 42 | 32 | 17 | 49 | 1.4 | 1.0 | 2.4 | 87 |
| SHEPPARTON | Greater Shepparton (C) | 8.1 | 2.9 | 1.8 | 4.8 | 37 | 0.2% | 18 | 55 | 43 | 19 | 62 | 1.8 | 1.0 | 2.8 | 100 |
| ALEXANDRA | Murrindindi (S) | 6.3 | 2.7 | 0.9 | 3.7 | 29 | 3.2% | 9 | 37 | 34 | 9 | 43 | 1.5 | 0.5 | 2.0 | 58 |
| BAIRNSDALE | East Gippsland (S) | 5.6 | 2.0 | 0.9 | 2.9 | 21 | 0.5% | 9 | 31 | 25 | 10 | 35 | 1.0 | 0.5 | 1.5 | 56 |
| DRIFFIELD | Baw Baw (S) | 5.5 | 2.0 | 1.3 | 3.3 | 24 | NA | 11 | 35 | 27 | 12 | 39 | 1.2 | 0.7 | 1.9 | 77 |
| WANGARATTA | Wangaratta (RC) | 4.7 | 1.6 | 0.9 | 2.4 | 17 | 0.3% | 9 | 26 | 21 | 10 | 31 | 0.8 | 0.5 | 1.3 | 52 |
| BALLARAT | Ballarat (C) | 4.6 | 1.4 | 1.1 | 2.4 | 16 | 0.0% | 9 | 25 | 18 | 10 | 29 | 0.9 | 0.6 | 1.5 | 57 |
| STRATHDALE | Greater Bendigo (C) | 4.6 | 1.5 | 1.0 | 2.5 | 15 | NA | 9 | 24 | 18 | 10 | 28 | 0.8 | 0.5 | 1.4 | 49 |
| HILL END | Baw Baw (S) | 4.4 | 1.6 | 1.0 | 2.6 | 19 | NA | 9 | 27 | 21 | 10 | 31 | 1.0 | 0.6 | 1.5 | 61 |
| SEYMOUR | Mitchell (S) | 4.3 | 1.4 | 0.6 | 2.0 | 15 | 0.7% | 6 | 20 | 18 | 6 | 24 | 0.8 | 0.3 | 1.2 | 40 |
| BEVERIDGE | Mitchell (S) | 4.2 | 1.3 | 0.6 | 1.9 | 14 | NA | 5 | 19 | 17 | 6 | 23 | 0.8 | 0.3 | 1.1 | 38 |
| MERRINEE | Mildura (RC) | 4.0 | 1.6 | 0.4 | 2.0 | 8 | NA | 4 | 12 | 9 | 5 | 14 | 0.4 | 0.2 | 0.6 | 21 |
| INVERLEIGH | Golden Plains (S) | 4.0 | 1.4 | 0.5 | 1.9 | 14 | 4.2% | 4 | 17 | 23 | 4 | 27 | 0.8 | 0.2 | 1.0 | 42 |
| MARYVALE | Latrobe (C) | 3.5 | 1.2 | 0.6 | 1.9 | 11 | NA | 5 | 15 | 13 | 5 | 19 | 0.7 | 0.3 | 1.0 | 25 |

[a] 'Share' represents the direct employment attributable to hunting as a percentage of total fte employment in the town.

## Table A4- 6: Economic impact of deer hunting by key towns, 2013

| | | Expenditure | Gross Regional Product ($m) | | | Employment (fte) | | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Town | LGA | ($m) | Direct | Flow-on | Total | Direct | Share[a] | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| MANSFIELD | Mansfield (S) | 5.2 | 1.9 | 0.8 | 2.7 | 24 | 1.9% | 8 | 32 | 28 | 9 | 37 | 1.1 | 0.4 | 1.5 | 50 |
| BEVERIDGE | Mitchell (S) | 4.2 | 1.2 | 0.5 | 1.8 | 13 | NA | 5 | 18 | 15 | 6 | 21 | 0.7 | 0.3 | 1.0 | 34 |
| TRARALGON | Latrobe (C) | 3.8 | 1.3 | 0.7 | 2.0 | 11 | 0.1% | 5 | 16 | 14 | 5 | 19 | 0.7 | 0.4 | 1.1 | 25 |
| WODONGA | Wodonga (RC) | 3.8 | 1.3 | 0.8 | 2.1 | 14 | 0.1% | 7 | 21 | 16 | 7 | 23 | 0.8 | 0.4 | 1.2 | 46 |
| SALE | Wellington (S) | 2.9 | 1.1 | 0.3 | 1.4 | 7 | 0.1% | 3 | 10 | 9 | 3 | 12 | 0.4 | 0.2 | 0.6 | 19 |
| BAIRNSDALE | East Gippsland (S) | 2.5 | 1.0 | 0.4 | 1.4 | 10 | 0.2% | 4 | 15 | 12 | 5 | 16 | 0.5 | 0.2 | 0.7 | 26 |
| BALLARAT | Ballarat (C) | 2.5 | 0.7 | 0.5 | 1.2 | 8 | 0.0% | 5 | 12 | 9 | 5 | 14 | 0.4 | 0.3 | 0.8 | 28 |
| ALEXANDRA | Murrindindi (S) | 2.5 | 1.0 | 0.4 | 1.4 | 11 | 1.2% | 3 | 14 | 13 | 4 | 17 | 0.6 | 0.2 | 0.8 | 21 |
| SEYMOUR | Mitchell (S) | 2.1 | 0.6 | 0.3 | 0.9 | 7 | 0.3% | 2 | 9 | 8 | 3 | 11 | 0.4 | 0.2 | 0.5 | 17 |
| SHEPPARTON | Greater Shepparton (C) | 2.1 | 0.8 | 0.5 | 1.3 | 10 | 0.1% | 5 | 15 | 12 | 5 | 17 | 0.5 | 0.3 | 0.8 | 26 |
| DARGO | Wellington (S) | 2.1 | 0.8 | 0.2 | 1.0 | 5 | NA | 2 | 7 | 6 | 2 | 8 | 0.3 | 0.1 | 0.4 | 13 |
| WANGARATTA | Wangaratta (RC) | 1.8 | 0.6 | 0.3 | 0.9 | 6 | 0.1% | 3 | 10 | 8 | 4 | 11 | 0.3 | 0.2 | 0.5 | 19 |
| DROUIN | Baw Baw (S) | 1.6 | 0.6 | 0.3 | 0.9 | 6 | NA | 3 | 9 | 7 | 3 | 11 | 0.3 | 0.2 | 0.5 | 20 |
| GEELONG | Greater Geelong (C) | 1.4 | 0.5 | 0.4 | 0.9 | 6 | 0.0% | 3 | 9 | 6 | 4 | 10 | 0.3 | 0.2 | 0.5 | 17 |
| KILMORE | Mitchell (S) | 1.4 | 0.4 | 0.2 | 0.6 | 4 | 0.2% | 2 | 6 | 5 | 2 | 7 | 0.2 | 0.1 | 0.3 | 12 |
| TOONGABBIE | Latrobe (C) | 1.4 | 0.5 | 0.2 | 0.7 | 4 | 2.1% | 2 | 6 | 5 | 2 | 7 | 0.3 | 0.1 | 0.4 | 9 |
| MAFFRA | Wellington (S) | 1.2 | 0.5 | 0.1 | 0.6 | 3 | 0.2% | 1 | 4 | 4 | 1 | 5 | 0.2 | 0.1 | 0.3 | 8 |
| LICOLA | Wellington (S) | 1.1 | 0.4 | 0.1 | 0.5 | 3 | 0.1% | 1 | 4 | 3 | 1 | 4 | 0.2 | 0.1 | 0.2 | 7 |
| MORWELL | Latrobe (C) | 0.9 | 0.3 | 0.2 | 0.5 | 3 | 0.1% | 1 | 4 | 3 | 1 | 5 | 0.2 | 0.1 | 0.3 | 6 |
| WARRNAMBOOL | Warrnambool (C) | 0.9 | 0.3 | 0.2 | 0.5 | 3 | 0.0% | 2 | 5 | 4 | 2 | 6 | 0.2 | 0.1 | 0.3 | 8 |

[a] 'Share' represents the direct employment attributable to hunting as a percentage of total fte employment in the town.

## Table A4- 7: Economic impact of duck hunting by key towns, 2013

| | | Expenditure | Gross Regional Product ($m) | | | Employment (fte) | | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Town | LGA | ($m) | Direct | Flow-on | Total | Direct | Share[a] | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| ROSEDALE | Wellington (S) | 5.4 | 2.1 | 0.7 | 2.8 | 16 | 3.9% | 6 | 22 | 18 | 6 | 25 | 1.0 | 0.4 | 1.4 | 41 |
| GEELONG | Greater Geelong (C) | 4.9 | 1.8 | 1.3 | 3.1 | 21 | 0.0% | 11 | 32 | 24 | 12 | 36 | 1.1 | 0.8 | 1.9 | 60 |
| BARNADOWN | Greater Bendigo (C) | 4.5 | 1.5 | 1.0 | 2.5 | 16 | NA | 9 | 25 | 19 | 10 | 28 | 0.8 | 0.6 | 1.4 | 49 |
| TRARALGON | Latrobe (C) | 3.6 | 1.3 | 0.6 | 1.9 | 11 | 0.1% | 5 | 15 | 13 | 5 | 19 | 0.7 | 0.3 | 1.0 | 24 |
| SHEPPARTON | Greater Shepparton (C) | 3.0 | 1.1 | 0.7 | 1.7 | 13 | 0.1% | 6 | 20 | 15 | 7 | 22 | 0.6 | 0.4 | 1.0 | 35 |
| KERANG | Gannawarra (S) | 2.9 | 1.2 | 0.4 | 1.6 | 14 | 1.2% | 4 | 19 | 15 | 5 | 20 | 0.6 | 0.2 | 0.8 | 36 |
| HIGHTON | Greater Geelong (C) | 1.9 | 0.7 | 0.5 | 1.2 | 8 | NA | 4 | 12 | 9 | 5 | 14 | 0.4 | 0.3 | 0.7 | 23 |
| BAIRNSDALE | East Gippsland (S) | 1.8 | 0.7 | 0.3 | 1.0 | 8 | 0.2% | 3 | 11 | 9 | 4 | 12 | 0.4 | 0.2 | 0.6 | 19 |
| STRATHDALE | Greater Bendigo (C) | 1.7 | 0.6 | 0.4 | 0.9 | 6 | NA | 3 | 9 | 7 | 4 | 11 | 0.3 | 0.2 | 0.5 | 19 |
| BENDIGO | Greater Bendigo (C) | 1.5 | 0.5 | 0.3 | 0.9 | 5 | 0.0% | 3 | 8 | 6 | 3 | 10 | 0.3 | 0.2 | 0.5 | 17 |
| WANGARATTA | Wangaratta (RC) | 1.5 | 0.5 | 0.3 | 0.8 | 6 | 0.1% | 3 | 9 | 7 | 3 | 11 | 0.3 | 0.2 | 0.5 | 18 |
| BARRAPORT | Loddon (S) | 1.5 | 0.6 | 0.1 | 0.7 | 5 | NA | 1 | 6 | 6 | 1 | 7 | 0.2 | 0.0 | 0.3 | 10 |
| SWAN HILL PIONE | Swan Hill (RC) | 1.3 | 0.5 | 0.2 | 0.8 | 7 | 0.2% | 2 | 9 | 8 | 2 | 10 | 0.3 | 0.1 | 0.4 | 16 |
| WODONGA | Wodonga (RC) | 1.2 | 0.4 | 0.2 | 0.6 | 4 | 0.0% | 2 | 6 | 4 | 2 | 6 | 0.2 | 0.1 | 0.3 | 13 |
| BIDDLES BEACH | Colac-Otway (S) | 1.2 | 0.5 | 0.2 | 0.7 | 5 | NA | 2 | 7 | 6 | 2 | 9 | 0.3 | 0.1 | 0.4 | 13 |
| BALLARAT | Ballarat (C) | 1.1 | 0.4 | 0.3 | 0.7 | 5 | 0.0% | 3 | 7 | 5 | 3 | 8 | 0.3 | 0.2 | 0.4 | 16 |
| PYRAMID HILL | Loddon (S) | 1.0 | 0.4 | 0.1 | 0.5 | 4 | 3.4% | 1 | 4 | 4 | 1 | 5 | 0.2 | 0.0 | 0.2 | 7 |
| JALLUMBA | Horsham (RC) | 0.9 | 0.4 | 0.2 | 0.5 | 4 | NA | 2 | 5 | 4 | 2 | 6 | 0.2 | 0.1 | 0.3 | 10 |
| MARYVALE | Latrobe (C) | 0.8 | 0.3 | 0.1 | 0.4 | 2 | NA | 1 | 3 | 3 | 1 | 4 | 0.2 | 0.1 | 0.2 | 5 |
| CULGOA | Buloke (S) | 0.8 | 0.3 | 0.1 | 0.4 | 3 | NA | 1 | 4 | 3 | 1 | 4 | 0.1 | 0.0 | 0.2 | 8 |

[a] 'Share' represents the direct employment attributable to hunting as a percentage of total fte employment in the town.

## Table A4- 8: Economic impact of quail hunting by key towns, 2013

| | | Expenditure | Gross Regional Product ($m) | | | Employment (fte) | | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Town | LGA | ($m) | Direct | Flow-on | Total | Direct | Share[a] | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| GEELONG | Greater Geelong (C) | 2.4 | 0.7 | 0.5 | 1.2 | 7 | 0.0% | 4 | 12 | 9 | 5 | 14 | 0.4 | 0.3 | 0.7 | 23 |
| BARNADOWN | Greater Bendigo (C) | 1.6 | 0.4 | 0.3 | 0.6 | 4 | NA | 2 | 6 | 5 | 3 | 7 | 0.2 | 0.1 | 0.4 | 13 |
| SHEPPARTON | Greater Shepparton (C) | 1.5 | 0.6 | 0.4 | 1.0 | 8 | 0.0% | 4 | 12 | 9 | 4 | 13 | 0.4 | 0.2 | 0.6 | 21 |
| MARYVALE | Latrobe (C) | 1.4 | 0.6 | 0.3 | 0.9 | 5 | NA | 2 | 8 | 7 | 3 | 9 | 0.4 | 0.2 | 0.5 | 13 |
| ROSEDALE | Wellington (S) | 0.7 | 0.2 | 0.1 | 0.3 | 2 | 0.4% | 1 | 3 | 2 | 1 | 3 | 0.1 | 0.0 | 0.2 | 5 |
| BAIRNSDALE | East Gippsland (S) | 0.6 | 0.2 | 0.1 | 0.3 | 2 | 0.0% | 1 | 3 | 2 | 1 | 3 | 0.1 | 0.0 | 0.2 | 5 |
| WANGARATTA | Wangaratta (RC) | 0.6 | 0.1 | 0.1 | 0.2 | 2 | 0.0% | 1 | 3 | 2 | 1 | 3 | 0.1 | 0.1 | 0.1 | 5 |
| BALLARAT | Ballarat (C) | 0.5 | 0.1 | 0.1 | 0.2 | 2 | 0.0% | 1 | 2 | 2 | 1 | 3 | 0.1 | 0.1 | 0.1 | 5 |
| TRARALGON | Latrobe (C) | 0.5 | 0.2 | 0.1 | 0.3 | 2 | 0.0% | 1 | 3 | 2 | 1 | 3 | 0.1 | 0.1 | 0.2 | 5 |
| BENDIGO | Greater Bendigo (C) | 0.4 | 0.1 | 0.1 | 0.2 | 1 | 0.0% | 1 | 2 | 1 | 1 | 2 | 0.1 | 0.0 | 0.1 | 4 |
| WODONGA | Wodonga (RC) | 0.4 | 0.1 | 0.1 | 0.1 | 1 | 0.0% | 0 | 1 | 1 | 0 | 2 | 0.1 | 0.0 | 0.1 | 3 |
| CULGOA | Buloke (S) | 0.4 | 0.1 | 0.0 | 0.2 | 1 | NA | 0 | 2 | 1 | 0 | 2 | 0.1 | 0.0 | 0.1 | 3 |
| CHAPPLE VALE | Colac-Otway (S) | 0.3 | 0.1 | 0.1 | 0.2 | 2 | NA | 1 | 2 | 2 | 1 | 3 | 0.1 | 0.0 | 0.1 | 4 |
| JALLUMBA | Horsham (RC) | 0.3 | 0.1 | 0.1 | 0.2 | 2 | NA | 1 | 2 | 2 | 1 | 3 | 0.1 | 0.0 | 0.1 | 5 |
| ECHUCA | Campaspe (S) | 0.2 | 0.1 | 0.0 | 0.1 | 1 | 0.0% | 0 | 2 | 1 | 0 | 2 | 0.1 | 0.0 | 0.1 | 3 |
| MERRINEE | Mildura (RC) | 0.2 | 0.0 | 0.0 | 0.1 | 1 | NA | 0 | 1 | 1 | 0 | 1 | 0.0 | 0.0 | 0.0 | 1 |
| MINYIP | Yarriambiack (S) | 0.1 | 0.0 | 0.0 | 0.0 | 0 | 0.4% | 0 | 1 | 1 | 0 | 1 | 0.0 | 0.0 | 0.0 | 1 |

[a] 'Share' represents the direct employment attributable to hunting as a percentage of total fte employment in the town.

## Table A4- 9: Economic impact of pest animal hunting by key towns, 2013

| | | Expenditure | Gross Regional Product ($m) | | | Employment (fte) | | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Town | LGA | ($m) | Direct | Flow-on | Total | Direct | Share[a] | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| MANSFIELD | Mansfield (S) | 5.3 | 2.0 | 0.7 | 2.8 | 23 | 1.8% | 8 | 30 | 26 | 8 | 34 | 1.0 | 0.4 | 1.4 | 54 |
| KERANG | Gannawarra (S) | 5.0 | 2.0 | 0.8 | 2.9 | 30 | 2.4% | 9 | 38 | 30 | 10 | 40 | 1.1 | 0.4 | 1.6 | 83 |
| HILL END | Baw Baw (S) | 3.9 | 1.4 | 0.9 | 2.4 | 18 | NA | 8 | 26 | 20 | 9 | 29 | 0.9 | 0.5 | 1.4 | 62 |
| TRARALGON | Latrobe (C) | 3.9 | 1.4 | 0.7 | 2.1 | 12 | 0.1% | 5 | 16 | 15 | 6 | 20 | 0.7 | 0.4 | 1.1 | 31 |
| ALEXANDRA | Murrindindi (S) | 3.9 | 1.7 | 0.6 | 2.2 | 18 | 2.0% | 5 | 23 | 21 | 6 | 26 | 0.9 | 0.3 | 1.2 | 39 |
| DRIFFIELD | Baw Baw (S) | 3.9 | 1.4 | 0.9 | 2.3 | 17 | NA | 8 | 25 | 20 | 9 | 29 | 0.9 | 0.5 | 1.4 | 61 |
| INVERLEIGH | Golden Plains (S) | 3.6 | 1.3 | 0.4 | 1.7 | 12 | 3.8% | 3 | 16 | 21 | 4 | 25 | 0.7 | 0.2 | 0.9 | 41 |
| MERRINEE | Mildura (RC) | 3.2 | 1.3 | 0.3 | 1.6 | 5 | NA | 3 | 8 | 6 | 3 | 9 | 0.2 | 0.2 | 0.4 | 14 |
| WODONGA | Wodonga (RC) | 3.1 | 1.1 | 0.6 | 1.7 | 10 | 0.1% | 5 | 15 | 12 | 5 | 17 | 0.6 | 0.3 | 0.9 | 35 |
| STRATHDALE | Greater Bendigo (C) | 2.8 | 1.0 | 0.6 | 1.6 | 9 | NA | 5 | 15 | 11 | 6 | 17 | 0.5 | 0.3 | 0.8 | 33 |
| ROCHESTER | Campaspe (S) | 2.8 | 1.0 | 0.4 | 1.4 | 9 | 1.0% | 4 | 13 | 11 | 4 | 15 | 0.5 | 0.2 | 0.7 | 29 |
| ROSEDALE | Wellington (S) | 2.6 | 1.0 | 0.4 | 1.4 | 9 | 2.0% | 3 | 12 | 10 | 3 | 13 | 0.5 | 0.2 | 0.7 | 24 |
| ROMSEY | Macedon Ranges (S) | 1.9 | 0.8 | 0.5 | 1.3 | 6 | 0.3% | 4 | 9 | 7 | 4 | 12 | 0.4 | 0.3 | 0.7 | 38 |
| KIALLA | Greater Shepparton (C) | 1.9 | 0.7 | 0.4 | 1.1 | 8 | NA | 4 | 12 | 10 | 4 | 14 | 0.4 | 0.2 | 0.6 | 25 |
| SEYMOUR | Mitchell (S) | 1.6 | 0.6 | 0.3 | 0.9 | 6 | 0.3% | 2 | 8 | 7 | 3 | 10 | 0.3 | 0.1 | 0.5 | 18 |
| TAMLEUGH | Greater Shepparton (C) | 1.5 | 0.5 | 0.3 | 0.9 | 7 | NA | 3 | 10 | 8 | 3 | 11 | 0.3 | 0.2 | 0.5 | 20 |
| SHEPPARTON | Greater Shepparton (C) | 1.5 | 0.5 | 0.3 | 0.9 | 7 | 0.0% | 3 | 10 | 8 | 3 | 11 | 0.3 | 0.2 | 0.5 | 20 |
| COWA | Wellington (S) | 1.3 | 0.5 | 0.2 | 0.7 | 4 | NA | 1 | 6 | 5 | 2 | 6 | 0.2 | 0.1 | 0.3 | 12 |
| YEA | Murrindindi (S) | 1.2 | 0.5 | 0.2 | 0.7 | 6 | 1.6% | 2 | 7 | 7 | 2 | 8 | 0.3 | 0.1 | 0.4 | 12 |
| WOODEND | Macedon Ranges (S) | 1.2 | 0.5 | 0.3 | 0.8 | 4 | 0.3% | 2 | 6 | 5 | 3 | 7 | 0.2 | 0.2 | 0.4 | 24 |

[a] 'Share' represents the direct employment attributable to hunting as a percentage of total fte employment in the town.

# Appendix 5: Economic impact of hunting by LGA and by animal group

**Table A5- 1: Economic impact of hunting by LGA, all animal groups, 2013**

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 166.6 | 40% | 68.4 | 93.4 | 161.8 | 622 | 636 | 1,258 | 687 | 663 | 1,350 | 41.5 | 52.6 | 94.0 | 3,714 |
| Wellington | 25.8 | 6% | 9.6 | 3.3 | 12.9 | 75 | 26 | 101 | 85 | 29 | 114 | 4.5 | 1.8 | 6.3 | 195 |
| Latrobe | 18.5 | 4% | 6.5 | 3.2 | 9.7 | 56 | 24 | 80 | 70 | 27 | 97 | 3.6 | 1.8 | 5.4 | 132 |
| Baw Baw | 16.8 | 4% | 6.2 | 3.8 | 10.0 | 72 | 34 | 106 | 82 | 38 | 120 | 3.7 | 2.2 | 5.9 | 234 |
| Greater Bendigo | 16.5 | 4% | 5.6 | 3.7 | 9.3 | 57 | 33 | 90 | 69 | 36 | 104 | 3.1 | 2.0 | 5.1 | 184 |
| Mansfield | 14.6 | 3% | 5.4 | 2.1 | 7.5 | 65 | 21 | 87 | 75 | 24 | 99 | 2.8 | 1.2 | 4.0 | 141 |
| Greater Shepparton | 14.0 | 3% | 5.1 | 3.2 | 8.3 | 64 | 31 | 95 | 74 | 33 | 107 | 3.1 | 1.8 | 4.9 | 174 |
| Greater Geelong | 13.5 | 3% | 4.9 | 3.6 | 8.5 | 54 | 30 | 83 | 62 | 33 | 95 | 3.0 | 2.0 | 5.0 | 165 |
| Mitchell | 12.4 | 3% | 4.0 | 1.8 | 5.8 | 42 | 16 | 58 | 50 | 18 | 68 | 2.3 | 1.0 | 3.3 | 115 |
| East Gippsland | 10.9 | 3% | 4.0 | 1.8 | 5.8 | 42 | 18 | 60 | 48 | 20 | 69 | 2.0 | 1.0 | 3.0 | 111 |
| Gannawarra | 10.4 | 2% | 4.1 | 1.6 | 5.6 | 56 | 17 | 73 | 58 | 19 | 77 | 2.2 | 0.8 | 3.0 | 147 |
| Murrindindi | 10.2 | 2% | 4.3 | 1.5 | 5.8 | 46 | 14 | 59 | 53 | 15 | 68 | 2.4 | 0.8 | 3.2 | 91 |
| Wodonga | 8.4 | 2% | 2.9 | 1.6 | 4.5 | 29 | 14 | 43 | 33 | 15 | 48 | 1.6 | 0.9 | 2.5 | 97 |
| Macedon Ranges | 6.8 | 2% | 2.6 | 1.8 | 4.4 | 19 | 13 | 33 | 25 | 15 | 40 | 1.4 | 1.0 | 2.4 | 124 |
| Campaspe | 5.9 | 1% | 2.1 | 0.9 | 3.0 | 22 | 9 | 30 | 25 | 9 | 34 | 1.1 | 0.5 | 1.6 | 60 |
| Wangaratta | 5.7 | 1% | 1.9 | 1.1 | 3.0 | 21 | 11 | 32 | 26 | 12 | 38 | 1.0 | 0.6 | 1.7 | 64 |
| Golden Plains | 5.4 | 1% | 1.9 | 0.6 | 2.5 | 18 | 5 | 23 | 31 | 5 | 36 | 1.0 | 0.3 | 1.4 | 57 |
| Mildura | 5.0 | 1% | 2.0 | 0.5 | 2.5 | 10 | 5 | 15 | 12 | 6 | 17 | 0.5 | 0.3 | 0.8 | 27 |
| Ballarat | 4.7 | 1% | 1.5 | 1.2 | 2.7 | 17 | 10 | 27 | 20 | 11 | 32 | 1.0 | 0.7 | 1.6 | 63 |
| Alpine | 3.8 | 1% | 1.4 | 0.5 | 2.0 | 14 | 5 | 19 | 16 | 6 | 21 | 0.6 | 0.3 | 0.9 | 29 |
| Other [a] | 41.2 | 10% | 32.6 | 130.8 | 163.4 | 196 | 911 | 1,108 | 186 | 914 | 1,100 | 17.8 | 73.6 | 91.5 | 1,726 |
| **Total Victoria** | **416.9** | **100%** | **177.0** | **262.0** | **439.0** | **1,598** | **1,882** | **3,480** | **1,787** | **1,948** | **3,735** | **100.2** | **147.3** | **247.5** | **7,649** |

[a] 'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.

## Table A5- 2: Economic impact of game hunting by LGA, game animals, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 134.5 | 48% | 54.5 | 77.1 | 131.6 | 521 | 526 | 1,046 | 574 | 549 | 1,122 | 35.0 | 43.5 | 78.4 | 3,115 |
| Wellington | 17.0 | 6% | 6.3 | 2.0 | 8.4 | 47 | 16 | 63 | 53 | 18 | 71 | 2.8 | 1.1 | 3.9 | 122 |
| Latrobe | 13.6 | 5% | 4.7 | 2.4 | 7.1 | 42 | 17 | 59 | 51 | 20 | 71 | 2.7 | 1.3 | 4.0 | 96 |
| Greater Geelong | 11.4 | 4% | 4.1 | 3.1 | 7.2 | 47 | 26 | 72 | 54 | 29 | 82 | 2.6 | 1.7 | 4.4 | 143 |
| Greater Bendigo | 10.9 | 4% | 3.5 | 2.5 | 6.0 | 38 | 22 | 60 | 46 | 24 | 70 | 2.1 | 1.4 | 3.4 | 123 |
| Mitchell | 8.9 | 3% | 2.7 | 1.2 | 3.9 | 29 | 11 | 40 | 34 | 12 | 46 | 1.6 | 0.7 | 2.3 | 78 |
| Greater Shepparton | 8.5 | 3% | 3.1 | 2.0 | 5.2 | 40 | 20 | 60 | 46 | 21 | 67 | 2.0 | 1.1 | 3.1 | 109 |
| East Gippsland | 8.0 | 3% | 3.0 | 1.4 | 4.4 | 33 | 14 | 47 | 37 | 16 | 53 | 1.6 | 0.8 | 2.4 | 86 |
| Mansfield | 8.0 | 3% | 2.9 | 1.2 | 4.1 | 37 | 12 | 49 | 43 | 13 | 56 | 1.6 | 0.7 | 2.3 | 79 |
| Baw Baw | 6.7 | 2% | 2.5 | 1.4 | 3.9 | 26 | 13 | 39 | 31 | 14 | 45 | 1.4 | 0.8 | 2.2 | 87 |
| Wodonga | 5.2 | 2% | 1.8 | 1.0 | 2.8 | 19 | 9 | 28 | 21 | 10 | 31 | 1.1 | 0.6 | 1.6 | 64 |
| Wangaratta | 4.4 | 2% | 1.4 | 0.8 | 2.3 | 16 | 8 | 25 | 20 | 9 | 29 | 0.8 | 0.5 | 1.3 | 49 |
| Ballarat | 4.3 | 2% | 1.4 | 1.1 | 2.5 | 16 | 9 | 25 | 19 | 10 | 29 | 0.9 | 0.6 | 1.5 | 59 |
| Gannawarra | 4.2 | 2% | 1.6 | 0.6 | 2.2 | 21 | 6 | 28 | 22 | 7 | 29 | 0.8 | 0.3 | 1.2 | 56 |
| Murrindindi | 4.2 | 1% | 1.8 | 0.6 | 2.4 | 19 | 6 | 24 | 22 | 6 | 28 | 1.0 | 0.3 | 1.3 | 37 |
| Loddon | 2.8 | 1% | 1.1 | 0.2 | 1.3 | 9 | 2 | 11 | 11 | 2 | 12 | 0.5 | 0.1 | 0.6 | 21 |
| Colac-Otway | 2.7 | 1% | 1.1 | 0.5 | 1.5 | 12 | 5 | 17 | 15 | 5 | 20 | 0.6 | 0.3 | 0.9 | 32 |
| Alpine | 2.5 | 1% | 0.9 | 0.4 | 1.3 | 10 | 4 | 13 | 11 | 4 | 15 | 0.4 | 0.2 | 0.7 | 19 |
| Bass Coast | 2.0 | 1% | 0.8 | 0.3 | 1.0 | 9 | 3 | 12 | 10 | 3 | 13 | 0.5 | 0.2 | 0.6 | 13 |
| Campaspe | 1.9 | 1% | 0.7 | 0.3 | 1.1 | 8 | 3 | 11 | 9 | 3 | 13 | 0.4 | 0.2 | 0.6 | 22 |
| Other [a] | 20.1 | 7% | 17.9 | 76.5 | 94.4 | 115 | 537 | 652 | 113 | 539 | 652 | 10.4 | 43.1 | 53.5 | 807 |
| **Total Victoria** | **281.7** | **100%** | **118.0** | **176.7** | **294.7** | **1,115** | **1,268** | **2,382** | **1,242** | **1,315** | **2,557** | **70.7** | **99.4** | **170.1** | **5,215** |

[a] **'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.**

## Table A5- 3: Economic impact of deer hunting by LGA, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 65.7 | 48% | 26.5 | 36.6 | 63.1 | 246 | 249 | 496 | 272 | 260 | 532 | 16.4 | 20.6 | 37.0 | 1,418 |
| Wellington | 9.0 | 6% | 3.3 | 1.0 | 4.3 | 22 | 8 | 30 | 26 | 9 | 35 | 1.3 | 0.5 | 1.9 | 57 |
| Mitchell | 8.1 | 6% | 2.4 | 1.1 | 3.4 | 25 | 9 | 34 | 30 | 11 | 40 | 1.4 | 0.6 | 2.0 | 66 |
| Mansfield | 7.5 | 5% | 2.8 | 1.1 | 3.9 | 35 | 11 | 46 | 40 | 13 | 52 | 1.5 | 0.6 | 2.1 | 72 |
| Latrobe | 6.6 | 5% | 2.3 | 1.1 | 3.4 | 20 | 8 | 28 | 24 | 10 | 34 | 1.3 | 0.6 | 1.9 | 44 |
| Baw Baw | 5.1 | 4% | 1.9 | 1.1 | 3.0 | 21 | 10 | 30 | 24 | 11 | 35 | 1.1 | 0.6 | 1.7 | 66 |
| East Gippsland | 5.1 | 4% | 1.9 | 0.9 | 2.8 | 21 | 9 | 29 | 23 | 10 | 33 | 1.0 | 0.5 | 1.5 | 53 |
| Murrindindi | 3.9 | 3% | 1.7 | 0.6 | 2.2 | 18 | 5 | 23 | 21 | 6 | 26 | 0.9 | 0.3 | 1.2 | 34 |
| Wodonga | 3.8 | 3% | 1.3 | 0.8 | 2.1 | 14 | 7 | 21 | 16 | 7 | 23 | 0.8 | 0.4 | 1.2 | 47 |
| Ballarat | 2.7 | 2% | 0.8 | 0.7 | 1.5 | 10 | 6 | 15 | 11 | 6 | 18 | 0.5 | 0.4 | 0.9 | 35 |
| Greater Shepparton | 2.4 | 2% | 0.9 | 0.6 | 1.5 | 12 | 6 | 17 | 13 | 6 | 19 | 0.6 | 0.3 | 0.9 | 31 |
| Wangaratta | 2.3 | 2% | 0.8 | 0.4 | 1.2 | 8 | 4 | 12 | 10 | 5 | 14 | 0.4 | 0.2 | 0.6 | 24 |
| Alpine | 2.3 | 2% | 0.9 | 0.3 | 1.2 | 9 | 3 | 12 | 10 | 4 | 14 | 0.4 | 0.2 | 0.6 | 17 |
| Greater Geelong | 1.6 | 1% | 0.6 | 0.4 | 1.0 | 7 | 4 | 10 | 8 | 4 | 12 | 0.4 | 0.3 | 0.6 | 20 |
| Bass Coast | 1.5 | 1% | 0.6 | 0.2 | 0.8 | 6 | 2 | 8 | 7 | 2 | 9 | 0.3 | 0.1 | 0.4 | 11 |
| Towong | 1.5 | 1% | 0.6 | 0.2 | 0.7 | 6 | 2 | 8 | 7 | 2 | 8 | 0.3 | 0.1 | 0.4 | 14 |
| Greater Bendigo | 0.9 | 1% | 0.3 | 0.2 | 0.6 | 4 | 2 | 6 | 5 | 2 | 7 | 0.2 | 0.1 | 0.3 | 12 |
| Warrnambool | 0.8 | 1% | 0.3 | 0.2 | 0.5 | 3 | 2 | 5 | 4 | 2 | 6 | 0.2 | 0.1 | 0.3 | 8 |
| Gannawarra | 0.8 | 1% | 0.3 | 0.1 | 0.5 | 5 | 1 | 6 | 5 | 2 | 6 | 0.2 | 0.1 | 0.3 | 12 |
| Benalla | 0.7 | 1% | 0.3 | 0.1 | 0.4 | 2 | 1 | 3 | 3 | 1 | 4 | 0.1 | 0.1 | 0.2 | 7 |
| Other [a] | 5.8 | 4% | 7.0 | 37.1 | 44.1 | 39 | 259 | 298 | 37 | 260 | 296 | 4.3 | 20.9 | 25.1 | 454 |
| **Total Victoria** | **138.3** | **100%** | **57.2** | **84.8** | **142.1** | **531** | **608** | **1,140** | **594** | **631** | **1,224** | **33.5** | **47.7** | **81.2** | **2,501** |

[a] 'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.

## Table A5- 4: Economic impact of duck hunting by LGA, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 38.5 | 39% | 15.8 | 22.8 | 38.6 | 154 | 156 | 310 | 169 | 162 | 332 | 10.3 | 12.9 | 23.2 | 895 |
| Greater Bendigo | 8.4 | 8% | 2.7 | 1.9 | 4.6 | 29 | 16 | 45 | 35 | 18 | 53 | 1.6 | 1.0 | 2.6 | 91 |
| Greater Geelong | 7.6 | 8% | 2.8 | 2.1 | 4.9 | 32 | 17 | 49 | 37 | 19 | 56 | 1.7 | 1.2 | 2.9 | 94 |
| Wellington | 7.5 | 8% | 2.8 | 1.0 | 3.8 | 22 | 8 | 30 | 25 | 9 | 34 | 1.3 | 0.5 | 1.9 | 56 |
| Latrobe | 4.8 | 5% | 1.7 | 0.8 | 2.5 | 14 | 6 | 20 | 17 | 7 | 24 | 0.9 | 0.4 | 1.4 | 32 |
| Greater Shepparton | 4.6 | 5% | 1.6 | 1.0 | 2.6 | 20 | 10 | 30 | 24 | 10 | 34 | 1.0 | 0.6 | 1.6 | 54 |
| Gannawarra | 3.3 | 3% | 1.3 | 0.4 | 1.7 | 16 | 5 | 20 | 17 | 5 | 22 | 0.6 | 0.2 | 0.9 | 40 |
| Loddon | 2.8 | 3% | 1.0 | 0.2 | 1.2 | 9 | 2 | 11 | 10 | 2 | 12 | 0.5 | 0.1 | 0.6 | 19 |
| East Gippsland | 2.4 | 2% | 0.9 | 0.4 | 1.3 | 10 | 4 | 14 | 11 | 5 | 16 | 0.5 | 0.2 | 0.7 | 25 |
| Colac-Otway | 2.0 | 2% | 0.8 | 0.4 | 1.1 | 9 | 3 | 12 | 11 | 4 | 15 | 0.4 | 0.2 | 0.6 | 22 |
| Wangaratta | 1.6 | 2% | 0.5 | 0.3 | 0.9 | 6 | 3 | 10 | 8 | 4 | 11 | 0.3 | 0.2 | 0.5 | 19 |
| Swan Hill | 1.5 | 1% | 0.5 | 0.2 | 0.8 | 7 | 2 | 10 | 8 | 3 | 11 | 0.3 | 0.1 | 0.4 | 16 |
| Baw Baw | 1.5 | 1% | 0.5 | 0.3 | 0.8 | 5 | 3 | 8 | 6 | 3 | 9 | 0.3 | 0.2 | 0.5 | 17 |
| Campaspe | 1.4 | 1% | 0.5 | 0.2 | 0.8 | 6 | 2 | 8 | 7 | 2 | 9 | 0.3 | 0.1 | 0.4 | 15 |
| Ballarat | 1.2 | 1% | 0.4 | 0.3 | 0.8 | 5 | 3 | 8 | 6 | 3 | 9 | 0.3 | 0.2 | 0.5 | 17 |
| Wodonga | 1.2 | 1% | 0.4 | 0.2 | 0.6 | 4 | 2 | 6 | 4 | 2 | 6 | 0.2 | 0.1 | 0.3 | 13 |
| Horsham | 1.0 | 1% | 0.4 | 0.2 | 0.6 | 4 | 2 | 6 | 5 | 2 | 7 | 0.2 | 0.1 | 0.3 | 11 |
| Buloke | 0.9 | 1% | 0.3 | 0.1 | 0.4 | 4 | 1 | 5 | 4 | 1 | 5 | 0.2 | 0.0 | 0.2 | 9 |
| Mitchell | 0.6 | 1% | 0.3 | 0.1 | 0.4 | 3 | 1 | 4 | 3 | 1 | 4 | 0.2 | 0.1 | 0.2 | 7 |
| Moira | 0.6 | 1% | 0.2 | 0.1 | 0.3 | 2 | 1 | 3 | 3 | 1 | 4 | 0.1 | 0.0 | 0.2 | 6 |
| Other [a] | 6.4 | 6% | 7.0 | 30.7 | 37.7 | 36 | 211 | 248 | 34 | 212 | 246 | 4.0 | 17.3 | 21.3 | 418 |
| **Total Victoria** | **99.4** | **100%** | **42.5** | **63.8** | **106.3** | **399** | **458** | **857** | **444** | **475** | **919** | **25.2** | **35.9** | **61.1** | **1,875** |

[a] 'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.

## Table A5- 5: Economic impact of quail hunting by LGA, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 30.3 | 69% | 12.2 | 17.7 | 29.9 | 120 | 121 | 241 | 132 | 126 | 258 | 8.3 | 10.0 | 18.3 | 718 |
| Latrobe | 2.3 | 5% | 0.8 | 0.4 | 1.2 | 8 | 3 | 11 | 9 | 4 | 13 | 0.5 | 0.2 | 0.7 | 18 |
| Greater Geelong | 2.1 | 5% | 0.8 | 0.6 | 1.3 | 8 | 5 | 13 | 9 | 5 | 15 | 0.5 | 0.3 | 0.8 | 25 |
| Greater Shepparton | 1.6 | 4% | 0.6 | 0.4 | 1.1 | 8 | 4 | 12 | 9 | 4 | 13 | 0.4 | 0.2 | 0.7 | 22 |
| Greater Bendigo | 1.6 | 4% | 0.5 | 0.4 | 0.8 | 6 | 3 | 9 | 7 | 3 | 10 | 0.3 | 0.2 | 0.5 | 17 |
| Wellington | 0.6 | 1% | 0.2 | 0.1 | 0.3 | 2 | 1 | 3 | 2 | 1 | 3 | 0.1 | 0.1 | 0.2 | 5 |
| East Gippsland | 0.5 | 1% | 0.2 | 0.1 | 0.3 | 2 | 1 | 3 | 3 | 1 | 4 | 0.1 | 0.1 | 0.2 | 6 |
| Wangaratta | 0.5 | 1% | 0.1 | 0.1 | 0.2 | 2 | 1 | 3 | 2 | 1 | 3 | 0.1 | 0.1 | 0.1 | 5 |
| Buloke | 0.5 | 1% | 0.2 | 0.0 | 0.2 | 2 | 0 | 2 | 2 | 0 | 2 | 0.1 | 0.0 | 0.1 | 4 |
| Ballarat | 0.4 | 1% | 0.1 | 0.1 | 0.2 | 2 | 1 | 2 | 2 | 1 | 3 | 0.1 | 0.1 | 0.1 | 5 |
| Horsham | 0.4 | 1% | 0.1 | 0.1 | 0.2 | 2 | 1 | 2 | 2 | 1 | 3 | 0.1 | 0.0 | 0.1 | 5 |
| Colac-Otway | 0.3 | 1% | 0.1 | 0.1 | 0.2 | 2 | 1 | 2 | 2 | 1 | 3 | 0.1 | 0.0 | 0.1 | 4 |
| Campaspe | 0.3 | 1% | 0.1 | 0.1 | 0.2 | 1 | 1 | 2 | 2 | 1 | 2 | 0.1 | 0.0 | 0.1 | 4 |
| Wodonga | 0.2 | 1% | 0.1 | 0.1 | 0.1 | 1 | 0 | 1 | 1 | 0 | 2 | 0.1 | 0.0 | 0.1 | 3 |
| Bass Coast | 0.2 | 1% | 0.1 | 0.1 | 0.2 | 2 | 1 | 3 | 2 | 1 | 3 | 0.1 | 0.0 | 0.1 | 1 |
| Southern Grampians | 0.2 | 0% | 0.1 | 0.0 | 0.1 | 1 | 0 | 1 | 1 | 0 | 1 | 0.0 | 0.0 | 0.1 | 2 |
| Mitchell | 0.2 | 0% | 0.1 | 0.0 | 0.1 | 1 | 0 | 1 | 1 | 0 | 1 | 0.1 | 0.0 | 0.1 | 2 |
| Gannawarra | 0.2 | 0% | 0.1 | 0.0 | 0.1 | 1 | 0 | 1 | 1 | 0 | 1 | 0.0 | 0.0 | 0.0 | 2 |
| Mildura | 0.1 | 0% | 0.1 | 0.0 | 0.1 | 1 | 0 | 1 | 1 | 0 | 1 | 0.0 | 0.0 | 0.1 | 2 |
| Yarriambiack | 0.1 | 0% | 0.0 | 0.0 | 0.1 | 1 | 0 | 1 | 1 | 0 | 1 | 0.0 | 0.0 | 0.0 | 1 |
| Other [a] | 1.5 | 3% | 1.6 | 7.7 | 9.3 | 14 | 57 | 70 | 13 | 57 | 70 | 1.0 | 4.3 | 5.3 | 0 |
| **Total Victoria** | **44.1** | **100%** | **18.2** | **28.1** | **46.3** | **184** | **201** | **385** | **205** | **209** | **414** | **12.1** | **15.8** | **27.9** | **839** |

[a] 'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.

## Table A5- 6: Economic impact of pest animal hunting by LGA, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 32.1 | 24% | 13.9 | 16.3 | 30.1 | 101 | 110 | 211 | 113 | 115 | 228 | 6.5 | 9.1 | 15.6 | 648 |
| Baw Baw | 10.1 | 7% | 3.7 | 2.4 | 6.1 | 46 | 21 | 66 | 51 | 23 | 75 | 2.3 | 1.3 | 3.7 | 160 |
| Wellington | 8.8 | 6% | 3.3 | 1.2 | 4.5 | 28 | 10 | 38 | 32 | 11 | 43 | 1.7 | 0.7 | 2.3 | 79 |
| Mansfield | 6.6 | 5% | 2.5 | 0.9 | 3.4 | 28 | 9 | 38 | 32 | 10 | 43 | 1.2 | 0.5 | 1.7 | 67 |
| Gannawarra | 6.1 | 5% | 2.4 | 1.0 | 3.4 | 35 | 10 | 45 | 36 | 12 | 47 | 1.3 | 0.5 | 1.9 | 98 |
| Macedon Ranges | 6.1 | 5% | 2.3 | 1.5 | 3.8 | 16 | 11 | 28 | 21 | 13 | 34 | 1.1 | 0.9 | 2.0 | 113 |
| Murrindindi | 6.0 | 4% | 2.5 | 0.9 | 3.4 | 27 | 8 | 35 | 31 | 9 | 40 | 1.4 | 0.5 | 1.9 | 59 |
| Greater Bendigo | 5.6 | 4% | 2.1 | 1.2 | 3.3 | 19 | 11 | 30 | 23 | 12 | 35 | 1.0 | 0.7 | 1.7 | 66 |
| Greater Shepparton | 5.4 | 4% | 1.9 | 1.2 | 3.1 | 24 | 11 | 35 | 28 | 12 | 40 | 1.1 | 0.7 | 1.8 | 70 |
| Golden Plains | 4.9 | 4% | 1.7 | 0.6 | 2.3 | 17 | 4 | 21 | 29 | 5 | 33 | 0.9 | 0.3 | 1.2 | 56 |
| Latrobe | 4.9 | 4% | 1.7 | 0.8 | 2.6 | 15 | 6 | 21 | 18 | 7 | 25 | 0.9 | 0.5 | 1.4 | 39 |
| Mildura | 4.0 | 3% | 1.7 | 0.3 | 2.0 | 6 | 3 | 10 | 7 | 4 | 11 | 0.3 | 0.2 | 0.5 | 18 |
| Campaspe | 4.0 | 3% | 1.4 | 0.6 | 2.0 | 14 | 6 | 19 | 16 | 6 | 22 | 0.7 | 0.3 | 1.0 | 41 |
| Mitchell | 3.6 | 3% | 1.3 | 0.6 | 1.9 | 13 | 5 | 18 | 16 | 6 | 22 | 0.7 | 0.3 | 1.0 | 40 |
| Wodonga | 3.1 | 2% | 1.1 | 0.6 | 1.7 | 10 | 5 | 15 | 12 | 5 | 17 | 0.6 | 0.3 | 0.9 | 35 |
| East Gippsland | 2.9 | 2% | 1.0 | 0.4 | 1.4 | 9 | 4 | 13 | 11 | 4 | 15 | 0.4 | 0.2 | 0.7 | 27 |
| Greater Geelong | 2.1 | 2% | 0.8 | 0.5 | 1.2 | 7 | 4 | 11 | 8 | 4 | 13 | 0.4 | 0.3 | 0.7 | 24 |
| Southern Grampians | 1.6 | 1% | 0.6 | 0.3 | 0.9 | 8 | 3 | 10 | 9 | 3 | 12 | 0.3 | 0.1 | 0.5 | 20 |
| Moorabool | 1.5 | 1% | 0.5 | 0.2 | 0.8 | 5 | 2 | 7 | 8 | 2 | 10 | 0.3 | 0.1 | 0.4 | 18 |
| Moira | 1.4 | 1% | 0.5 | 0.2 | 0.7 | 6 | 2 | 8 | 7 | 2 | 9 | 0.3 | 0.1 | 0.4 | 16 |
| Other [a] | 14.2 | 11% | 12.0 | 53.7 | 65.7 | 50 | 368 | 418 | 36 | 367 | 404 | 6.0 | 30.2 | 36.2 | 740 |
| **Total Victoria** | **135.1** | **100%** | **59.0** | **85.3** | **144.4** | **483** | **614** | **1,097** | **545** | **633** | **1,178** | **29.5** | **47.9** | **77.3** | **2,434** |

[a] 'Other' expenditure and *direct* GRP and *direct* employment estimates occur in other LGAs in the state. The *flow-on* GRP and *flow-on* employment estimates occur across all regions in the state, a significant proportion of which will be in the Melbourne region.

## Table A5- 7: Economic impact of hunting by LGA – regional share, all animal groups, 2013

| | Expenditure | Gross Regional Product | | Employment (fte) | | Employment (Total) | | Household Income ($m) | | Population | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Total ($m)[a] | Region Share | Total[a] | Region Share | Total[a] | Total | Total ($m)[a] | Region Share | Total | Region Share |
| Melbourne | 166.6 | 161.8 | 0.06% | 1,258 | 0.07% | 1,350 | 0.07% | 94.0 | 0.06% | 3,714 | 0.09% |
| Wellington | 25.8 | 12.9 | 0.39% | 101 | 0.59% | 114 | 0.68% | 6.3 | 0.49% | 195 | 0.46% |
| Latrobe | 18.5 | 9.7 | 0.22% | 80 | 0.28% | 97 | 0.33% | 5.4 | 0.24% | 132 | 0.18% |
| Baw Baw | 16.8 | 10.0 | 0.60% | 106 | 0.67% | 120 | 0.72% | 5.9 | 0.60% | 234 | 0.53% |
| Greater Bendigo | 16.5 | 9.3 | 0.20% | 90 | 0.22% | 104 | 0.24% | 5.1 | 0.19% | 184 | 0.18% |
| Mansfield | 14.6 | 7.5 | 2.51% | 87 | 2.59% | 99 | 2.80% | 4.0 | 2.35% | 141 | 1.72% |
| Greater Shepparton | 14.0 | 8.3 | 0.30% | 95 | 0.34% | 107 | 0.37% | 4.9 | 0.31% | 174 | 0.28% |
| Greater Geelong | 13.5 | 8.5 | 0.09% | 83 | 0.10% | 95 | 0.11% | 5.0 | 0.09% | 165 | 0.08% |
| Mitchell | 12.4 | 5.8 | 0.50% | 58 | 0.56% | 68 | 0.63% | 3.3 | 0.50% | 115 | 0.32% |
| East Gippsland | 10.9 | 5.8 | 0.39% | 60 | 0.39% | 69 | 0.41% | 3.0 | 0.36% | 111 | 0.26% |
| Gannawarra | 10.4 | 5.6 | 1.60% | 73 | 1.59% | 77 | 1.76% | 3.0 | 1.45% | 147 | 1.41% |
| Murrindindi | 10.2 | 5.8 | 1.22% | 59 | 1.26% | 68 | 1.39% | 3.2 | 1.22% | 91 | 0.69% |
| Wodonga | 8.4 | 4.5 | 0.24% | 43 | 0.24% | 48 | 0.26% | 2.5 | 0.22% | 97 | 0.26% |
| Macedon Ranges | 6.8 | 4.4 | 0.32% | 33 | 0.30% | 40 | 0.33% | 2.4 | 0.30% | 124 | 0.29% |
| Campaspe | 5.9 | 3.0 | 0.20% | 30 | 0.19% | 34 | 0.22% | 1.6 | 0.18% | 60 | 0.16% |
| Wangaratta | 5.7 | 3.0 | 0.27% | 32 | 0.26% | 38 | 0.29% | 1.7 | 0.24% | 64 | 0.24% |
| Golden Plains | 5.4 | 2.5 | 0.63% | 23 | 0.70% | 36 | 1.09% | 1.4 | 0.69% | 57 | 0.29% |
| Mildura | 5.0 | 2.5 | 0.12% | 15 | 0.07% | 17 | 0.08% | 0.8 | 0.07% | 27 | 0.05% |
| Ballarat | 4.7 | 2.7 | 0.06% | 27 | 0.07% | 32 | 0.07% | 1.6 | 0.06% | 63 | 0.07% |
| Alpine | 3.8 | 2.0 | 0.41% | 19 | 0.41% | 21 | 0.43% | 0.9 | 0.37% | 29 | 0.23% |
| **Victoria** | **416.9** | **439.0** | **0.13%** | **3,480** | **0.15%** | **3,735** | **0.15%** | **247.5** | **0.13%** | **7,649** | **0.14%** |

**Table A5- 8: Economic impact of game hunting by LGA – regional share, 2013**

| | Expenditure | Gross Regional Product | | Employment (fte) | | Employment (Total) | | Household Income ($m) | | Population | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Total ($m)[a] | Region Share | Total[a] | Region Share | Total[a] | Total | Total ($m)[a] | Region Share | Total | Region Share |
| Melbourne | 134.5 | 131.6 | 0.05% | 1,046 | 0.06% | 1,122 | 0.06% | 78.4 | 0.05% | 3,115 | 0.07% |
| Wellington | 17.0 | 8.4 | 0.26% | 63 | 0.37% | 71 | 0.43% | 3.9 | 0.31% | 122 | 0.29% |
| Latrobe | 13.6 | 7.1 | 0.16% | 59 | 0.21% | 71 | 0.24% | 4.0 | 0.18% | 96 | 0.13% |
| Greater Geelong | 11.4 | 7.2 | 0.08% | 72 | 0.09% | 82 | 0.09% | 4.4 | 0.08% | 143 | 0.07% |
| Greater Bendigo | 10.9 | 6.0 | 0.13% | 60 | 0.15% | 70 | 0.16% | 3.4 | 0.13% | 123 | 0.12% |
| Mitchell | 8.9 | 3.9 | 0.33% | 40 | 0.38% | 46 | 0.42% | 2.3 | 0.35% | 78 | 0.21% |
| Greater Shepparton | 8.5 | 5.2 | 0.19% | 60 | 0.21% | 67 | 0.23% | 3.1 | 0.19% | 109 | 0.18% |
| East Gippsland | 8.0 | 4.4 | 0.29% | 47 | 0.30% | 53 | 0.32% | 2.4 | 0.28% | 86 | 0.20% |
| Mansfield | 8.0 | 4.1 | 1.37% | 49 | 1.46% | 56 | 1.59% | 2.3 | 1.33% | 79 | 0.97% |
| Baw Baw | 6.7 | 3.9 | 0.24% | 39 | 0.25% | 45 | 0.27% | 2.2 | 0.23% | 87 | 0.20% |
| Wodonga | 5.2 | 2.8 | 0.15% | 28 | 0.16% | 31 | 0.17% | 1.6 | 0.14% | 64 | 0.18% |
| Wangaratta | 4.4 | 2.3 | 0.20% | 25 | 0.20% | 29 | 0.23% | 1.3 | 0.19% | 49 | 0.18% |
| Ballarat | 4.3 | 2.5 | 0.06% | 25 | 0.06% | 29 | 0.07% | 1.5 | 0.06% | 59 | 0.06% |
| Gannawarra | 4.2 | 2.2 | 0.64% | 28 | 0.60% | 29 | 0.68% | 1.2 | 0.56% | 56 | 0.54% |
| Murrindindi | 4.2 | 2.4 | 0.50% | 24 | 0.52% | 28 | 0.57% | 1.3 | 0.50% | 37 | 0.28% |
| Loddon | 2.8 | 1.3 | 0.41% | 11 | 0.33% | 12 | 0.41% | 0.6 | 0.34% | 21 | 0.27% |
| Colac-Otway | 2.7 | 1.5 | 0.18% | 17 | 0.18% | 20 | 0.21% | 0.9 | 0.17% | 32 | 0.15% |
| Alpine | 2.5 | 1.3 | 0.27% | 13 | 0.28% | 15 | 0.30% | 0.7 | 0.26% | 19 | 0.16% |
| Bass Coast | 2.0 | 1.0 | 0.07% | 12 | 0.09% | 13 | 0.10% | 0.6 | 0.07% | 13 | 0.04% |
| Campaspe | 1.9 | 1.1 | 0.07% | 11 | 0.07% | 13 | 0.08% | 0.6 | 0.07% | 22 | 0.06% |
| Other [b] | 20.1 | 94.4 | - | 652 | - | 652 | - | 53.5 | - | 807 | - |
| **Victoria** | **281.7** | **294.7** | **0.09%** | **2,382** | **0.10%** | **2,557** | **0.10%** | **170.1** | **0.09%** | **5,215** | **0.09%** |

## Table A5- 9: Economic impact of deer hunting by LGA – regional share, 2013

| | Expenditure | Gross Regional Product | | Employment (fte) | | Employment (Total) | | Household Income ($m) | | Population | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Total ($m)[a] | Region Share | Total[a] | Region Share | Total[a] | Total | Total ($m)[a] | Region Share | Total | Region Share |
| Melbourne | 65.7 | 63.1 | 0.02% | 496 | 0.03% | 532 | 0.03% | 37.0 | 0.02% | 1,418 | 0.03% |
| Wellington | 9.0 | 4.3 | 0.13% | 30 | 0.18% | 35 | 0.21% | 1.9 | 0.15% | 57 | 0.14% |
| Mitchell | 8.1 | 3.4 | 0.29% | 34 | 0.33% | 40 | 0.37% | 2.0 | 0.30% | 66 | 0.18% |
| Mansfield | 7.5 | 3.9 | 1.28% | 46 | 1.37% | 52 | 1.49% | 2.1 | 1.24% | 72 | 0.88% |
| Latrobe | 6.6 | 3.4 | 0.08% | 28 | 0.10% | 34 | 0.11% | 1.9 | 0.09% | 44 | 0.06% |
| Baw Baw | 5.1 | 3.0 | 0.18% | 30 | 0.19% | 35 | 0.21% | 1.7 | 0.17% | 66 | 0.15% |
| East Gippsland | 5.1 | 2.8 | 0.19% | 29 | 0.19% | 33 | 0.20% | 1.5 | 0.17% | 53 | 0.12% |
| Murrindindi | 3.9 | 2.2 | 0.47% | 23 | 0.48% | 26 | 0.53% | 1.2 | 0.47% | 34 | 0.25% |
| Wodonga | 3.8 | 2.1 | 0.11% | 21 | 0.12% | 23 | 0.13% | 1.2 | 0.11% | 47 | 0.13% |
| Ballarat | 2.7 | 1.5 | 0.03% | 15 | 0.04% | 18 | 0.04% | 0.9 | 0.04% | 35 | 0.04% |
| Greater Shepparton | 2.4 | 1.5 | 0.05% | 17 | 0.06% | 19 | 0.07% | 0.9 | 0.06% | 31 | 0.05% |
| Wangaratta | 2.3 | 1.2 | 0.10% | 12 | 0.10% | 14 | 0.11% | 0.6 | 0.09% | 24 | 0.09% |
| Alpine | 2.3 | 1.2 | 0.25% | 12 | 0.26% | 14 | 0.28% | 0.6 | 0.24% | 17 | 0.14% |
| Greater Geelong | 1.6 | 1.0 | 0.01% | 10 | 0.01% | 12 | 0.01% | 0.6 | 0.01% | 20 | 0.01% |
| Bass Coast | 1.5 | 0.8 | 0.05% | 8 | 0.06% | 9 | 0.07% | 0.4 | 0.05% | 11 | 0.04% |
| Towong | 1.5 | 0.7 | 0.39% | 8 | 0.32% | 8 | 0.37% | 0.4 | 0.34% | 14 | 0.24% |
| Greater Bendigo | 0.9 | 0.6 | 0.01% | 6 | 0.01% | 7 | 0.02% | 0.3 | 0.01% | 12 | 0.01% |
| Warrnambool | 0.8 | 0.5 | 0.03% | 5 | 0.04% | 6 | 0.04% | 0.3 | 0.03% | 8 | 0.02% |
| Gannawarra | 0.8 | 0.5 | 0.13% | 6 | 0.13% | 6 | 0.15% | 0.3 | 0.12% | 12 | 0.12% |
| Benalla | 0.7 | 0.4 | 0.08% | 3 | 0.06% | 4 | 0.07% | 0.2 | 0.06% | 7 | 0.05% |
| **Victoria** | **138.3** | **142.1** | **0.04%** | **1,140** | **0.05%** | **1,224** | **0.05%** | **81.2** | **0.04%** | **2,501** | **0.04%** |

## Table A5- 10: Economic impact of duck hunting by LGA – regional share, 2013

| | Expenditure | Gross Regional Product | | Employment (fte) | | Employment (Total) | | Household Income ($m) | | Population | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Total ($m)[a] | Region Share | Total[a] | Region Share | Total[a] | Total | Total ($m)[a] | Region Share | Total | Region Share |
| Melbourne | 38.5 | 38.6 | 0.01% | 310 | 0.02% | 332 | 0.02% | 23.2 | 0.02% | 895 | 0.02% |
| Greater Bendigo | 8.4 | 4.6 | 0.10% | 45 | 0.11% | 53 | 0.12% | 2.6 | 0.10% | 91 | 0.09% |
| Greater Geelong | 7.6 | 4.9 | 0.05% | 49 | 0.06% | 56 | 0.06% | 2.9 | 0.05% | 94 | 0.04% |
| Wellington | 7.5 | 3.8 | 0.12% | 30 | 0.17% | 34 | 0.20% | 1.9 | 0.14% | 56 | 0.13% |
| Latrobe | 4.8 | 2.5 | 0.06% | 20 | 0.07% | 24 | 0.08% | 1.4 | 0.06% | 32 | 0.04% |
| Greater Shepparton | 4.6 | 2.6 | 0.09% | 30 | 0.11% | 34 | 0.12% | 1.6 | 0.10% | 54 | 0.09% |
| Gannawarra | 3.3 | 1.7 | 0.48% | 20 | 0.44% | 22 | 0.51% | 0.9 | 0.41% | 40 | 0.39% |
| Loddon | 2.8 | 1.2 | 0.40% | 11 | 0.32% | 12 | 0.40% | 0.6 | 0.33% | 19 | 0.26% |
| East Gippsland | 2.4 | 1.3 | 0.09% | 14 | 0.09% | 16 | 0.10% | 0.7 | 0.09% | 25 | 0.06% |
| Colac-Otway | 2.0 | 1.1 | 0.13% | 12 | 0.13% | 15 | 0.15% | 0.6 | 0.13% | 22 | 0.11% |
| Wangaratta | 1.6 | 0.9 | 0.08% | 10 | 0.08% | 11 | 0.09% | 0.5 | 0.07% | 19 | 0.07% |
| Swan Hill | 1.5 | 0.8 | 0.09% | 10 | 0.10% | 11 | 0.12% | 0.4 | 0.09% | 16 | 0.08% |
| Baw Baw | 1.5 | 0.8 | 0.05% | 8 | 0.05% | 9 | 0.06% | 0.5 | 0.05% | 17 | 0.04% |
| Campaspe | 1.4 | 0.8 | 0.05% | 8 | 0.05% | 9 | 0.06% | 0.4 | 0.05% | 15 | 0.04% |
| Ballarat | 1.2 | 0.8 | 0.02% | 8 | 0.02% | 9 | 0.02% | 0.5 | 0.02% | 17 | 0.02% |
| Wodonga | 1.2 | 0.6 | 0.03% | 6 | 0.03% | 6 | 0.04% | 0.3 | 0.03% | 13 | 0.04% |
| Horsham | 1.0 | 0.6 | 0.06% | 6 | 0.06% | 7 | 0.07% | 0.3 | 0.06% | 11 | 0.06% |
| Buloke | 0.9 | 0.4 | 0.15% | 5 | 0.15% | 5 | 0.16% | 0.2 | 0.14% | 9 | 0.14% |
| Mitchell | 0.6 | 0.4 | 0.03% | 4 | 0.04% | 4 | 0.04% | 0.2 | 0.03% | 7 | 0.02% |
| Moira | 0.6 | 0.3 | 0.03% | 3 | 0.03% | 4 | 0.03% | 0.2 | 0.03% | 6 | 0.02% |
| **Victoria** | **99.4** | **106.3** | **0.03%** | **857** | **0.04%** | **919** | **0.04%** | **61.1** | **0.03%** | **1,875** | **0.03%** |

## Table A5- 11: Economic impact of quail hunting by LGA – regional share, 2013

| | Expenditure | Gross Regional Product | | Employment (fte) | | Employment (Total) | | Household Income ($m) | | Population | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Total ($m)[a] | Region Share | Total[a] | Region Share | Total[a] | Total | Total ($m)[a] | Region Share | Total | Region Share |
| Melbourne | 30.3 | 29.9 | 0.01% | 241 | 0.01% | 258 | 0.01% | 18.3 | 0.01% | 718 | 0.02% |
| Latrobe | 2.3 | 1.2 | 0.03% | 11 | 0.04% | 13 | 0.04% | 0.7 | 0.03% | 18 | 0.02% |
| Greater Geelong | 2.1 | 1.3 | 0.01% | 13 | 0.02% | 15 | 0.02% | 0.8 | 0.01% | 25 | 0.01% |
| Greater Shepparton | 1.6 | 1.1 | 0.04% | 12 | 0.04% | 13 | 0.05% | 0.7 | 0.04% | 22 | 0.03% |
| Greater Bendigo | 1.6 | 0.8 | 0.02% | 9 | 0.02% | 10 | 0.02% | 0.5 | 0.02% | 17 | 0.02% |
| Wellington | 0.6 | 0.3 | 0.01% | 3 | 0.02% | 3 | 0.02% | 0.2 | 0.01% | 5 | 0.01% |
| East Gippsland | 0.5 | 0.3 | 0.02% | 3 | 0.02% | 4 | 0.02% | 0.2 | 0.02% | 6 | 0.01% |
| Wangaratta | 0.5 | 0.2 | 0.02% | 3 | 0.02% | 3 | 0.03% | 0.1 | 0.02% | 5 | 0.02% |
| Buloke | 0.5 | 0.2 | 0.08% | 2 | 0.07% | 2 | 0.08% | 0.1 | 0.07% | 4 | 0.07% |
| Ballarat | 0.4 | 0.2 | 0.01% | 2 | 0.01% | 3 | 0.01% | 0.1 | 0.01% | 5 | 0.01% |
| Horsham | 0.4 | 0.2 | 0.03% | 2 | 0.03% | 3 | 0.03% | 0.1 | 0.03% | 5 | 0.02% |
| Colac-Otway | 0.3 | 0.2 | 0.03% | 2 | 0.03% | 3 | 0.03% | 0.1 | 0.03% | 4 | 0.02% |
| Campaspe | 0.3 | 0.2 | 0.01% | 2 | 0.01% | 2 | 0.01% | 0.1 | 0.01% | 4 | 0.01% |
| Wodonga | 0.2 | 0.1 | 0.01% | 1 | 0.01% | 2 | 0.01% | 0.1 | 0.01% | 3 | 0.01% |
| Bass Coast | 0.2 | 0.2 | 0.01% | 3 | 0.02% | 3 | 0.02% | 0.1 | 0.01% | 1 | 0.00% |
| Southern Grampians | 0.2 | 0.1 | 0.02% | 1 | 0.02% | 1 | 0.02% | 0.1 | 0.01% | 2 | 0.01% |
| Mitchell | 0.2 | 0.1 | 0.01% | 1 | 0.01% | 1 | 0.01% | 0.1 | 0.01% | 2 | 0.01% |
| Gannawarra | 0.2 | 0.1 | 0.02% | 1 | 0.02% | 1 | 0.03% | 0.0 | 0.02% | 2 | 0.02% |
| Mildura | 0.1 | 0.1 | 0.00% | 1 | 0.00% | 1 | 0.00% | 0.1 | 0.00% | 2 | 0.00% |
| Yarriambiack | 0.1 | 0.1 | 0.02% | 1 | 0.02% | 1 | 0.03% | 0.0 | 0.02% | 1 | 0.02% |
| **Victoria** | **44.1** | **46.3** | **0.01%** | **385** | **0.02%** | **414** | **0.02%** | **27.9** | **0.02%** | **839** | **0.01%** |

## Table A5- 12: Economic impact of pest animal hunting by LGA – regional share, 2013

| | Expenditure | Gross Regional Product | | Employment (fte) | | Employment (Total) | | Household Income ($m) | | Population | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Total ($m)[a] | Region Share | Total[a] | Region Share | Total[a] | Total | Total ($m)[a] | Region Share | Total | Region Share |
| Melbourne | 32.1 | 30.1 | 0.01% | 211 | 0.01% | 228 | 0.01% | 15.6 | 0.01% | 648 | 0.02% |
| Baw Baw | 10.1 | 6.1 | 0.37% | 66 | 0.42% | 75 | 0.45% | 3.7 | 0.37% | 160 | 0.36% |
| Wellington | 8.8 | 4.5 | 0.14% | 38 | 0.22% | 43 | 0.26% | 2.3 | 0.18% | 79 | 0.19% |
| Mansfield | 6.6 | 3.4 | 1.14% | 38 | 1.12% | 43 | 1.21% | 1.7 | 1.02% | 67 | 0.82% |
| Gannawarra | 6.1 | 3.4 | 0.96% | 45 | 0.99% | 47 | 1.08% | 1.9 | 0.89% | 98 | 0.95% |
| Macedon Ranges | 6.1 | 3.8 | 0.28% | 28 | 0.26% | 34 | 0.28% | 2.0 | 0.25% | 113 | 0.26% |
| Murrindindi | 6.0 | 3.4 | 0.72% | 35 | 0.74% | 40 | 0.82% | 1.9 | 0.71% | 59 | 0.44% |
| Greater Bendigo | 5.6 | 3.3 | 0.07% | 30 | 0.07% | 35 | 0.08% | 1.7 | 0.06% | 66 | 0.06% |
| Greater Shepparton | 5.4 | 3.1 | 0.11% | 35 | 0.12% | 40 | 0.14% | 1.8 | 0.11% | 70 | 0.11% |
| Golden Plains | 4.9 | 2.3 | 0.57% | 21 | 0.64% | 33 | 1.00% | 1.2 | 0.63% | 56 | 0.29% |
| Latrobe | 4.9 | 2.6 | 0.06% | 21 | 0.07% | 25 | 0.09% | 1.4 | 0.06% | 39 | 0.05% |
| Mildura | 4.0 | 2.0 | 0.10% | 10 | 0.05% | 11 | 0.05% | 0.5 | 0.04% | 18 | 0.04% |
| Campaspe | 4.0 | 2.0 | 0.13% | 19 | 0.12% | 22 | 0.14% | 1.0 | 0.11% | 41 | 0.11% |
| Mitchell | 3.6 | 1.9 | 0.16% | 18 | 0.18% | 22 | 0.20% | 1.0 | 0.16% | 40 | 0.11% |
| Wodonga | 3.1 | 1.7 | 0.09% | 15 | 0.08% | 17 | 0.09% | 0.9 | 0.08% | 35 | 0.10% |
| East Gippsland | 2.9 | 1.4 | 0.10% | 13 | 0.09% | 15 | 0.09% | 0.7 | 0.08% | 27 | 0.06% |
| Greater Geelong | 2.1 | 1.2 | 0.01% | 11 | 0.01% | 13 | 0.01% | 0.7 | 0.01% | 24 | 0.01% |
| Southern Grampians | 1.6 | 0.9 | 0.11% | 10 | 0.13% | 12 | 0.15% | 0.5 | 0.12% | 20 | 0.12% |
| Moorabool | 1.5 | 0.8 | 0.10% | 7 | 0.11% | 10 | 0.15% | 0.4 | 0.10% | 18 | 0.06% |
| Moira | 1.4 | 0.7 | 0.07% | 8 | 0.07% | 9 | 0.08% | 0.4 | 0.06% | 16 | 0.06% |
| **Victoria** | **135.1** | **144.4** | **0.04%** | **1,097** | **0.05%** | **1,178** | **0.05%** | **77.3** | **0.04%** | **2,434** | **0.04%** |

# Appendix 6: Economic impact of hunting by RDV and by animal group

**Table A6- 1: Economic impact of hunting by RDV, all animal groups, 2013**

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 166.6 | 40% | 68.4 | 93.4 | 161.8 | 622 | 636 | 1,258 | 687 | 663 | 1,350 | 41.5 | 52.6 | 94.0 | 4,016 |
| Gippsland | 76.0 | 18% | 27.9 | 14.3 | 42.2 | 267 | 122 | 389 | 310 | 133 | 443 | 14.7 | 7.9 | 22.6 | 812 |
| Loddon Mallee South | 27.9 | 7% | 10.0 | 6.3 | 16.3 | 92 | 53 | 145 | 112 | 57 | 169 | 5.2 | 3.5 | 8.7 | 500 |
| Central Hume | 26.3 | 6% | 9.7 | 5.0 | 14.7 | 106 | 50 | 156 | 123 | 53 | 176 | 5.0 | 2.8 | 7.8 | 443 |
| Loddon Mallee North | 26.2 | 6% | 10.1 | 4.7 | 14.7 | 105 | 46 | 151 | 117 | 47 | 165 | 4.7 | 2.6 | 7.3 | 309 |
| Lower Hume | 22.6 | 5% | 8.2 | 3.5 | 11.7 | 89 | 31 | 120 | 102 | 35 | 137 | 4.6 | 1.9 | 6.5 | 234 |
| Goulburn Valley | 18.1 | 4% | 6.6 | 3.5 | 10.2 | 81 | 34 | 115 | 93 | 36 | 129 | 3.9 | 1.9 | 5.8 | 175 |
| G21 | 17.2 | 4% | 6.3 | 4.6 | 10.9 | 67 | 39 | 106 | 78 | 43 | 121 | 3.8 | 2.6 | 6.4 | 160 |
| Central Highlands | 13.4 | 3% | 4.6 | 3.0 | 7.7 | 48 | 27 | 75 | 59 | 30 | 88 | 2.6 | 1.7 | 4.3 | 104 |
| Upper Hume | 11.6 | 3% | 4.1 | 1.9 | 6.0 | 42 | 17 | 59 | 49 | 18 | 66 | 2.2 | 1.1 | 3.3 | 76 |
| Great South Coast | 5.8 | 1% | 2.2 | 1.0 | 3.2 | 25 | 9 | 35 | 30 | 10 | 39 | 1.2 | 0.5 | 1.8 | 58 |
| Wimmera Southern Mallee | 5.2 | 1% | 2.0 | 0.8 | 2.7 | 21 | 8 | 28 | 24 | 8 | 32 | 1.0 | 0.4 | 1.4 | 39 |
| **Total Victoria** [a] | **416.9** | **100%** | **177.0** | **262.0** | **439.0** | **1,598** | **1,882** | **3,480** | **1,787** | **1,948** | **3,735** | **100.2** | **147.3** | **247.5** | **7,649** |

[a] Total *flow-on* GRP and total *flow-on* employment estimates are greater than the sum of the individual regions because there are flow-on effects generated by each region that occur within Victoria but outside the region.

## Table A6- 2: Economic impact of deer hunting by RDV, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 65.7 | 48% | 26.5 | 36.6 | 63.1 | 246 | 249 | 496 | 272 | 260 | 532 | 16.4 | 20.6 | 37.0 | 1,418 |
| Gippsland | 27.9 | 20% | 10.2 | 5.0 | 15.1 | 92 | 42 | 135 | 107 | 46 | 153 | 5.1 | 2.7 | 7.9 | 254 |
| Central Hume | 12.8 | 9% | 4.7 | 2.4 | 7.1 | 52 | 24 | 77 | 60 | 26 | 86 | 2.5 | 1.4 | 3.9 | 142 |
| Lower Hume | 12.0 | 9% | 4.0 | 1.7 | 5.7 | 44 | 15 | 59 | 50 | 17 | 67 | 2.3 | 0.9 | 3.2 | 104 |
| Upper Hume | 5.9 | 4% | 2.1 | 1.0 | 3.0 | 22 | 9 | 31 | 25 | 9 | 34 | 1.2 | 0.6 | 1.7 | 58 |
| Central Highlands | 3.0 | 2% | 0.9 | 0.7 | 1.6 | 11 | 6 | 17 | 13 | 7 | 19 | 0.6 | 0.4 | 1.0 | 34 |
| Goulburn Valley | 3.0 | 2% | 1.1 | 0.6 | 1.7 | 14 | 6 | 20 | 16 | 6 | 22 | 0.7 | 0.3 | 1.0 | 37 |
| Great South Coast | 2.1 | 2% | 0.8 | 0.4 | 1.2 | 11 | 4 | 15 | 12 | 4 | 17 | 0.5 | 0.2 | 0.8 | 26 |
| G21 | 2.0 | 1% | 0.7 | 0.6 | 1.3 | 8 | 5 | 13 | 9 | 5 | 14 | 0.5 | 0.3 | 0.8 | 27 |
| Loddon Mallee South | 1.6 | 1% | 0.6 | 0.4 | 1.0 | 6 | 4 | 10 | 7 | 4 | 12 | 0.4 | 0.2 | 0.6 | 22 |
| Loddon Mallee North | 1.5 | 1% | 0.6 | 0.3 | 0.9 | 7 | 3 | 10 | 8 | 3 | 11 | 0.3 | 0.2 | 0.5 | 18 |
| Wimmera Southern Mallee | 0.8 | 1% | 0.3 | 0.1 | 0.4 | 4 | 1 | 5 | 4 | 1 | 6 | 0.2 | 0.1 | 0.2 | 9 |
| **Total Victoria** [a] | **138.3** | **100%** | **57.2** | **84.8** | **142.1** | **531** | **608** | **1,140** | **594** | **631** | **1,224** | **33.5** | **47.7** | **81.2** | **2,501** |

[a] Total *flow-on* GRP and total *flow-on* employment estimates are greater than the sum of the individual regions because there are flow-on effects generated by each region that occur within Victoria but outside the region.

## Table A6- 3: Economic impact of duck hunting by RDV, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 38.5 | 39% | 15.8 | 22.8 | 38.6 | 154 | 156 | 310 | 169 | 162 | 332 | 16.4 | 20.6 | 37.0 | 895 |
| Gippsland | 16.4 | 17% | 6.0 | 3.0 | 9.1 | 56 | 26 | 82 | 65 | 28 | 93 | 5.1 | 2.7 | 7.9 | 153 |
| Loddon Mallee South | 11.7 | 12% | 4.0 | 2.5 | 6.6 | 39 | 21 | 60 | 47 | 23 | 70 | 0.4 | 0.2 | 0.6 | 122 |
| G21 | 9.8 | 10% | 3.7 | 2.7 | 6.4 | 41 | 23 | 63 | 47 | 25 | 72 | 0.5 | 0.3 | 0.8 | 133 |
| Loddon Mallee North | 7.5 | 8% | 2.8 | 1.4 | 4.3 | 32 | 14 | 46 | 36 | 15 | 51 | 0.3 | 0.2 | 0.5 | 81 |
| Goulburn Valley | 5.6 | 6% | 2.0 | 1.1 | 3.1 | 25 | 10 | 35 | 29 | 11 | 40 | 0.7 | 0.3 | 1.0 | 66 |
| Central Hume | 2.3 | 2% | 0.8 | 0.4 | 1.2 | 10 | 4 | 14 | 11 | 5 | 16 | 2.5 | 1.4 | 3.9 | 26 |
| Central Highlands | 2.2 | 2% | 0.8 | 0.5 | 1.3 | 8 | 5 | 13 | 10 | 5 | 15 | 0.6 | 0.4 | 1.0 | 26 |
| Wimmera Southern Mallee | 2.1 | 2% | 0.8 | 0.3 | 1.1 | 8 | 3 | 12 | 10 | 3 | 13 | 0.2 | 0.1 | 0.2 | 21 |
| Upper Hume | 1.3 | 1% | 0.4 | 0.2 | 0.6 | 4 | 2 | 6 | 5 | 2 | 7 | 1.2 | 0.6 | 1.7 | 12 |
| Great South Coast | 1.2 | 1% | 0.5 | 0.2 | 0.6 | 4 | 2 | 6 | 5 | 2 | 7 | 0.5 | 0.2 | 0.8 | 10 |
| Lower Hume | 0.9 | 1% | 0.4 | 0.2 | 0.5 | 4 | 1 | 5 | 4 | 2 | 6 | 2.3 | 0.9 | 3.2 | 9 |
| **Total Victoria** [a] | **99.4** | **100%** | **42.5** | **63.8** | **106.3** | **399** | **458** | **857** | **444** | **475** | **919** | **33.5** | **47.7** | **81.2** | **1,875** |

[a] Total *flow-on* GRP and total *flow-on* employment estimates are greater than the sum of the individual regions because there are flow-on effects generated by each region that occur within Victoria but outside the region.

## Table A6- 4: Economic impact of quail hunting by RDV, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 30.3 | 69% | 12.2 | 17.7 | 29.9 | 120 | 121 | 241 | 132 | 126 | 258 | 8.3 | 10.0 | 18.3 | 718 |
| Gippsland | 3.7 | 8% | 1.4 | 0.8 | 2.2 | 15 | 7 | 22 | 18 | 8 | 25 | 0.9 | 0.4 | 1.3 | 41 |
| G21 | 2.5 | 6% | 0.9 | 0.7 | 1.6 | 10 | 6 | 16 | 12 | 7 | 18 | 0.6 | 0.4 | 1.0 | 33 |
| Loddon Mallee South | 1.8 | 4% | 0.6 | 0.4 | 1.0 | 6 | 3 | 10 | 8 | 4 | 11 | 0.4 | 0.2 | 0.6 | 20 |
| Goulburn Valley | 1.8 | 4% | 0.7 | 0.4 | 1.1 | 9 | 4 | 13 | 10 | 4 | 14 | 0.5 | 0.2 | 0.7 | 25 |
| Loddon Mallee North | 1.1 | 3% | 0.4 | 0.2 | 0.6 | 5 | 2 | 7 | 5 | 2 | 8 | 0.2 | 0.1 | 0.3 | 12 |
| Central Hume | 0.7 | 1% | 0.2 | 0.1 | 0.4 | 3 | 1 | 4 | 3 | 1 | 5 | 0.1 | 0.1 | 0.2 | 8 |
| Wimmera Southern Mallee | 0.6 | 1% | 0.2 | 0.1 | 0.3 | 3 | 1 | 4 | 3 | 1 | 4 | 0.1 | 0.1 | 0.2 | 7 |
| Central Highlands | 0.6 | 1% | 0.2 | 0.1 | 0.4 | 2 | 1 | 4 | 3 | 1 | 4 | 0.1 | 0.1 | 0.2 | 7 |
| Great South Coast | 0.5 | 1% | 0.2 | 0.1 | 0.2 | 2 | 1 | 2 | 2 | 1 | 3 | 0.1 | 0.0 | 0.1 | 4 |
| Upper Hume | 0.2 | 1% | 0.1 | 0.0 | 0.1 | 1 | 0 | 1 | 1 | 0 | 2 | 0.1 | 0.0 | 0.1 | 3 |
| Lower Hume | 0.2 | 0% | 0.1 | 0.0 | 0.1 | 1 | 0 | 2 | 1 | 0 | 2 | 0.1 | 0.0 | 0.1 | 2 |
| **Total Victoria** [a] | **44.1** | **100%** | **18.2** | **28.1** | **46.3** | **184** | **201** | **385** | **205** | **209** | **414** | **12.1** | **15.8** | **27.9** | **839** |

[a] Total *flow-on* GRP and total *flow-on* employment estimates are greater than the sum of the individual regions because there are flow-on effects generated by each region that occur within Victoria but outside the region.

## Table A6- 5: Economic impact of pest animal hunting by RDV, 2013

| | Expenditure | | Gross Regional Product ($m) | | | Employment (fte) | | | Employment (Total) | | | Household Income ($m) | | | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | ($m) | Share | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Direct | Flow-on | Total | Total |
| Melbourne | 32.1 | 24% | 13.9 | 16.3 | 30.1 | 101 | 110 | 211 | 113 | 115 | 228 | 6.5 | 9.1 | 15.6 | 648 |
| Gippsland | 28.0 | 21% | 10.3 | 5.5 | 15.9 | 104 | 47 | 151 | 120 | 51 | 171 | 5.6 | 3.0 | 8.6 | 314 |
| Loddon Mallee North | 16.0 | 12% | 6.2 | 2.7 | 8.9 | 60 | 27 | 87 | 67 | 27 | 95 | 2.7 | 1.5 | 4.2 | 170 |
| Loddon Mallee South | 12.8 | 9% | 4.7 | 2.9 | 7.7 | 41 | 24 | 65 | 50 | 27 | 76 | 2.3 | 1.6 | 3.9 | 157 |
| Central Hume | 10.5 | 8% | 4.0 | 2.0 | 6.0 | 42 | 20 | 61 | 48 | 21 | 69 | 1.9 | 1.1 | 3.0 | 127 |
| Lower Hume | 9.6 | 7% | 3.8 | 1.6 | 5.4 | 40 | 14 | 54 | 46 | 16 | 62 | 2.0 | 0.9 | 2.9 | 108 |
| Goulburn Valley | 7.7 | 6% | 2.8 | 1.4 | 4.2 | 33 | 14 | 47 | 38 | 14 | 53 | 1.5 | 0.8 | 2.3 | 97 |
| Central Highlands | 7.6 | 6% | 2.7 | 1.7 | 4.4 | 27 | 15 | 42 | 33 | 17 | 50 | 1.4 | 1.0 | 2.4 | 95 |
| Upper Hume | 4.3 | 3% | 1.6 | 0.7 | 2.2 | 15 | 6 | 21 | 17 | 6 | 23 | 0.8 | 0.4 | 1.2 | 44 |
| G21 | 2.8 | 2% | 1.0 | 0.6 | 1.7 | 9 | 6 | 14 | 11 | 6 | 17 | 0.5 | 0.4 | 0.9 | 33 |
| Great South Coast | 2.1 | 2% | 0.8 | 0.3 | 1.1 | 9 | 3 | 12 | 10 | 3 | 13 | 0.4 | 0.2 | 0.6 | 23 |
| Wimmera Southern Mallee | 1.7 | 1% | 0.7 | 0.2 | 0.9 | 6 | 2 | 8 | 7 | 2 | 9 | 0.3 | 0.1 | 0.4 | 16 |
| **Total Victoria** [a] | **135.1** | **100%** | **59.0** | **85.3** | **144.4** | **483** | **614** | **1,097** | **545** | **633** | **1,178** | **29.5** | **47.9** | **77.3** | **2,434** |

[a] Total *flow-on* GRP and total *flow-on* employment estimates are greater than the sum of the individual regions because there are flow-on effects generated by each region that occur within Victoria but outside the region.

# Appendix 7: Survey Instrument

| | | |
|---|---|---|
| Intro | **We are undertaking a survey to better understand the experiences of people who hunt game in Victoria. Thank you very much for your time and assistance.**<br><br>**The questionnaire should take about 15 to 20 minutes to complete.**<br><br>**<Next button>**<br><br>This research is being conducted by DBM Consultants, an independent market research company, on behalf of the Victorian Government Department of Environment and Primary Industries. The information collected will be used for research purposes only. None of your personal details will be disclosed unless you give your permission, and will be held as strictly confidential, according to the Code of Professional Behaviour set out by the Australian Market and Social Research Society and the Privacy Act.<br><br>[Footer:] To view our privacy policy, please click here <insert link>.<br>© DBM Consultants 2013 | |
| S1 | **Firstly, we have a few questions about you.**<br>**Are you...**<br>1. Male<br>2. Female | Single response |
| S2 | **And which of the following age ranges do you fall into?**<br>1. Under 18<br>2. 18-24<br>3. 25-29<br>4. 30-34<br>5. 35-39<br>6. 40-44<br>7. 45-49<br>8. 50-54<br>9. 55-59<br>10. 60-64<br>11. 65-74<br>12. 75 and over<br>13. Do not wish to answer | Single response |

| | | |
|---|---|---|
| S3a | **Which state or territory do you currently live in?**<br>1. New South Wales<br>2. Queensland<br>3. Victoria<br>4. South Australia<br>5. Tasmania<br>6. Western Australia<br>7. Northern Territory<br>8. Australian Capital Territory<br>9. Outside Australia | Single response |

Ask S3b if response to S3a=3 'Victoria'

| | | |
|---|---|---|
| S3b | **Where do you live in Victoria?**<br>Please enter your postcode and select your town/suburb from the drop down list.<br>**POSTCODE: _ _ _ _ Town/location _____**<br>ERROR MESSAGE IF INVALID POSTCODE: Please enter the 4 digit postcode of your street address and not of a PO Box. | Open ended |

| | | |
|---|---|---|
| S4a | **Please select from the list below what animals or ways you have been licensed to hunt in Victoria for the last 12 months?**<br>**Please select all that apply**<br>1. Deer (Stalking)<br>2. Deer (Hounds)<br>3. Duck<br>4. Stubble quail<br>5. Non-indigenous Game Birds (farm hunting licence only)<br>6. Unsure<br>7. None of these in the last 12 months | Multiple response |
| S4b | **Have you hunted in Victoria in the past 12 months?**<br>1. Yes<br>2. No | Single response |

IF S3a<>3 AND S4b=2 TERMINATE (If live outside of Victoria and have not hunted in Victoria in past 12 months)

TERMINATION MESSAGE: Thank you very much for participating in the survey. Unfortunately the rest of the survey asks about experiences of people who have hunted in Victoria in the past 12 months.

| | | |
|---|---|---|
| S5 | **Which hunting association/s are you a member of?**<br>1. Sporting Shooters Association Australia<br>2. Field and Game Australia<br>3. Australian Deer Association<br>4. Victorian Deer Association<br>5. Australian Bowhunters Association<br>6. Victorian Game and Deerstalking Association<br>7. Victorian Hound Hunters<br>8. Other (please specify)<br>9. I am not a member of a hunting association | Multiple response |

| | | |
|---|---|---|
| INTRO 2 | **This next section asks some questions about the main reasons you hunt, and the types of benefits you get from hunting. We also ask a bit more about what is the most important to you about hunting – for example, the type of hunting you do, or the places you go hunting.** | |
| Q14 | **What are the top 5 reasons you like to go hunting?**<br><br>**(If the most important reason/s you hunt aren't given, please type them in the space provided).**<br><br>*[Please select up to 5 of the following]*<br><br>1. …to relax and unwind<br>2. …to spend time in the outdoors<br>3. …to spend time with family<br>4. …to spend time with friends<br>5. …to meet new people<br>6. …to get away from my day-to-day life<br>7. …to continue a family or cultural tradition of hunting<br>8. …to get away from other people<br>9. …for the sport of hunting<br>10. ...because it is challenging<br>11. …because it is exciting<br>12. …to get food for myself or my friends/family<br>13. …to get exercise<br>14. …to spend time in places that are special to me<br>15. …to reduce pest species populations<br>16. …other (please describe) | Minimum 1, Maximum 5 responses |

| Q15a | **A lot of people who participate in hunting also take part in other recreation activities.**<br><br>**Do you do any of the following types of recreation? (some of these may be things you do at the same time as hunting).**<br>**Please select all that apply** | Multiple response, Randomise (except none of these) |
|---|---|---|

**1.** Bushwalking
**2.** Outdoor photography
**3.** Bird or animal watching
**4.** Fishing
**5.** Mountain biking
**6.** Skiing (e.g. water or snow)
**7.** Rock climbing
**8.** Four wheel driving
**9.** Horse riding
**10.** Camping
**11.** None of these

Ask all (except if Q15=11)

| Q15b | **Are these activities less important, more important or just as important to you as hunting?** | Single response |
|---|---|---|

| | **Less important than my hunting** | **Just as important as my hunting** | **More important than my hunting** |
|---|---|---|---|
| [Responses from Q15a] | | | |

| Q16 | **Some people like to hunt in the same places each year, or for the same type of game, while other people vary the places they hunt and the species they hunt for. To what extent do you agree or disagree with the following statements about your hunting?** | Single response per row<br>Randomise |
|---|---|---|

| | | **Strongly Disagree** 1 | 2 | 3 | 4 | 5 | 6 | **Strongly Agree** 7 |
|---|---|---|---|---|---|---|---|---|
| 1. | I usually hunt for the same type of game (e.g. deer, or quail) | | | | | | | |
| 2. | I usually hunt in the same places each season | | | | | | | |
| 3. | The places I go hunting are special to me | | | | | | | |
| 4. | If I hunted for different game than normal (e.g. for ducks instead of deer), I would enjoy it just as much | | | | | | | |
| 5. | I change the places where I go hunting regularly | | | | | | | |
| 6. | I usually go hunting during school holidays or public holidays | | | | | | | |
| 7. | If I couldn't hunt for the type of game I currently hunt, I would swap to hunting different species instead | | | | | | | |
| 8. | If I couldn't hunt in the places I currently hunt, I would swap to hunting in new locations | | | | | | | |

| INTRO 3 | **Now we would like to find out about hunting trips you have been on in the last 12 months.** | |
|---|---|---|
| Q1 | **Firstly, how many hunting trips have you been on in the last 12 months?**<br>Please count both **overnight** and **day trips**. An **overnight trip** is where you stayed overnight in another location. A **day trip** is where you travelled more than 50km and were away from home for at least 4 hours.<br>_____ trips | Numeric field |

Ask if Q1=0 (No trips)

| Q2a | **Do you expect to go hunting again in the future?**<br>1. Yes<br>2. No<br>**3.** Unsure | Single response |
|---|---|---|

Ask if Q1=0 (No trips)

| | | |
|---|---|---|
| Q2b | **What are the reasons you didn't go on any hunting trips in the last 12 months? Please select all that apply**<br>1. I have been too busy at work<br>2. My health has been poor or I had an injury that prevented hunting<br>3. I have shifted to different sports or hobbies instead of hunting<br>4. I had increased personal commitments at home (e.g. a new baby, caring responsibilities, renovations)<br>5. The people I used to go hunting with were no longer going hunting<br>6. Weather conditions prevented me hunting<br>7. I shifted to a new community<br>8. Changes in hunting rules or regulations<br>9. I couldn't afford the cost of going on a hunting trip<br>10. I couldn't hunt in the locations I would like to, for example because of a ban on hunting or other reasons<br>11. No reason<br>12. Other | Multiple response<br>Randomise except no reason/other |

Ask if Q1 > 0 (At least one trip)

| | | |
|---|---|---|
| Q3a | **Did you hunt outside of Victoria in the past 12 months?**<br>1. No, hunted within Victoria only<br>2. Yes, hunted both within and outside Victoria<br>3. Yes, hunted outside Victoria only | Single response |

Q3a= 2 (hunted in Victoria and outside Victoria)

| | | |
|---|---|---|
| Q3b | **Approximately how many of these hunting trips in the last 12 months were in Victoria?**<br>_____ trips | Numeric field |

Ask if Q3b>0 or Q3a=1 (i.e. has at least one trip in Victoria)

| | | |
|---|---|---|
| Q4 | **Just thinking about your hunting trips in Victoria in the past 12 months, on how many trips was each of the following animals the MAIN ANIMAL hunted, that is the animal that you intended to hunt?**<br>For each trip, consider the animal you hunted the most, that is, only count **one** animal per trip. If you didn't hunt for the animal please choose "Never main animal" | Single response per row |

| | | Never main animal | 1-3 trips | 4-6 trips | 7-12 trips | 13-24 trips | 25-49 trips | 50 or more trips |
|---|---|---|---|---|---|---|---|---|
| 1. | Deer [Show if S4a=1, 2, 6] | | | | | | | |
| 2. | Duck [Show if S4a=3, 6] | | | | | | | |
| 3. | Stubble quail [Show if S4=4, 6] | | | | | | | |
| 4. | Non-indigenous game birds at a game bird farm [Show if S4=4, 5, 6] | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 5. | Pest animals (e.g. rabbits, foxes, pigs, goats) [Show all] | | | | | | | |

Ask if Q4_1 'Deer' ≠ Never

| | | |
|---|---|---|
| Q5a | **Thinking about all the times when you hunted DEER in Victoria in the last 12 months, which were the nearest town/s where the DEER were hunted? Please indicate the most frequent town under "Town 1", second most frequent under "Town 2", etc.**<br>To select your town, start typing in the fields below and a drop down menu will appear. From this list, please select the right town. | Drop down,<br>Specify up to four locations. |

| | | Town 1 | Town 2 | Town 3 | Town 4 |
|---|---|---|---|---|---|
| a. | Deer | | | | |

Ask if Q4_2 'Duck' ≠ Never

| | | |
|---|---|---|
| Q5b | **Thinking about all of the times when you hunted DUCK in Victoria in the last 12 months, which were the nearest town/s where the DUCK were hunted? Please indicate the most frequent town under "Town 1", second most frequent under "Town 2", etc.**<br>To select your town, start typing in the fields below and a drop down menu will appear. From this list, please select the right town. | Drop down,<br>Specify up to four locations. |

| | | Town 1 | Town 2 | Town 3 | Town 4 |
|---|---|---|---|---|---|
| b. | Duck | | | | |

Ask if Q4_3 'Stubble Quail' ≠ Never

| | | |
|---|---|---|
| Q5c | **Thinking about all of the times when you hunted STUBBLE QUAIL in Victoria in the last 12 months, which were the nearest town/s where the STUBBLE QUAIL were hunted? Please indicate the most frequent location under "Town 1", second most frequent under "Town 2", etc.**<br>To select your town, start typing in the fields below and a drop down menu will appear. From this list, please select the right town. | Drop down,<br>Specify up to four locations. |

| | | Town 1 | Town 2 | Town 3 | Town 4 |
|---|---|---|---|---|---|
| c. | Stubble quail | | | | |

Ask if Q4_4 'Non-native game birds' ≠ Never

| | | |
|---|---|---|
| Q5d | **Thinking about all of the times when you hunted NON INDIGENOUS GAME BIRDS in Victoria in the last 12 months, which were the nearest town/s where the GAME BIRDS were hunted? Please indicate the most frequent location under "Town 1", second most frequent under "Town 2", etc.**<br>To select your town, start typing in the fields below and a drop down menu will appear. From this list, please select the right town. | Drop down,<br>Specify up to four locations. |

| | | Town 1 | Town 2 | Town 3 | Town 4 |
|---|---|---|---|---|---|
| d. | Non-indigenous game birds at a game farm | | | | |

Ask if Q4_5 'Pest Animals' ≠ Never

| | | |
|---|---|---|
| Q5e | **Thinking about when you hunted PEST ANIMALS in Victoria in the last 12 months, which were the nearest town/s where the PEST ANIMALS were hunted? Please indicate the most frequent location under "Town 1", second most frequent under "Town 2", etc.**<br>To select your town, start typing in the fields below and a drop down menu will appear. From this list, please select the right town. | Drop down,<br>Specify up to four locations. |

| | | Town 1 | Town 2 | Town 3 | Town 4 |
|---|---|---|---|---|---|
| e. | Pest animals (e.g. rabbits, foxes, pigs, goats) | | | | |

Ask if Q4≠never for all animals (At least one trip for at least one of the animals listed)

If Q4=only **one** animal that is not 'never', Q6 is skipped.

| | | |
|---|---|---|
| Q6 | **Which of the following animals did you hunt during your <u>most recent hunting trip</u> in Victoria?**<br>**Please only consider the animal you hunted the most.**<br>[Animals shown where Q4≠Never]<br>1. Deer<br>2. Duck<br>3. Stubble quail<br>4. Non-indigenous game birds<br>5. Pest animals (e.g. rabbits, foxes, pigs, goats) | Single response. |

[CHECK QUOTA - The next section boosted responses for some animals (particularly Duck and Quail) by asking about a respondent's most recent trip for a particular target animal if that animal was hunted at Q4]

Ask if Q3b>0 or Q3a=1 (I.e. Had at least one trip in Victoria), Q4≠never for all animals

| | |
|---|---|
| INTRO 4 | **Now we would like you to think about your <u>most recent hunting trip</u> in Victoria where you hunted [QUOTA GROUP]**<br>**Please note that the above animal may or may not be most recent animal you have hunted.** |
| INTRO | **When did you take this trip?** |

If QUOTA=DEER

| | | |
|---|---|---|
| Q6a | 1. November-December 2012<br>2. January-February 2013<br>3. March-April 2013<br>4. May-June 2013<br>5. July-August 2013<br>6. September-October 2013<br>7. November-December 2013 | Single response |

If QUOTA=DUCK

| | | |
|---|---|---|
| Q6b | 1. Opening weekend in 2013<br>2. Other March 2013<br>3. April 2013<br>4. May 2013<br>***5.*** June 2013 | Single response |

If QUOTA=QUAIL

| | | |
|---|---|---|
| Q6c | 1. April 2013<br>2. May 2013<br>3. June 2013 | Single response |

If QUOTA=GAME BIRD/PEST

| | | |
|---|---|---|
| Q6d | 1. December 2012<br>2. January 2013<br>3. February 2013<br>4. March 2013<br>5. April 2013<br>6. May 2013<br>7. June 2013<br>8. July 2013<br>9. August 2013<br>10. September 2013<br>11. October 2013<br>12. November 2013<br>13. December 2013 | Single response |

Ask if Q3b>0 or Q3a=1 (I.e. Had at least one trip in Victoria) , Q4≠never for all animals

If only one location selected at Q5a to Q5e, Q7 is skipped

| | | |
|---|---|---|
| Q7 | **Where did you mainly hunt on that trip?**<br>1. **[Locations selected from Q5a to Q5e corresponding to QUOTA animal. If 4 locations specified at Q5a to Q5e, 'Other (please specify) appeared]** | Single response |

Ask if Q3b>0 or Q3a=1 (I.e. Had at least one trip in Victoria) , Q4≠never for all animals

| | | |
|---|---|---|
| Q8 | **During your <u>most recent hunting trip</u> in Victoria where you hunted [QUOTA], did you undertake any other activities apart from hunting?**<br>**Please select all that apply**<br>1. Bushwalking<br>2. Fishing<br>3. Other outdoor activity (e.g. Four wheel driving, Camping)<br>4. Other activity (e.g. Indoor)<br>**5.** None of these | Multiple response |

Ask if Q3b>0 or Q3a=1 (I.e. Had at least one trip in Victoria) , Q4≠never for all animals

| | | |
|---|---|---|
| Q9 | **And on this trip did you stay away from home overnight?**<br>1. Yes<br>2. No | Single response |

Ask if Q9=1 (Stayed overnight)

| | | |
|---|---|---|
| Q10 | **And how many nights did you stay away from home?**<br>1. 1 night<br>2. 2 nights<br>3. 3 nights<br>4. 4 nights<br>5. 5 nights<br>6. More than 5 nights, (please specify how many nights_____) | Single response |

Ask if Q9=1 (Stayed overnight)

| | | |
|---|---|---|
| Q11 | **Did you stay in [Answer from Q7/Q5] [NOTE: Show if Q10 is 2 or more nights] for [DP Note: Answer from Q10][/NOTE]?**<br>1. Yes<br>2. No | Single response |

If Q11=2 (Stayed in another location other than hunting location)

<table>
<tr>
<td>Q12</td>
<td>Please list each town and how many night/s you stayed in each town in the boxes below.
<table>
<tr><th></th><th>Town</th><th>Number of nights stayed</th></tr>
<tr><td>a.</td><td>[Victorian locations dropdown]</td><td></td></tr>
<tr><td>b.</td><td>[Victorian locations dropdown]</td><td></td></tr>
<tr><td>c.</td><td>[Victorian locations dropdown]</td><td></td></tr>
<tr><td>d.</td><td>[Victorian locations dropdown]</td><td></td></tr>
</table>
</td>
<td>Dropdown and open text</td>
</tr>
</table>

Ask if Q3b>0 or Q3a=1, (At least one trip in Victoria) , Q4≠never for all animals

| | |
|---|---|
| INTRO 5 | **Still thinking about your <u>most recent hunting trip</u> in Victoria where you hunted [QUOTA]** |

Ask if Q3b>0 or Q3a=1 (I.e. Had at least one trip in Victoria) , Q4≠never for all animals

| | | |
|---|---|---|
| Q17 | **During this hunting trip in Victoria, what did you spend money on?**<br>Please include anything <u>you</u> paid for, whether by cash, EFTPOS, cheque, credit card or any other means. If you paid for other people at any stage (for example, if you paid for someone else's dinner) then do include that amount. But if someone else paid for you, then exclude that amount.<br>1. Fuel<br>2. Vehicle hire<br>3. Vehicle repairs<br>4. Long-distance transport (e.g. airline, train, coach fares)<br>5. Taxis<br>6. Accommodation<br>7. Takeaways & restaurant meals<br>8. Groceries etc. for self-catering at your accommodation<br>9. Drinks, alcohol (not already reported above) for consumption at your accommodation<br>10. Ammunition<br>11. Hunting tours/package tour<br>12. Other hunting equipment (e.g. decoys, clothing)<br>13. Other (please specify)<br>14. Not applicable – I did not spend any money on this trip | Multiple response |

Ask if at least one item selected at Q17 (i.e. Q17≠14)

Q18 **And during your <u>most recent hunting trip</u> in Victoria where you hunted [QUOTA], approximately how much did you spend on these items?**

Please include:

- Anything <u>you</u> paid for, whether by cash, EFTPOS, cheque, credit card or any other means.
- Any money you paid for other people and you were not reimbursed (e.g. if paid for someone else's meal)
- Any money paid for you by someone who didn't go on the hunting trip (e.g. employer or parents)

Please exclude:

- Any money paid on your behalf by someone else who travelled with you on the hunting trip.

Single response per row

| | | $1-$20 | $21-$50 | $51-$100 | $101 - $200 | $201 - $500 | $501 or more |
|---|---|---|---|---|---|---|---|
| a. | [Responses from Q17] | | | | | | |

If Q17 = 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13 (Not accommodation or not applicable)

Q19a **What was the location of the business/es from which you bought these items? For example, were the items bought in your home town/city, at the main hunting destination or at another location?**

**If you bought items from more than one location, please select the location where the most money was spent.**

Single response per row

| | | Home | At the destination | Another town in Victoria) | Other |
|---|---|---|---|---|---|
| a. | [Responses from Q17] | | | | |

If Q19a = 'Another town in Victoria'

Q19b **Which Victorian town/s did you buy these item/s from?**

Single response per row

| | | Which Victorian town or city? |
|---|---|---|
| a. | [Responses from Q17] | *[Victorian locations dropdown]* |

Ask all

| | |
|---|---|
| INTRO 6 | **Now we'd like you to consider what you've spent when you've NOT been on a hunting trip, to support your hunting activities.**<br>**Please don't include expenses made during hunting trips; this type of expense has been addressed in the previous section.** |

Ask all [including those who have not been hunting in the last 12 months]

| | | |
|---|---|---|
| Q20 | During the last 12 months, which of the items from the following list have you spent money on to **support your hunting activities**?<br><br>1. Firearms, bows and other firearm equipment<br>2. Ammunition<br>3. Licenses (game, firearm)<br>4. Hunting dog expenses (e.g. dog purchases, training, food, veterinary expenses, registrations etc.)<br>5. Training to support your hunting activities (e.g. target practice)<br>6. Hunting club memberships<br>7. Hunting clothing<br>8. General hunting equipment (inc knives, binoculars and safety)<br>9. Vehicles (e.g. purchased with hunting in mind)<br>10. Vehicle equipment/accessories<br>11. Vehicle maintenance<br>12. Boats [Show if S4=3 or 6]<br>13. Boat equipment/accessories [Show if S4=3 or 6]<br>14. Boat maintenance [Show if S4=3 or 6]<br>15. Camping equipment<br>16. Photography equipment<br>17. Other (please specify)_____<br>**18.** Not applicable – I did not spend any money to support hunting activities in the past 12 months | Multiple response |

If at least one item selected at Q20 (i.e. Q20≠18)

Q21 **And during the past 12 months, approximately how much have you spent on these items?** — Single response per row

| | | **$1-$100** | **$101-$500** | **$501-$1,000** | **$1,001-$2,000** | **$2,001-$5,000** | **$5,001-$10,000** | **$10,001 or more** |
|---|---|---|---|---|---|---|---|---|
| a. | [Responses from Q20] | | | | | | | |

If 8-17 selected at Q20 (General hunting equipment to Other).

Q22 **And approximately what percentage of the use of these items has been on <u>hunting activities</u> versus non hunting activities?** — Single response per row

| | **Percentage accounted for by hunting...** | **0%-25%** | **26%-50%** | **51%-75%** | **76%-100%** |
|---|---|---|---|---|---|
| **a.** | [Responses from Q20] | | | | |

If at least one item selected at Q20 (i.e. Q20≠18)

| | | |
|---|---|---|
| Q23 | **What is the location of the business/es from which you usually buy these items?**<br>For example, for online purchases, please consider the town or city (if within Victoria) or state or country (if outside Victoria) where your usual vendor is located. | Single response per row |

| | | Melbourne | In a Victorian town or city other than Melbourne | Interstate (e.g. NSW, QLD) | Overseas | Unsure |
|---|---|---|---|---|---|---|
| a. | [DP Note: Populate with responses from Q20] | | | | | |

Ask if at least one response in column 2 of Q20 'In a Victorian town or city other than Melbourne'

| | | |
|---|---|---|
| Q24 | **At which Victorian town or city do you usually buy these items?** | Single response per row |

| | | Which Victorian town or city? |
|---|---|---|
| b. | [Responses from Q20] | *[Victorian locations dropdown]* |

Ask all

| | | |
|---|---|---|
| INTRO 7 | **Now just a few questions about you, to help us better understand who is involved in hunting in Victoria.** | |
| D1 | **Which of the following best describes you…?**<br>1. Indigenous - Australian<br>2. Australian born (non-indigenous)<br>3. Overseas born (English speaking background)<br>4. Overseas born (non-English speaking background)<br>5. Do not wish to answer [Display in grey font] | Single response |
| D2 | **Which of the following is <u>the highest level</u> of formal education that you have completed?**<br>1. Primary school<br>2. Third year of high school (completed year 9 or equivalent)<br>3. Fourth year of high school (completed year 10 or equivalent)<br>4. High school certificate (completed year 12 or equivalent)<br>5. Certificate I or II<br>6. Certificate III or IV (e.g. trade certificate, apprenticeship)<br>7. TAFE diploma (post high-school)<br>8. Graduate diploma or graduate certificate (from a university)<br>9. University degree (e.g. Bachelors degree)<br>10. Postgraduate degree (e.g. Masters, PhD) | Single response |

| | | |
|---|---|---|
| | 11. Do not wish to answer [Display in grey font] | |
| D3 | **Which of the following best describes you…?**<br>1. In full-time paid work<br>2. In part-time paid work (e.g. you work an agreed number of hours per week)<br>3. In casual paid work (e.g. your hours vary and are not set)<br>4. Unemployed and looking for paid work<br>5. Home duties<br>6. Retired<br>7. Student not in paid work<br>8. Other<br>9. Do not wish to answer [Display in grey font] | Single response |
| D4 | **Which of the following best describes your living situation…?**<br>1. Living as a couple, no children aged under 15 years at home<br>2. Living as a couple, with 1 or more children aged under 15 years at home<br>3. Single parent, no children aged under 15 years at home<br>4. Single parent, with 1 or more children aged under 15 years at home<br>5. Living with other non-family members (e.g. flatmates)<br>6. Living alone<br>7. Other | Single response |
| D6 | **What is your gross or pre-tax <u>household</u> income?**<br>*Please include the income earned by all working people in your household. Include income received from government pensions investments/dividends, and salaried employment.*<br>1. Negative or nil income<br>2. $1 - $10,399<br>3. $10,400 - $20,799<br>4. $20,800-$31,199<br>5. $31,200-$41,599<br>6. $41,600-$51,999<br>7. $52,000-$64,999<br>8. $65,000-$77,999<br>9. $78,000-$102,999<br>10. $103,000-$129,999<br>11. $130,000-$155,999<br>12. $156,000-$207,999<br>13. $208,000 or more<br>14. Don't know [Display in grey font]<br>15. Prefer not to say [Display in grey font] | Single response |

Ask all

| | | |
|---|---|---|
| INTRO 8 | **Finally, we have some <u>optional</u> questions about your overall health and wellbeing.** Participating in recreational activities like hunting can influence your health and wellbeing. The following questions about your health and wellbeing are used in several Australian surveys, and will be used to help us understand whether people who participate in hunting have different health and wellbeing to the average Victorian. | |
| H1 | **How would you rate your general health?**<br>1. Excellent<br>2. Very good<br>3. Good<br>4. Fair<br>**5.** Poor | Single response |
| H2 | **Thinking about your own life and personal circumstances, how satisfied are you with the following?** *Please* **i***ndicate how satisfied or dissatisfied you are with each of the following.* | Single response per row |

| | | **Completely Dissatisfied** | | | | | | | | | | **Completely Satisfied** | Don't Know |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| a. | Your life as a whole | | | | | | | | | | | | |
| b. | Your standard of living | | | | | | | | | | | | |
| c. | Your health | | | | | | | | | | | | |
| d. | What you are currently achieving in life | | | | | | | | | | | | |
| e. | Your personal relationships | | | | | | | | | | | | |
| f. | Feeling part of your community | | | | | | | | | | | | |
| g. | The amount of free time you have | | | | | | | | | | | | |

| | | |
|---|---|---|
| H3 | **We all have 'communities' – groups of people we spend time with, who might live in the same place as us, or live in different places but have common interests. What is your community like? (answer in general if you interact with multiple communities)?**<br>***Indicate how much you agree or disagree with each statement.*** | Single response per row |

| | | Strongly Disagree | | | | | | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| a. | I feel welcome in my social group/s | | | | | | | |
| b. | I feel part of my community | | | | | | | |
| c. | I belong in my community | | | | | | | |
| d. | We are all 'in it together' in my community | | | | | | | |
| e. | I feel like an outsider in my community | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| f. | I get on well with most people in my community | | | | | | | |
| g. | People look out for me in my community | | | | | | | |
| h. | If I need help or support I can easily find it | | | | | | | |
| i. | I enjoy spending time with my extended family | | | | | | | |
| j. | I enjoy spending time doing organised community activities | | | | | | | |
| k. | I enjoy spending time with my friends | | | | | | | |
| l. | Most people can be trusted | | | | | | | |

| H4 | **Now, we want to know a bit about what you think about your hunting trips. To what extent do you agree or disagree with the following statements?** | Single response per row |
|---|---|---|

| | | Strongly Disagree | | | | | | Strongly Agree | Don't know |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| a. | …let me get away from my day-to-day routine | | | | | | | | |
| c. | …make me feel proud | | | | | | | | |
| d. | …make me feel confident | | | | | | | | |
| e. | …are physically risky | | | | | | | | |
| f. | …help me connect to nature | | | | | | | | |
| g. | …let me spend more time outdoors than I would otherwise | | | | | | | | |
| h. | …let me enjoy nature | | | | | | | | |
| i. | …make me feel more connected to the places I hunt in | | | | | | | | |
| j. | …help me meet new people | | | | | | | | |
| k. | …help me spend more time with friends | | | | | | | | |
| l. | …help me connect to my community | | | | | | | | |
| m. | …let me meet different types of people I wouldn't normally get to meet | | | | | | | | |
| n. | …let me spend time with other people who have a similar outlook to me | | | | | | | | |

| Outro | |
|---|---|

**That's the end of the survey. Thank you very much for your time and assistance today.**

**Your responses have been successfully submitted.**

*If you have any queries about this survey, you can contact our office on 1800 063 989 and quote job number R773. If you have any queries about DBM Consultants or market research in general you can contact the Australian Market and Social Research Society's free survey line on 1300 364 830.*

*Thank you again for your time.*