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Environment, Natural Resources and Regional
Development Committee

Inquiry into the control of invasive animals on Crown land

Parliament of Victoria
Environment, Natural Resources and Regional Development Committee

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Committee functions

The Environment, Natural Resources and Regional Development Committee is constituted under section 10 of the *Parliamentary Committees Act 2003*.

The Committee's functions are to inquire into, consider and report to the Parliament on any proposal, matter or thing concerned with:

- a. the environment
- b. natural resources
- c. planning the use, development or protection of land
- d. the provision of services to rural and regional Victoria
- e. the development of rural and regional Victoria.

Committee membership



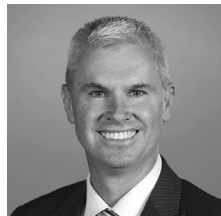
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This full report and a Summary Booklet version are available on the Committee's website.

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Terms of reference

Inquiry into the control of invasive animals on Crown land

Received from the Legislative Assembly on 14 April 2016:

That, under s 33 of the *Parliamentary Committees Act 2003*, an inquiry be referred to the Environment, Natural Resources and Regional Development Committee for consideration and report no later than 30 March 2017* into the benefits of Parks Victoria and other agencies such as the Game Management Authority's use of community hunting organisations and individuals in the control of invasive animals on Crown land including but not limited to the following:

1. assessment of the biodiversity outcomes, community safety and limitations of the trial conducted by Parks Victoria on control of deer populations in a national park;
2. consideration of the application of these types of programs for other invasive animal species in partnership with Crown land managers;
3. assessment of the relative costs and benefits, financial or otherwise, of other forms of pest control in national parks.

**The reporting date was extended to 22 June 2017.*

Chair's foreword

There is no doubt that invasive animals are a problem in Victoria. They impact on agriculture by preying on livestock, consuming pasture and damaging fences. They harm the environment by killing native species, damaging native vegetation and competing with native animals for food. They threaten people's safety and amenity through car accidents and the fear of being attacked.

During this inquiry, the Committee heard from people and organisations from across Victoria. Many of them had directly experienced the negative effects of invasive animals. Many believed the problem is getting worse.

It is clear that more needs to be done to manage invasive animals.

However, it is less clear exactly what should be done. This inquiry found that there is a lack of robust data about the extent of the invasive animal problem and the effectiveness of different control methods. Some work is currently underway to improve our understanding but the results are not yet available. Further work in this area will be important for future policy development.

This inquiry focussed on the role of shooting in invasive animal control, particularly the role of recreational hunters. There was general agreement that recreational hunting cannot manage Victoria's invasive animal problem by itself. However, it may be part of the solution in some circumstances, if the hunting effort can be focussed at particular times and places and integrated into a broader control program involving multiple methods of animal control. This report considers in more detail when and how recreational hunters can be most helpful in terms of animal control.

The inquiry also identified potential improvements in the way that invasive animals are managed by government bodies. Effective animal control programs require a co-ordinated, long-term, strategic approach. But the responsibility for invasive animal control is currently spread between multiple bodies. There is no single point of accountability. It can be difficult for groups wanting to work together with government bodies to co-ordinate action.

These factors make it harder to manage invasive animal control in Victoria. The Committee determined that it is necessary for one body to be given overall responsibility for invasive animal control. This body should develop and implement an overall plan. This body needs to be a single point of contact for the community, so different stakeholders can more easily collaborate. This body should be accountable for invasive animal control across the state through a robust monitoring, evaluation and reporting framework.

Invasive animals are a significant problem affecting many Victorians. This report identifies some ways to improve our response to the problem and I commend it to the Parliament.

On behalf of the Committee, I would like to thank the many individuals and organisations who wrote submissions, attended public hearings or hosted site visits for this inquiry. The Committee very much appreciates the significant effort made to inform the Committee about the current situation and potential ways forward.

I would also like to express gratitude to present and former members of the Committee for their hard work and collegiate approach to this inquiry. I would particularly like to acknowledge the work of Ms Bronwyn Halfpenny MP, who chaired the Committee for the majority of this inquiry. I also thank the Committee's secretariat for their hard work and invaluable assistance to the Committee throughout the inquiry.

A handwritten signature in blue ink, appearing to read 'JBull', is positioned above the name of the chair.

Josh Bull MP
Chair

Executive summary

Invasive animals are expanding in number and distribution across Victoria, damaging the environment, hurting agricultural businesses and reducing liveability. In many cases, invasive animals spread from Crown land onto private land, where they can damage property, kill livestock and consume pasture and crops. Evidence suggests that these problems are becoming worse in many parts of Victoria.

Victoria's complex legislative framework and complicated division of responsibilities have contributed to confusion and inefficiencies in controlling invasive species.

In response to the growing problems with invasive animals, Parks Victoria and other organisations have tried using recreational hunters to help. Several programs have been established in which government or other bodies work with community hunting organisations to control invasive animals. In these programs, volunteer recreational hunters are co-ordinated to shoot invasive animals at specific times and specific locations on Crown land. This approach is distinct from unsupervised recreational hunting, in which individuals or groups operate in areas and at times of their own choosing.

The terms of reference for this inquiry asked the Committee to investigate these co-ordinated programs and assess their effects on biodiversity, community safety and the deer population. The Committee was also asked to assess whether these programs could be used to control other invasive species. The Committee was required to compare the costs and benefits of this approach to other forms of pest control (which include trapping, baiting, biological control, habitat destruction and other forms of shooting, such as paid professional shooters and unsupervised recreational hunting).

The continuing expansion of invasive species highlights that greater animal control is needed in Victoria. However, invasive species control is a complex area. Determining the most appropriate management strategy is not a straight-forward task and can vary according to the species, environment and a variety of other factors. There is currently a lack of robust data about the effectiveness and relative costs and benefits of different control methods in the Victorian context. This compounds the difficulties of determining the most appropriate strategy.

However, there was broad agreement among submitters and witnesses to this inquiry that recreational hunting cannot remove enough animals by itself to manage the invasive animal problems in Victoria. Nonetheless, the evidence received by the Committee suggests that recreational hunting can be an effective part of programs involving multiple control methods for certain species in some circumstances, if the hunting effort can be focussed at particular times and places.

To effectively control invasive animals, there is also a need to change the way that government and its agencies manage the problem. Above all, there is a need for a strategic approach and a single point of responsibility and accountability.

These issues are discussed in detail within the report. Following a brief introduction (Chapter 1), the report is divided into three parts.

Part A: Background

Part A of the report comprises three chapters that provide background information on invasive species and the current approach to their control, including an outline of the management, regulation and oversight of recreational hunting in Victoria.

Chapter 2: Invasive animals

Chapter 2 examines the number and distribution of key invasive species in Victoria. The chapter outlines the species defined as ‘invasive’ in Victoria, which include deer, foxes, cats, horses, rabbits, goats, pigs and dogs. The Committee finds that the size of the invasive animal population in Victoria is generally unknown, although work is underway to get a better understanding of the distribution of animals. While acknowledging that accurate numbers can be difficult to determine, the Committee considers that more research and information in this area may be useful to inform future policy decisions.

Chapter 2 also highlights the wide-spread issues invasive species are causing across the state. These include damage to biodiversity, the environment and native vegetation. Invasive animals also have negative impacts on agriculture, through predation of livestock, destruction of pasture, consumption of crops, damage to farming infrastructure (particularly fencing) and the potential spread of disease. Invasive animals are causing increasing concern for the broader community due to the risk of vehicle accidents, the destruction of urban environments, threats to people’s safety and potential damage to the tourism industry.

Chapter 3: Current approaches to invasive animal control in Victoria

Chapter 3 outlines Victoria’s complex regulatory framework in relation to invasive animals. This includes multiple pieces of legislation, a variety of policies and overlapping responsibilities. Responsibility for invasive animals is also divided between various government bodies, non-government bodies and private landowners. As a result, there are challenges in relation to establishing an overall strategic approach, co-ordinating action between different stakeholders and establishing appropriate accountability mechanisms.

Chapter 4: Recreational hunting in Victoria

Chapter 4 provides an overview of recreational hunting in Victoria. The various rules and regulations around hunting and the impact of recreational hunters on invasive species are detailed. This provides context for further discussions throughout the report about using recreational hunters as part of an invasive species control strategy.

It is noted that recreational hunting kills a large number of invasive animals each year (including over 70,000 deer in 2015) and contributes to regional economies. The Committee also received evidence from individuals concerned about irresponsible and illegal hunting activity. However, the Committee notes that the extent of this problem is unknown.

Part B: Approaches to invasive animal control

Part B of the report considers and compares the different control methods that can be used to manage invasive species.

Chapter 5: Assessing animal control methods

Chapter 5 considers how we might determine which control methods are the most appropriate. The chapter notes the significant data limitations that currently exist in relation to the effectiveness and costs of different methods. The chapter highlights the importance of measuring the outcomes and consequences of any control method, noting that the appropriateness of a method will differ depending on factors including location, species, the broader control program and the outcomes the method is aiming to achieve.

Merely counting the number of animals removed from an area is not an effective means of measuring the success of a program. Many invasive species are able to recover quickly from large numbers of animals being culled. Control efforts may have no impact on an animal population beyond the immediate term unless a critical proportion of the population is removed. Simply counting the number of animals killed does not indicate whether or not that critical proportion has been achieved. In addition, in some cases, reducing the number of one species may increase the number of another, which may offset the benefits that come from killing the target species. These considerations need to be taken into account when assessing the effectiveness of control programs.

Monitoring changes in the impact of invasive species (such as the condition of the environment, native species numbers or livestock losses) or changes in the relative abundance of an invasive species are considered the most appropriate methods of assessing control programs.

Chapter 6: Professional and recreational shooting

Chapter 6 examines professional and recreational shooting as methods of invasive species control. Paid professional shooters are highly trained, competent and experienced hunters. Recreational hunters do not necessarily have the same level of proficiency, although some recreational shooters are also well trained and highly experienced. Professional shooters have access to a range of equipment and are able to apply a range of control methods, whereas restrictions apply to the equipment that recreational hunters can access. Differences in effectiveness and concerns about public safety were identified as reasons to utilise professionals over recreational shooters.

New South Wales, South Australia and Victoria have trialled the use of co-ordinated recreational hunters as part of pest control programs. Co-ordinated programs often involve accreditation, a high degree of supervision and a strong safety focus. Chapter 6 examines these programs, including the evaluation of these programs and any known outcomes achieved.

The chapter looks at the trials of co-ordinated recreational hunting to control deer in Wilsons Promontory National Park, Alpine National Park and the Yarra Ranges. There is a lack of robust evaluation for the Wilsons Promontory and Yarra Ranges programs, though there is some evidence to suggest that the Yarra Ranges program may be achieving positive outcomes. The Alpine National Park trial design is comprehensive and should strengthen our ability to determine which deer control activities are effective. However, this program is currently only in the early stages and results are not yet available. Other co-ordinated volunteer efforts to control pest animals in Werribee Park, St Helens Flora Reserve and Griffiths Island suggest that co-ordinated recreational hunting can be successfully applied to the control of species other than deer.

Finally, costs associated with each form of shooting are examined in the chapter. Costs to government associated with unsupervised recreational hunting are minimal. While there are no salary costs for volunteer hunters in co-ordinated recreational hunting programs, there are costs associated with co-ordinating, planning and executing these programs. There can be substantial costs associated with paid professional shooters, though the outcomes achieved in return may be considerably higher.

Chapter 7: Other methods of control

Chapter 7 details methods other than shooting that can be used to control invasive animals. The chapter looks at the advantages and disadvantages of poisons, biological control (such as pathogens or predators), live capture, warren destruction, harbour destruction, fencing, deterrents and fertility control.

Chapter 8: Comparison of recreational hunting with other methods of invasive animal control

Chapter 8 evaluates the relative effectiveness of the different control methods for each invasive species examined in this inquiry.

In relation to deer, fencing and shooting are the main methods of control. Further research on alternative control methods in this area may be beneficial. Rabbits require a combination of control methods (such as viruses, poison and warren destruction) to achieve effective control. Goats have been successfully controlled via a mixture of professional and recreational shooting (aerial and ground). Poisoning is the most effective control method to achieve broad-scale control of wild dogs, foxes and pigs. Programs combining poisoning with other methods, including trapping and shooting, may be more effective in some cases.

Shooting, baiting and trapping may be effective mechanisms to control wild cats. However, current Victorian legislation prevents these being used, as cats found in the wild must be captured and delivered to the local council. Changes are required to allow effective cat control to occur.

Live capture (with the animals then transported for sale or euthanased), ground shooting and aerial shooting were cited as possible management techniques for wild horses. Recreational hunters expressed a strong disinterest in shooting wild horses. Using volunteer hunters for horse control is therefore not a viable option.

The chapter concludes that recreational hunting does not have the capacity by itself to control invasive animals in Victoria. However, it may play a useful role in some circumstances as one part of a multi-method approach, especially for deer, rabbits, pigs and goats. To be effective, though, it is essential for the shooting effort to be focussed at particular places and times.

Part C: Improving invasive animal control in Victoria

Part C of the report looks at the potential changes to invasive animal control in Victoria based on the findings in Parts A and B.

Chapter 9: Suggested changes to recreational hunting

Chapter 9 examines changes that could be made to enhance recreational hunters' contribution to invasive species control.

The chapter examines opening more areas of public land for hunting and finds that a land use investigation should be undertaken to assess potential changes (while also considering potential risks, including public safety). Similarly, the Committee believes that consideration should be given to allowing recreational hunters to shoot pest species in more areas. Improving track access on public land and facilitating hunting tourism may also be ways to increase the contribution of recreational hunting to invasive species control.

The Committee considered the current classification of deer as game (with the exemption that allows the destruction of deer on private land) rather than pests. The Committee finds that this status does not restrict the ability of landowners and land managers from implementing control strategies.

This chapter discusses what recreational hunters believe are the barriers that reduce the effectiveness of recreational hunting's contributions to the control of invasive species. These include restrictions on firearms, noise suppressors and spotlights.

Motivating hunters to target female animals and an 'aim to cull' approach are also discussed as means of increasing hunters' contribution to the fight against invasive species. Research into the location, numbers, behaviour and movements of invasive species may also assist hunters to be more effective.

Bounties were raised by a number of submitters and witnesses to this inquiry as a way to provide incentives for recreational hunters to kill more animals. However, the negative evaluations of previous bounty schemes are noted.

The Committee considers that reducing barriers and providing incentives in specific areas at certain times may be ways to focus recreational hunting efforts to where they can most effectively contribute to invasive species control. Any consideration of changes, however, must carefully consider the costs, benefits and risks to ensure that funds are spent most effectively and that community safety is not compromised. If hunting is expanded through these means, the Game Management Authority would require additional resources to manage and monitor hunting activities.

Chapter 10: Invasive animal control – going forward

Chapter 10 considers the future of invasive species control in Victoria. The chapter details the strategic approach that is required to ensure effective programs can be implemented, with clear responsibility and accountability for invasive animal control, collaboration between stakeholders, adaptability, long-term planning and recurrent funding.

The Committee finds that giving a single body overall responsibility for invasive and pest animal management in Victoria is important for achieving this strategic approach. This authority could also provide a single point of contact for people and organisations undertaking control activities and could facilitate strong collaboration between these individuals and bodies. This would contribute to the application of the tenure-blind approach that is required for effective invasive species control.

The chapter highlights the importance of monitoring, evaluating and reporting on any control program.

The chapter concludes that effective, long-term invasive species control must incorporate multiple methods in an appropriate sequence. Shooting, when focussed at particular times and places, can be one part of this broader approach.

The Committee notes that the current Alpine National Park deer control trial has the potential to identify the circumstances where recreational and professional shooting are best suited, as well as identifying the costs and benefits of co-ordinated recreational hunting more generally. Results from this trial should be analysed and used to form future policy and direction in this area.

Findings and recommendations

2 Invasive animals

FINDING 1: No accurate population numbers exist for invasive species in Victoria. Data relating to invasive species populations and densities are important to inform decisions on invasive animal control. However, determining absolute population numbers can be difficult and costly. 16

RECOMMENDATION 1: That the Government allocate resources to the appropriate authority to undertake work to quantify and measure the numbers and impact of invasive species populations. 16

FINDING 2: Important projects are currently underway to enable a better understanding of the distribution of invasive animal populations and to make that information accessible. 18

FINDING 3: The lack of comprehensive data about deer in Victoria makes it difficult to accurately determine the reasons for changes in the deer population. 23

FINDING 4: The population of deer in Victoria has increased alarmingly in recent decades, causing a number of problems for native ecosystems and agricultural enterprises. While there is some debate about whether or not the population will continue to increase, deer will continue to be a problem, regardless of marginal increases or decreases in the population. 23

FINDING 5: Numbers of feral and wild animals, including cats, horses, rabbits, foxes, goats, pigs and dogs have increased over time and have become a major issue in Victoria. They are causing substantial economic, environmental, agricultural and social issues through overpopulation, predation and competition for resources. 28

FINDING 6: European wasps pose serious threats to biodiversity, agriculture and community safety in Victoria. Indian myna birds may also impact on native bird populations through competition for resources. The Committee recognises the importance of controlling these animals, though it acknowledges they are outside the terms of reference for this inquiry. 30

FINDING 7: Invasive animals pose a serious problem for Victoria’s native flora and fauna and therefore require urgent action. 38

FINDING 8: Public land managers are failing to control invasive species on public land. As a result, the animals are expanding onto private land, causing problems for private individuals. It can be time-consuming and costly for farmers to protect their land from invasive animals, particularly when they are not controlled on neighbouring public land. 45

FINDING 9: Invasive animals in Victoria cause road accidents, threaten the personal safety of people in bush areas, cause damage to urban environments and risk damage to Victoria’s tourism industry. 48

3 Current approaches to invasive animal control in Victoria

FINDING 10: While the responsibility for invasive animal control on private land is clear, the responsibility for public land is divided between multiple parties, with sometimes overlapping roles. There is no body with an overall responsibility for invasive animal control. 62

FINDING 11: The convoluted nature of the legislative and policy framework in Victoria means that different rules apply to what control methods can be used depending on who you are, the species causing problems and the classification of the land. Responsibility for invasive animals is spread across multiple parties and differs depending on the species and land type. This makes it very difficult to co-ordinate an overall strategic approach to invasive animals. 69

FINDING 12: The complicated division and over-lapping of powers, responsibilities and roles between various government bodies, non-government bodies and private landowners is unclear and makes accountability and transparency difficult. 69

FINDING 13: Invasive animals do not recognise or obey land boundaries and any management approach must acknowledge this. Therefore, programs must run across multiple land tenures. Co-operation and contribution from different landowners is essential for effective invasive species management. 69

FINDING 14: The Victorian Government’s commitment in its *Protecting Victoria’s Environment – Biodiversity 2037* plan to ‘progressively review the regulatory framework to ensure that it supports achievement of the goals and targets of this Plan, is adaptable to changing circumstances and upholds accountability’ is a big step in the right direction. 69

FINDING 15: It is important for land managers to be able to undertake the most effective approach to invasive animal control, which will often involve using multiple methods. While recreational hunters may have a role to play, professional pest controllers will remain an essential component, given their ability to employ a variety of control methods. 69

4 Recreational hunting in Victoria

FINDING 16: The number of deer harvested by recreational hunters has increased over time with over 70,000 killed in 2015. The number of pest species harvested by recreational hunters is unknown. 89

FINDING 17: Recreational hunting is an activity undertaken by many Victorians. While a 2013 study found that hunting contributes \$439.0 million per year to the Victorian economy, concerns have been expressed about the methodology used to make that estimate and about the extent to which hunters’ expenditure would take place regardless of whether or not they were allowed to hunt. 91

FINDING 18: There are legitimate community concerns with irresponsible and illegal hunting activity, including damage caused to private property, stress for landowners from having to confront illegal hunters, concerns about safety and disruptions to farming activities. However, the incidence of this behaviour is unknown. 97

RECOMMENDATION 2: That Victoria Police and the Game Management Authority work collaboratively to better monitor and educate the community on reporting mechanisms for illegal hunting activity.. . . . 97

5 Assessing animal control methods

FINDING 19: Programs aimed at controlling invasive animals have not previously incorporated sufficient monitoring or evaluation mechanisms. Therefore, there is currently a lack of data about the relative costs and benefits of different control techniques in Victoria. The Committee cannot undertake a quantified cost-benefit analysis of different control techniques without accurate data. 104

RECOMMENDATION 3: That the Government evaluate the effectiveness of existing control programs to manage invasive species. 104

FINDING 20: Land managers need to have the flexibility to employ different control methods (or combinations of methods) depending on the circumstances. 106

FINDING 21: Counting the number of invasive animals killed is not a reliable way to assess the effectiveness of an animal control program. It fails to account for the differing numbers of animals that may be causing a problem in different situations, the fact that many species can recover from large culls quickly and possible secondary impacts from species that benefit from the removal of the target species. More effective ways to assess control programs include monitoring changes in the impact of invasive animals (such as the condition of the environment, native species numbers or livestock losses) or changes in the relative abundance of an invasive species.. . . . 111

FINDING 22: In addition to effectiveness, it is important to identify and agree on the purpose of performing the control work when determining the method of control to apply in a particular circumstance. An assessment of control methods may consider the impact on agriculture, the impact on the environment, the humaneness and the recreational and lifestyle opportunities of hunting.. . . . 116

6 Professional and recreational shooting

FINDING 23: In spite of safety concerns with hunting, there was overwhelming support for the use of shooting (including co-ordinated volunteer hunting programs) in invasive species control. 127

FINDING 24: The Committee supports improvements in monitoring the effectiveness of the Wilsons Promontory National Park trial and believes the focus of assessment should be on measuring the impacts on the assets the trial aims to protect, as indicated in the Wilsons Promontory Conservation Action Plan.. . . . 132

FINDING 25: The Alpine National Park deer management trial design is comprehensive and addresses a number of key issues. The comparative evaluation of co-ordinated volunteer hunting, unsupervised recreational hunting and paid professional shooters should strengthen our ability to determine which deer control activities are most effective. The results should be important in future government policy and will help the public to understand government decisions about invasive animal control. 135

RECOMMENDATION 4: That the Government make publicly available the results of the Alpine National Park deer management trial once completed and use these findings to inform future invasive species management program designs. 135

FINDING 26: It is essential that private landowners and public land managers work collaboratively to ensure any control program on one land type complements work occurring on another. 140

RECOMMENDATION 5: That Parks Victoria engage, consult and work together with private landowners whose property adjoins public land where invasive species control programs are occurring to facilitate and ensure complementary control activities occur across land tenures. 140

FINDING 27: Co-ordinated recreational hunting programs have been successfully used for invasive species other than deer and complement the use of other control techniques to achieve landscape-level control. 143

FINDING 28: Co-ordinated recreational hunting programs are most appropriate in small, contained locations that experience high visitation, where the goal is asset protection. Their application to a larger scale across the state is likely to be less effective. 146

RECOMMENDATION 6: That the Government ensure all co-ordinated recreational hunting programs are appropriately supervised, involve wide consultation, are well advertised, are rigorously evaluated and are transparent to ensure the concerns and needs of communities are addressed. 146

FINDING 29: Evidence provided about some co-ordinated recreational hunting programs suggests that they may be achieving benefits in terms of controlling invasive animals. However, in most cases, the monitoring activities are inadequate to properly evaluate the programs. Different measures have been adopted for different programs, preventing a proper assessment of the relative effectiveness of different techniques. 164

FINDING 30: The current lack of data makes it impossible to accurately assess the effectiveness of co-ordinated recreational hunting or compare it to other methods of animal control. 164

FINDING 31: The Government intends to implement a more robust monitoring framework for the Alpine National Park deer management trial, which involves using multiple methods. The results of this trial should improve our knowledge of the effectiveness of co-ordinated recreational hunting and strengthen our ability to determine which deer control activities are most effective. 164

RECOMMENDATION 7: That the Government develop a monitoring framework that is designed to provide a better understanding of the relative effectiveness of different control methods (and combinations of methods) and can be used to assess whether or not funds for invasive animal control are providing the best value for money. 164

FINDING 32: Program designs need to address community concerns relating to recreational hunting, such as increases in invasive animals on surrounding private land, reductions in amenity for other park users, increases in illegal hunting and risks to community safety. 165

FINDING 33: Many Victorians have a cautious attitude towards the use of firearms and concerns about the safety of recreational hunting, especially unsupervised recreational hunting. For any program involving shooting to control invasive animals, it is important for there to be effective communication and consultation to ensure community confidence and understanding. 165

FINDING 34: Paid professional pest controllers play an important role in invasive animal control as they are able to apply a flexible approach, providing not only shooting but also a range of other animal control methods. Recreational hunting should not be seen as a substitute for the use of paid professional shooters. 165

FINDING 35: Paid professional pest controllers and recreational hunters can work well together to achieve effective invasive animal control. These two methods can complement each other as a part of a multi-method animal control program. 165

RECOMMENDATION 8: That programs using volunteer hunters be used to complement rather than displace the use of paid professional pest controllers. Any funding to support co-ordinated recreational hunting programs should be in addition to funding for engaging professional pest controllers. 165

8 Comparison of recreational hunting with other methods of invasive animal control

FINDING 36: The most effective method of rabbit control has been combining methods such as viruses, poison and warren destruction. Recreational hunting has not significantly contributed to rabbit control. 185

FINDING 37: A combination of paid professional shooters and recreational hunting organisations has proven successful in reducing goat numbers in some areas of Victoria and South Australia. 186

FINDING 38: Recreational hunting by itself is not an effective method of controlling pigs in most circumstances. 190

FINDING 39: Poisoning has been found to be the most effective and economical method to control foxes. Recreational hunting has been shown to be effective when concentrated in smaller areas. 203

FINDING 40: Current Victorian legislation prevents any effective control of feral cats. 206

RECOMMENDATION 9: That the Government declare feral or wild cats to be ‘established pest animals’ under the *Catchment and Land Protection Act 1994*, mirroring the way wild dogs are classified. 206

FINDING 41: There has been little work done to control feral horses and therefore best control methods cannot be determined. 210

FINDING 42: Shooting feral and wild horses using recreational hunters is not a viable option of control as a horse-shooting culture does not exist in Victoria and hunters have expressed a strong disinterest in the act. 210

FINDING 43: Deer-proof fencing can be effective at keeping deer out of an area but is expensive. The government is not required to contribute to the cost of fences between private and Crown land, leaving private land owners with the full cost of fences to keep animals on Crown land from entering private property. 213

RECOMMENDATION 10: That the Government provide some financial support to private landowners to assist with the additional cost of deer-proof fencing (over and above the cost of regular fencing) where there are ongoing, severe problems with invasive animals entering the private property from Crown land or where establishing a deer-proof fence would provide significant environmental benefits. 213

FINDING 44: Fencing and shooting are the only methods available to control deer and these are not enough. Deer-proof fencing is expensive and only suitable to protect small areas. 221

FINDING 45: Deer as invasive animals seem to be limited to Australia and New Zealand. Therefore, we cannot rely on international research or studies on how to control deer. 221

RECOMMENDATION 11: That the State Government raise, during a Council of Australian Governments forum (or other inter-governmental meeting), the need for urgent funding to research methods and techniques to control deer that could be practically implemented in Victoria. 221

FINDING 46: Recreational hunting has not had the capacity by itself to control invasive animals in Victoria. However, it has played a useful role when part of co-ordinated programs using a number of animal control methods and when focussed at particular places and times. 226

9 Suggested changes to recreational hunting

FINDING 47: There are more areas in Victoria that would benefit from recreational hunting to control invasive animals. However, there is a lack of data about where hunting would be most beneficial. Comprehensive trials (such as the deer control trial in the Alpine National Park) have not been finalised but should provide more information in the future. 234

RECOMMENDATION 12: That the Victorian Environmental Assessment Council undertake a land use investigation to assess what areas of public land could be available for recreational hunting. This investigation should include risk assessments and community consultation. 234

FINDING 48: Safety for public land users is the primary concern raised in the consideration of opening more areas of public land for recreational hunting.	236
FINDING 49: The game licencing system provides an important regulatory safeguard on game hunters. However, the Game Management Authority has limited capacity to provide in-field oversight.	236
RECOMMENDATION 13: That the Government provide the Game Management Authority with additional resources to manage an increase in recreational hunting, specifically additional authorised Game Officers to improve the in-field monitoring of hunters.	236
FINDING 50: Communication, education and training are all essential elements to a safe and effective recreational hunting industry.	236
RECOMMENDATION 14: That the Government develop mechanisms to improve information sharing and communication between hunters and other land users to facilitate safe co-existence on public land.	236
FINDING 51: In some cases, current legislation prevents hunters shooting pest animals on certain categories of land, resulting in lost opportunities for game hunters to contribute to reducing the pest species population.	238
RECOMMENDATION 15: That the Government review its current pest management plans and explore legislative barriers that prevent shooting of pest species whose control might be assisted by recreational hunting.	238
FINDING 52: The current game classification of deer, and the exemption that allows the destruction of deer on private land, does not restrict the ability of landowners and land managers from implementing deer management strategies.	242
FINDING 53: The current access to tracks on public land and their condition are limiting the number of invasive animals recreational hunters are able to cull and their ability to remove the carcasses.	244
FINDING 54: Victoria has significant hunting tourism potential due to its game and pest species population and its extensive areas of public land. Facilitating hunting tourism, specifically in a way that targets hunters to certain areas, may provide economic benefits to the state and contribute to invasive animal control.	248
FINDING 55: Using category C and D firearms can assist in achieving greater efficiency in controlling invasive animals. While professional pest controllers are eligible to apply for category C and D firearms and primary producers may apply for category C firearms for pest control, recreational hunters are not eligible to access these categories.	252
RECOMMENDATION 16: That the Victorian Government consult with Victoria Police in relation to recreational hunters having access to category C and D firearms to facilitate greater invasive animal and pest control.	252

FINDING 56: The use of noise suppressors allows for an increase in shooting efficiency due to reduced recoil, more accurate shot placement and a reduction in animal disturbance. These factors increase the number of animals a shooter is able to cull in a shorter space of time. Noise suppressors reduce noise pollution, prevent hearing loss and increase hunters’ capacity to communicate with others in the area. 256

RECOMMENDATION 17: That Victoria Police consider including recreational hunters participating in co-ordinated invasive animal control programs within the categories of people eligible to obtain noise suppressors. 256

FINDING 57: Spotlighting is a more effective hunting method than stalking. The use of spotlights in co-ordinated deer control trials has proven to increase the cull rate.. . . . 258

FINDING 58: Advancements in technology have improved the management and safety of hound hunting. In particular, technology such as GPS collars can reduce the likelihood of hunting dogs becoming lost in the bush.. . . . 261

RECOMMENDATION 18: That the Government promote the use of GPS collars by recreational hunters when hound hunting. 261

FINDING 59: The lack of infrastructure and assistance provided to recreational hunters to facilitate the personal use of carcasses is a deterrent for some hunters to hunt more. It may result in meat wastage or in fewer animals being harvested due to a reluctance to ‘kill to waste’.. . . . 263

RECOMMENDATION 19: That the Government explore amendments to the *Meat Industry Act 1993* that would allow wild deer to be processed at game and general meat-processing facilities for personal consumption. 263

FINDING 60: Commercial harvesting of wild game and pest animals could provide recreational hunters with an incentive to shoot more animals and remove more carcasses. The disease and pathogen risks associated with wild animals would need to be examined and strictly managed if commercial sale of meat from wild species were permitted in Victoria. 268

RECOMMENDATION 20: That the Government examine ways commercial harvesting of game and pest animals could be facilitated during co-ordinated recreational hunting programs in limited areas during short time periods.. . . . 268

FINDING 61: For recreational hunting to be most effective at controlling invasive animals, it needs to be concentrated at certain times and places and co-ordinated with other forms of animal control. Incentives may be useful in focussing the efforts of recreational hunters at these times and places. 269

RECOMMENDATION 21: That, as part of invasive animal control programs, the Government identify times and places where recreational hunting can make a helpful contribution. The Government should then explore ways to reduce the barriers to hunting at those times and places.. . . . 269

FINDING 62: Targeting the female population of a species has the biggest influence on invasive animal control. However, recreational hunters, as a whole, disproportionately target males to get trophies. 271

FINDING 63: Some recreational hunters are reluctant to kill as many animals as possible due to a culture of not wasting animals.	271
RECOMMENDATION 22: That the Game Management Authority, in association with Victorian hunting organisations, educate and encourage recreational hunters to contribute to controlling invasive species through shooting larger numbers of animals and targeting females.	272
FINDING 64: Many hunters support bounties as a way to increase hunting effort and compensate recreational hunters for their work. However, an evaluation of an earlier fox bounty scheme in Victoria suggested that bounties may not be effective in reducing the impact of invasive animals.	275
RECOMMENDATION 23: That the Government implement an ongoing evaluation program of the current wild dog and fox bounty systems which evaluates whether the bounties are providing value for money or whether the money would be more effectively spent on alternative invasive animal control methods.	275
RECOMMENDATION 24: That the Government publicly release the results of any evaluations of the bounty system.	275
FINDING 65: Understanding the habits, motivations and movements of a species can assist in its effective management. However, the Committee was told that there is a lack of data available in relation to the behaviour, populations, movement and distribution of invasive species, particularly deer, in Victoria.	277
RECOMMENDATION 25: That the Government conduct research into the location, numbers, behaviour and movements of invasive species in Victoria. Key insights from this research that could assist hunters should be communicated to the hunting community.	277

10 Invasive animal control – going forward

FINDING 66: To ensure ecosystem health, all species that are causing issues must be addressed across both public and private land.	281
RECOMMENDATION 26: That the Government include both invasive animals and native pests within one strategy that applies across all land types.	281
FINDING 67: Acting now to contain deer populations before they spread further will provide better financial returns than funding work to manage populations after they have been allowed to grow and expand.	282
RECOMMENDATION 27: That, as part of the planned deer management strategy, the Government develop an explicit strategy to contain deer within their current range and limit the spread of deer to new parts of Victoria.	282
FINDING 68: Recurrent funding is needed for invasive animal control, as short-term programs do little to limit invasive species damage overall.	285

RECOMMENDATION 28: That, as part of *Protecting Victoria’s Environment – Biodiversity 2037*, the Government guarantee long-term recurrent funding for invasive animal control. 285

FINDING 69: Government policy acknowledges the importance of partnerships in successful animal control programs. However, the evidence received suggests that this policy has not been implemented in practice, with individual landholders, organisations and local government experiencing difficulties co-ordinating their animal control programs with state government programs or getting required actions/permissions from government bodies. 289

RECOMMENDATION 29: That the Government investigate barriers preventing proper consultation and collaboration between individuals, organisations and other bodies in relation to animal control and implement measures to ensure that this occurs in the future. 290

FINDING 70: Paid professional pest controllers have extensive experience and knowledge of invasive species, areas of land and methods of control. Consultation and collaboration with professional pest controllers could provide benefits to any invasive animal control program. 290

RECOMMENDATION 30: That the Government engage paid professional pest controllers in an advisory role when designing and implementing invasive species control strategies and programs. 290

FINDING 71: Invasive animals do not recognise or obey any land boundaries, including state borders. Effective collaboration and co-operation, particularly in relation to research and knowledge about invasive animals, at both federal and state level, is important for informing decisions. 291

RECOMMENDATION 31: That the Government raise the issue of research into controlling deer with the Council of Australian Governments and request the Federal Government initiate comprehensive research into control methods. 291

FINDING 72: Adaptability is a key element of an effective animal control program. Bureaucratic processes need to be flexible and rapid enough to enable land managers to change approach when required and to take advantage of opportunities when they arise. 293

FINDING 73: There was some debate during this inquiry about the importance of research and whether funds are best spent on research or on executing control programs. Ongoing research is essential to better understand invasive animal management, including the relative effectiveness of different control methods, potential new methods, appropriate targets for animal control and the impacts of invasive animals on the environment and agriculture. 295

FINDING 74: An understanding about the need to control invasive animals and the rationale for government programs is important for community support. 296

RECOMMENDATION 32: That the Government develop initiatives to educate the public on the invasive species problem in Victoria. 296

FINDING 75: There are too many government agencies, departments and bodies that have ad hoc funding and multiple overlapping responsibilities for the control of invasive animals and pests in Victoria. 300

FINDING 76: Having multiple government departments, agencies, community groups and private landholders involved with animal management can make it difficult for parties to collaborate and for programs to be sufficiently adaptable to take advantage of opportunities.301

RECOMMENDATION 33: That the Government designate one government body to be a single point of contact for private landowners, local government and community groups, that has overall responsibility and accountability for invasive and pest animal control in Victoria. This body’s responsibilities should include:

- developing an overarching plan for invasive and pest animals, including identifying priority actions
- ensuring that programs take place in accordance with the plan
- monitoring landowners’ compliance with their legal responsibilities in relation to pest animals
- promoting best practice among people undertaking animal control programs
- facilitating collaborative efforts involving different government bodies, community groups and private landholders
- publicly reporting on the effectiveness of animal control programs each year. . 301

FINDING 77: Monitoring, evaluation and reporting are critical to ensure that appropriate actions are taking place to control invasive and pest animals and that funds are being spent in the most effective manner. 304

1.1 Background

Invasive species are a wide-spread issue across Australia, causing considerable impacts on biodiversity, agriculture and amenity. These impacts occur on both Crown land and private property. Evidence suggests that this problem is becoming worse in many parts of Victoria.

Of the 298 parks assessed by Parks Victoria in 2015, 87 per cent had an issue with invasive animals. Forty per cent of parks experienced a moderate impact of invasive animals and 16 per cent reported a major or severe impact. The majority of the surveyed parks reported an increase in the impact of invasive animals since 2010.¹

In many cases invasive animals spread out from parks onto private land, where they can damage property, kill livestock and consume pasture and crops.

Land managers have a number of techniques available to manage invasive animals, including poison, live capture (for instance, trapping and mustering), warren and harbour destruction, exclusion fencing and deterrents. Shooting is also used by a variety of people, including professional pest controllers, farmers and recreational hunters.

Paid professional pest controllers are employed by landowners and government bodies to undertake invasive animal control work. They are qualified to implement a variety of control methods, including shooting, poisoning and trapping and have access to equipment not available to non-professionals. They can transition between techniques or implement a combination of these techniques. Professional pest controllers have access to training and are proficient with these techniques, which may correlate with a more efficient and humane kill.

Recreational hunting is a growing pastime in Victoria. Recreational hunters volunteer their time to contribute to invasive animal control through both hunting as a recreational endeavour and participating in co-ordinated volunteer programs (see Chapters 4 and 6 of this report). These programs are the main focus of the terms of reference for this inquiry.

¹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.4

The first formal collaboration between Parks Victoria and volunteer hunters occurred in 2003, where co-ordinated hunting was used for goat control in the Murray Sunset National Park.² Since then, co-ordinated volunteer programs have been commonly used as one mechanism for invasive animal management to tackle a variety of invasive species (see Chapter 6).

The use of co-ordinated recreational hunting programs is providing an innovative and positive contribution that has great potential to assist Victoria in its fight against invasive animals. While the invasive species problems continue to expand, these programs have provided controllers another avenue to enhance their management response.

The Victorian Government has recognised the growing interest in recreational hunting in the state and released its *Sustainable Hunting Action Plan* in December 2016 to plan and develop hunting into the future (see Section 3.7.2 of this report). This includes intended actions to expand pest and game hunting and establishing additional agreements with hunting organisations to contribute to animal control programs.³

However, Australia generally has a cautious approach to the use of firearms. Australia has relatively restrictive firearm laws compared to other countries. The *National Firearms Agreement*, which Victoria subscribed to in 1996, places strict laws on firearm ownership and restricts certain weapons (such as semi-automatic rifles). These laws reflect Australia's cautious attitude to firearms and hunting.

In addition, Australia does not have the hunting culture that exists elsewhere. The number of recreational hunters in Australia has been estimated at between 0.9 and 1.5 per cent of the population. This is lower than in a number of other countries, such as the United States of America (4.4 per cent), Canada (5.1 per cent), or New Zealand (1.5 per cent).⁴

The continuing expansion of invasive species populations highlights that greater animal control is needed in Victoria. However, invasive species control is a complex area. Determining the most appropriate management strategy is not a straight-forward task and can vary according to the species, environment and a variety of other factors. There is currently a lack of robust data about the effectiveness and relative costs and benefits of different control methods in the Victorian context. This compounds the difficulties of determining the most appropriate strategy.

This inquiry sought to examine the use of recreational hunting organisations as part of co-ordinated programs for invasive species control. This report provides details of some of the co-ordinated recreational hunting programs that have been

² Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.9

³ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), pp.15, 17

⁴ Andrew Bengsen, *A Systematic Review of Ground-Based Shooting for Pest Animal Control*, prepared for Invasive Animals Cooperative Research Committee (2016), p.5

used in Victoria to date and outlines the outcomes (where available) of these. This report also examines other methods of control that are available and outlines the benefits and limitations of each technique.

1.2 Key findings

The exact number and distribution of invasive species around the state is unknown (and is difficult to determine). Victoria's complex legislative and policy framework, and complicated division of powers and responsibilities have contributed to confusion and inefficiencies. A single point of responsibility, accountability and contact for invasive and pest animal control in Victoria would provide the first step in streamlining and simplifying this complexity and would improve communication and collaboration in this area.

The expanding issues caused by invasive species to communities, biodiversity and agriculture demonstrate that Victoria's current approach and control programs are not sufficient and urgent landscape-level, long-term control action is required.

Invasive species do not recognise or obey land boundaries. A number of private landowners in Victoria experience issues with invasive species coming onto their land from neighbouring Crown land. Therefore, a tenure-blind approach, that co-ordinates action across both private and public land is critical. Collaboration between private landowners, public land managers and those individuals and bodies undertaking control work is essential in effectively achieving landscape-level control.

Shooting is the primary method of deer control and can be used effectively for some other invasive species or as one component of a multi-method management approach.

The Committee found that there was some common ground between hunting groups and conservationists and their views align on a number of issues. Some recreational hunters have a strong environmental ethic, volunteer their time, and contribute significantly to conservation work in hunting areas. A number of conservationists are supportive of recreational hunters contributing to invasive animal control and view them as an important element in the promotion of biodiversity. Both groups agree that invasive species are negatively affecting Victoria's biodiversity and more work needs to be done to combat this.

The Committee found that shooting as a method to control invasive species is only effective when it is focussed on particular areas and concentrated in time. To achieve long-term population control, shooting needs to form part of an integrated approach to invasive species control, where multiple control methods are applied and managed.

The shooting aspect of this integrated approach would benefit from using both paid professional pest controllers and recreational hunters in collaboration. Focussing recreational hunting efforts can be achieved by:

- using volunteer shooters as part of a co-ordinated recreational hunting program
- removing barriers and providing incentives to recreational hunters to target certain areas of land at certain times.

An integrated approach to invasive species control should combine multiple control methods. In addition to shooting, depending on the species and location, methods such as poison, trapping, biological controls and harbour destruction should be incorporated into an invasive species control strategy. Other asset protection and management techniques that can be useful include fencing and deterrents.

To achieve long-term, broad-scale results, invasive species approaches must be constantly scrutinised, measured and evaluated. Control programs must be adaptable to cater for an ever-changing environment and unpredictable landscape. While quantifying costs and benefits for invasive animal control is inherently difficult, measuring and evaluating changes in species abundance and environmental impacts as a result of control mechanisms is essential. Research and data to inform control approaches and required changes are crucial.

The current Alpine National Park deer control trial involves monitoring deer impacts on particular assets and comparing different hunting methods (including co-ordinated volunteers, unsupervised recreational hunters and paid professional shooters), as well as establishing control areas where co-ordinated hunting is not occurring. The Committee notes that the outcomes of this program should inform future decisions in this area.

1.3 Inquiry process

The Environment, Natural Resources and Regional Development Committee (the Committee) received the terms of reference for an inquiry into the control of invasive animals on Crown land on 14 April 2016. The terms of reference are provided in full at the beginning of this report.

1.3.1 Submissions

The inquiry process began in July 2016 with a call for submissions on the Committee's website and in several Victorian newspapers. The Committee wrote to a range of key stakeholders inviting submissions, including government departments, local councils, hunting organisations and environmental groups.

The call for submissions closed on 8 August 2016. Due to a high level of community interest and a number of extension requests, the Committee extended the deadline for submissions to 5 September 2016. The Committee resolved to accept late submissions on a case-by-case basis.

The Committee received a large number of submissions from individuals who were adversely affected by invasive animals, including many farmers and landholders. Recreational hunters and hunting organisations also provided a number of submissions. In addition, the Committee heard from community and environment stakeholders, animal welfare organisations, local councils and other government bodies. The Committee received a substantial joint submission from the Department of Environment, Land, Water and Planning, the Department of Economic Development, Jobs, Transport and Resources and Parks Victoria (referred to throughout this report as the joint submission from government bodies).

In total, the Committee received 220 submissions. A list of submitters is provided in Appendix 1 of this report.

1.3.2 Public hearings

The Committee conducted nine days of public hearings between 5 September and 5 December 2016. It received evidence from 59 separate organisations and individuals. The public hearings were held in Melbourne, Sale, Bright, Mansfield and Dunkeld.

The Committee spoke to government bodies including the Game Management Authority, the Department of Environment, Land, Water and Planning and Parks Victoria. Other witnesses included local councils, hunting organisations, catchment management authorities, Landcare groups and community groups, as well as a number of individuals with direct experience with invasive animals.

A list of the witnesses who attended public hearings is included in Appendix 2 of this report.

1.3.3 Site visits

The Committee conducted two site visits during this inquiry.

On 7 October 2016, the Committee visited Dingley Dell Safaris, a hunting and tourism business in Gippsland (see Box 9.1 of this report). The Committee heard about the business and how hunting-based tourism could provide an economic benefit for regional Victoria.

On 19 October 2016, the Committee visited Harry and Sue Ryder's farm in Tawonga (see Box 2.1 of this report). The Committee was given a tour of the property to see first-hand some of the damage caused by deer.

The Committee is grateful to everyone who took the time to prepare a submission, provide evidence at a public hearing or host a site visit. Their views, knowledge and expertise contributed greatly to this report.

1.4 Terms of reference

The terms of reference (provided in full at the beginning of this report) required, amongst other things, the Committee to examine the benefits of Parks Victoria's and other agencies' use of community hunting organisations and individuals in the control of invasive animals on Crown land.

1.4.1 Recreational hunting

'Community hunting organisations' are also referred to throughout this report as 'recreational hunting organisations'. These are membership-based groups of volunteer recreational hunters. Some of these organisations have a long history. For instance, the Sporting Shooters Association of Australia was established in 1948 in order to promote shooting sports and protect firearm owners' interests. It now has more than 180,000 members and 400 clubs.

Field & Game Australia, established in 1958, provides its members with conservation, hunting and clay target opportunities.

The Australian Deer Association was founded in Melbourne in 1969 and has active branches in every state and territory in Australia.

Co-ordinated recreational hunting programs versus unsupervised recreational hunting

Throughout the report, the term 'co-ordinated recreational hunting programs' is used to refer to initiatives that utilise volunteers from recreational hunting organisations in programs directed and supervised by government bodies or other organisations. This is distinct from unsupervised recreational hunting, which may involve solo hunters, small or large groups of hunters or hound-hunt teams. Unsupervised recreational hunting involves these individuals or groups undertaking hunting activities at times and places chosen by them without government direction or supervision (other than through broad regulation of hunting areas and seasons).

1.4.2 Invasive species

The terms 'invasive species' and 'invasive animals' are used to describe 'a species occurring beyond its accepted normal distribution and which threatens valued environmental, agricultural or other social resources by the damage it causes.'⁵ Victorian policy only treats non-native animals as invasive.⁶ Invasive species can

⁵ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.2

⁶ Department of Primary Industries, *Weeds and Vertebrate Pests, Module 1 within the Invasive Plants and Animals Policy Framework* (2010), p.5 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 11); Agriculture Victoria, *Pest Animals* <agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals>, viewed 25 May 2017

be found in all terrestrial and aquatic environments in Victoria. Many invasive animal species were deliberately introduced to Australia, others escaped from captivity and some were inadvertently introduced (see Chapter 2 of this report).

Although deer were the focus of much of the evidence received during this inquiry, the terms of reference also required the Committee to consider the use of recreational hunting organisations to control other species.

This inquiry has focussed on those invasive animals for which shooting is a practical management method, specifically deer, cats, horses, rabbits, foxes, goats, pigs and dogs. Invasive animals where shooting is not considered a valid control method (for instance, aquatic and insect species) were not examined during this inquiry.

1.4.3 Crown land

Crown land is land owned and managed by the government. It comprises approximately one-third of all land in Victoria. The majority of Victoria's Crown land is national and state parks and forests. The remainder includes land set aside for public purposes, including cemeteries, public halls, railways, schools, hospitals and sporting amenities.

While the terms of reference for this inquiry refer to the control of invasive animals on Crown land, it is important to note that invasive species do not adhere to land boundaries. Therefore, controlling them requires a tenure-blind approach. Effective management of invasive species requires all landowners and land managers to play their part. This report has considered the rights, responsibilities and impacts of invasive animal control for all landowners.

Throughout this report, Crown land is also referred to as 'public land', as distinct from 'private land' which is owned and managed by private landowners.

1.4.4 The ethics of hunting

This is not an inquiry into the ethics of recreational hunting. Through the course of this inquiry, a number of objections were raised to recreational hunting as a whole, such as concerns about animals suffering or public safety (see, for example, Sections 6.2 and 6.8.2 of this report).

Humaneness and safety are certainly considerations in determining the most appropriate animal control method. However, the Committee has not sought to question the current status of recreational hunting in Victoria as a legal activity and legitimate use of public land. To explore the ethical issues around hunting would require a different inquiry conducted in a different manner.

1.5 Structure of the report

This report is divided into three parts:

- Part A ('Background') outlines the invasive species problem in Victoria, including the current approaches to invasive animal control
- Part B ('Approaches to invasive animal control') considers the evidence about different control methods for invasive species in Victoria (including the role of recreational hunters)
- Part C ('Improving invasive animal control in Victoria') examines potential changes to invasive animal control in Victoria given the findings in Parts A and B.

1.5.1 Part A: Background

Chapter 2 examines the number and distribution of key invasive animal species in Victoria and their environmental, economic and social impacts. The species examined during this inquiry are outlined here.

Chapter 3 explores the current approaches to invasive species management in Victoria, including the legislative framework and the impact different classifications (for instance, species and land category) have on who is responsible for an invasive animal and the methods available for its control.

Chapter 4 outlines the current management and oversight of recreational hunting in Victoria. It details the rules and regulations around hunting and highlights issues with illegal and irresponsible hunting in Victoria. It also looks at the prevalence of recreational hunting and the economic and environmental impact hunters have in Victoria.

1.5.2 Part B: Approaches to invasive animal control

Chapter 5 discusses the measurement and assessment of control methods. It examines different measurement approaches and details the importance of measuring outcomes and consequences of any control method to determine the best combination of control techniques for a given species and location.

Chapter 6 looks at the role of professional and recreational shooting in invasive species control. It distinguishes between paid professional pest controllers, volunteer recreational hunters working within co-ordinated programs and unsupervised recreational hunters. It considers the costs associated with these different forms of shooting for invasive animal control. It highlights some of the co-ordinated programs that have used recreational hunters to control invasive species in Victoria and in other Australian jurisdictions (including the requirements for involvement and any known outcomes).

Chapter 7 explores various other control methods raised during this inquiry that are available for invasive species, such as poisoning, trapping and a variety of other techniques.

Chapter 8 considers the control methods available for each species, including which animals recreational hunting is best suited to and what role recreational hunting should play in invasive animal control.

1.5.3 Part C: Improving invasive animal control in Victoria

Chapter 9 examines potential changes to recreational hunting to improve its effectiveness as a method of invasive animal control. This includes an examination of hunting permissions and regulations, as well as land and equipment access rules.

Chapter 10 outlines the importance of a strategic, long-term, appropriately funded approach to invasive species control. This chapter considers the best approaches to invasive animal control going forward, including improved arrangements for government bodies and the role recreational hunters may play.

Part A

Background

2 Invasive animals

2.1 Introduction

As noted in Chapter 1 of this report, an invasive species is ‘a species occurring beyond its accepted normal distribution and which threatens valued environmental, agricultural or other social resources by the damage it causes.’⁷ Throughout this inquiry, the Committee heard from numerous private individuals and community organisations about problems they had experienced with invasive animals. In terms of Crown land, research by Parks Victoria in 2015 looked at 298 parks and found that there were problems with invasive animals in 87 per cent of them.⁸ Some of the most problematic invasive species in Victoria include deer, cats, horses, rabbits, foxes, goats, pigs and dogs.

The Committee acknowledges the majority of evidence it received was in relation to deer, and the focus of the Committee’s recommendations are on invasive animals where shooting can contribute to their control.

This chapter looks at the number and distribution of key invasive animal species in Victoria and their environmental, economic and social impacts.

Within park areas, invasive animals are a significant threat to the native animals and vegetation. Invasive animals also move out from park areas to neighbouring private land, where they cause further problems. They cause losses for farmers, particularly through preying on livestock, eating pasture intended for livestock and consuming crops. In addition, they are responsible for vehicle accidents, can injure people, kill domestic animals, damage urban environments and destroy natural environments, potentially impacting on the tourism industry.

This chapter explores these impacts in more detail.

The Committee notes that some people suggested that moderate numbers of some invasive animals (such as wild dogs) may have environmental benefits.⁹ Some invasive animals (especially deer) are also popular among recreational hunters. Recreational hunting is discussed further in Chapter 4 of this report.

7 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.2

8 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.4

9 For example, see Section 8.5.3 of this report on wild dogs or The Australian Brumby Alliance, *Submission 159*, p.2 on horses.

2.2 Measuring invasive animal populations

Throughout this inquiry, the Committee heard that invasive animals are widespread, well established and out of control in Victoria. However, a number of submitters and witnesses noted that there are no reliable population figures for invasive animals. Estimates have been made of some species (such as aerial surveys of horses). However, for other species, reliable estimates are not practicable. Mr Cameron Skedd, President of the Vertebrate Pest Managers Association Australia, noted that ‘no-one really knows’ the number of some species (such as feral pigs and foxes).¹⁰

The Committee was told in a joint submission from Victorian government bodies that:

It can be challenging to quantify the distribution and density of invasive animals on Crown land in Victoria. While no formal census has been conducted, due in large part to the cost and methodological challenges involved in conducting rigorous measurement of animal distribution and density, it is thought that invasive animals roam or occupy all terrestrial habitats on Crown land in Victoria.¹¹

An attachment to the submission outlined that, even though population data have been collected in certain areas, datasets have not been integrated on a state-wide basis:

Basic information on state or regional presence, extent and abundance of many pests is lacking. Datasets held by different agencies for various purposes are not well integrated to provide accessible and standardised information.¹²

However, as discussed in Section 2.2.2 of this chapter, work is being undertaken at state and Commonwealth levels to bring distribution data together in an accessible manner.

2.2.1 The number of animals

The Committee heard that the number of invasive animals in Victoria is unknown and estimates for species vary widely. A number of submitters and witnesses identified the importance of obtaining data in relation to how many invasive animals there are, in what densities they are present and the impacts they are having.¹³ For instance, the East Gippsland Rainforest Conservation Management Network told the Committee in its submission that, ‘Further

¹⁰ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.11

¹¹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.3

¹² Department of Primary Industries, *Weeds and Vertebrate Pests, Module 1 within the Invasive Plants and Animals Policy Framework (2010)*, p.11 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 11)

¹³ Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.3; Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.11; Nancy McMurray, Friends of the Gippsland Lakes Parks and Reserves, *Public Hearing*, 6 October 2016, p.5

research urgently needs to be conducted on assessing the current population levels of several key species, including but not limited to sambar deer, so to quantify the problem.¹⁴

Similarly, Mr Cameron Skedd, President of the Victorian Pest Management Association, highlighted the importance of measuring invasive animal populations:

There should be surveys done to work out what the numbers are. There are other species in Australia, and they are guessing there are between 18 million and 24 million feral pigs around Australia. No-one really knows. It is the same for camels and foxes. No-one would have a clue as to how many foxes there are in an environment. Until you have an idea and until you do some surveying and get some good numbers, good relevant numbers, then you do not really know how many you need to take out of the environment.¹⁵

Several factors can make it difficult to measure the number of animals in an environment. Animal behaviour (such as avoiding people or spending significant periods underground) can make finding and counting animals challenging. Dense vegetation can make it hard to spot animals or signs of animals. Difficult terrain and remoteness can prevent people from accessing an area to take counts or set up devices to monitor animal numbers.

As an example of these difficulties, Dr Dave Forsyth (a wildlife ecologist formerly with the Arthur Rylah Institute for Environmental Research) and others outlined some of the impediments to counting deer. In relation to the current deer control trial in the Alpine National Park (discussed further in Section 6.5.2 of this report), they explained:

... deer are difficult to monitor using direct census techniques and biases resulting from deer moving away from the observer before being detected are likely to be acute in hunted populations. Further, in the ANP [Alpine National Park] study sites on the Bogong High Plains (BHP) and Howitt-Wellington Plains (HWP), a range of vegetation communities occur, some of which include understoreys too dense for use of direct survey methods ...

Estimates of absolute population abundance are not feasible for the ANP deer control trial because they can be prohibitively expensive and typically require complex experimental designs and data analysis.¹⁶

Dr Forsyth considered that allocating more money to trying to count the number of deer would not necessarily solve these problems:

¹⁴ East Gippsland Rainforest Conservation Management Network, *Submission 170*, p.5

¹⁵ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.11

¹⁶ Naomi E. Davis, Ami Bennett & David M. Forsyth, *Monitoring Changes in Deer Abundance and Habitat Use Associated with the Parks Victoria Deer Control Trial in the Alpine National Park: Survey Design and Rationale*, unpublished report prepared for Parks Victoria (2015), p.4 (with sources)

In terms of getting back to your question about how we settle the problem about numbers, you can actually spend a lot of time, a lot of effort and a lot of money and still not come up with potentially better figures than what we might have now, and then the impacts are still being caused.¹⁷

Though counting the number of an invasive species may be challenging or impractical, it remains vitally important to monitor whether or not there is a problem with invasive animals in an area. Where control programs are taking place, it is also essential that the effectiveness of these programs be measured in a robust way.

There are a number of possible approaches for this other than counting the number of animals in an area. The negative impacts of invasive animals (such as environmental damage or stock losses) can be measured. The relative abundance of a species over time can also be measured instead of the absolute number. This approach looks for signs of the animal (such as droppings) and measures whether these are increasing or decreasing over time. These sorts of monitoring techniques can be sufficient to understand whether a control program is having an effect on an animal population.

Ways to measure invasive animal problems are discussed further in Section 5.4.3 of this report.

The Committee notes that data relating to the number of invasive animals and their impacts would help inform the allocation of resources towards a specific problem species or area. The Committee believes that a cost-benefit analysis is required when determining the most appropriate method to obtain the data.

FINDING 1: No accurate population numbers exist for invasive species in Victoria. Data relating to invasive species populations and densities are important to inform decisions on invasive animal control. However, determining absolute population numbers can be difficult and costly.

RECOMMENDATION 1: That the Government allocate resources to the appropriate authority to undertake work to quantify and measure the numbers and impact of invasive species populations.

2.2.2 The distribution of animals

Though the number of invasive animals in Victoria remains unclear, the distribution of each species is better understood. A number of processes are in place to track where invasive animals are present.

Multiple sources have been drawn on to understand the distribution of deer in Victoria. For example, a report by the Arthur Rylah Institute on deer distribution explained:

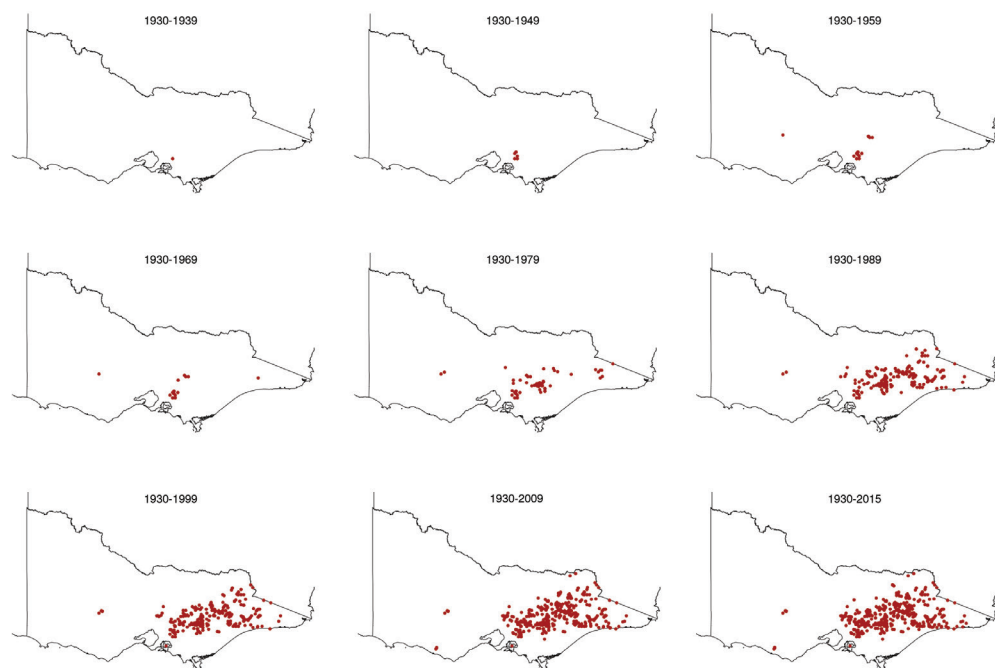
¹⁷ Dave Forsyth, *Public Hearing*, 10 October 2016, p.3

We obtained information on the historical and current breeding distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria from four sources: first, from books, journal articles and published/unpublished reports; second, from sightings recorded in the Victorian Biodiversity Atlas; third, from ARIER [Arthur Rylah Institute for Environmental Research] staff and contractors; fourth, from interviews with people with expert knowledge of deer in Victoria (and New South Wales and South Australia).

Sightings of deer were collated in a spreadsheet. The breeding distributions of deer were aggregated onto hard-copy maps and digitised ... A shapefile of hand-drawn polygon features, representing Sambar Deer distributions, was created using the construction tools in ArcMap. The Sambar Deer sightings were then projected onto these distribution polygons and displayed on a map of Victoria.¹⁸

Using this information, the expansion of sambar deer in Victoria since the 1930s can be seen (see Figure 2.1). The rapid expansion of the deer population since the 1980s, primarily in the north-east of the State, is clearly apparent. The report notes that the sighting records on which Figure 2.1 is based underestimate the deer distribution at any point in time, but indicate the general pattern of colonisation.¹⁹

Figure 2.1 Sighting records of sambar deer in Victoria, 1930-2015



Source: Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.7 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 18)

¹⁸ Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.2 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 18)

¹⁹ Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.6 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 18)

Government bodies have also established online tools for recording sightings of invasive species that can be used to understand their distribution. The Victorian Biodiversity Atlas, established by the Victorian Government, collates information from government, industry and the public on both native and invasive species. The tool has ‘more than 6.5 million records of species distribution and abundance from surveys and general observations.’²⁰

The Committee was also informed that:

... the Department of Environment, Land, Water and Planning is developing Strategic Management Prospects (SMP), a decision-support tool based on the analysis of significant amounts of complex spatial information. SMP allows the government to better understand the impacts of invasive animals on biodiversity on Crown land in Victoria, using modelled habitat distribution of invasive species as a key input.²¹

The development of Strategic Management Prospects is a key element in modernised conservation planning and investment processes. It will provide land managers with a powerful decision-support tool to assist in the prioritisation of effort to address threats. It will help direct where Crown land managers should concentrate their efforts to control invasive animals for the greatest benefit to biodiversity. Strategic Management Prospects will also provide a method for integrating information on expected biodiversity benefits and costs to help compare and select management options.²²

Another online tool for mapping the distribution of invasive animals is FeralScan, an initiative of the Commonwealth Invasive Animals Cooperative Research Centre. The Centre explains:

The FeralScan Pest Mapping Suite is a free resource for farmers, landholders, pest controllers and the community to map sightings of pest animals, record the damage they cause, and document or plan control activities in their local area. The FeralScan App can also be downloaded to your Smartphone or tablet to record and update information in the field, whether you are connected or disconnected to the internet.²³

FeralScan monitors animals across Australia.

The distribution of each invasive species is discussed further in Section 2.3 of this chapter.

FINDING 2: Important projects are currently underway to enable a better understanding of the distribution of invasive animal populations and to make that information accessible.

20 Department of Environment, Land, Water and Planning, *Victorian Biodiversity Atlas* <delwp.vic.gov.au/environment-and-wildlife/biodiversity/victorian-biodiversity-atlas>, viewed 24 February 2017

21 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.3

22 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.17

23 Invasive Animals Cooperative Research Centre, *“Together, Create and Apply Solutions”* <www.invasiveanimals.com>, viewed 24 February 2017

2.2.3 The generalised invasion curve

The ‘generalised invasion curve’ is a tool used in invasive species management to manage invasive species at each stage of their establishment in a new area (see Figure 2.2). The joint submission from government bodies explained that the Victorian Government uses the curve ‘to identify invasive species threat, assess their relative risk to the environment, agriculture or the community and select the most appropriate intervention.’²⁴

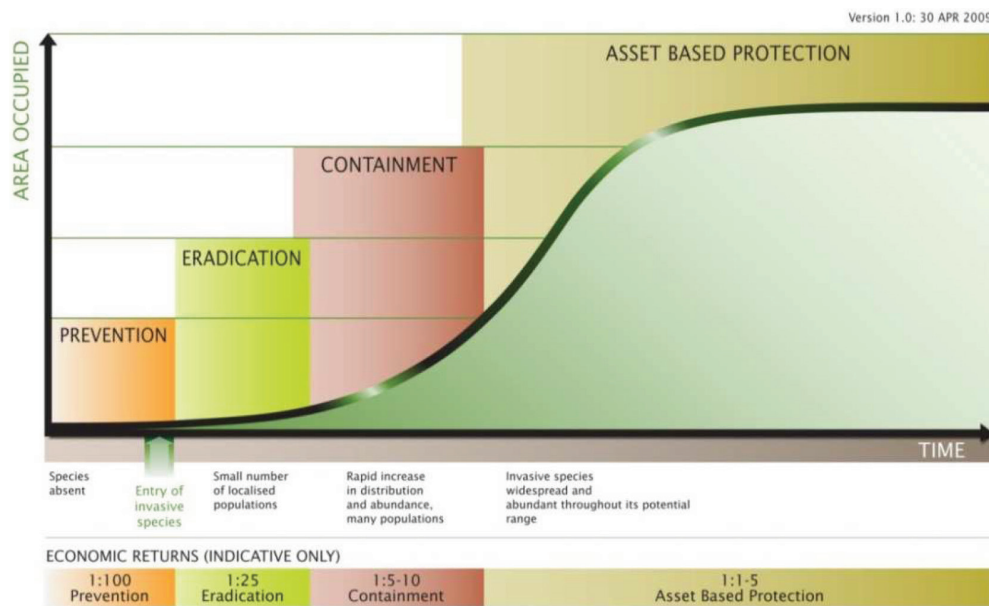
For instance, at a public hearing, the Committee asked Mr Ben Fahey, State Leader of Invasive Species at Parks Victoria, about the establishment of the deer population in Victoria and where it would fit on the curve:

Mr YOUNG — Thanks. On page 11 of your submission there is a handy little graph that I have seen before — I would imagine most of the committee has — in terms of being able to actually eradicate a pest. To me, reading this, you basically get to a stage where it is inevitable that it is here forever; you are not going to eradicate it. Where would deer fit into this graph?

Mr FAHEY — Deer would definitely establish right up in the big green end.

Mr YOUNG — Right. So with the big green end we get to a point where we know it is here forever.²⁵

Figure 2.2 The generalised invasion curve



Source: Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.11

See Section 3.7.2 of this report for details on the application of the invasion curve in invasive animal management in Victoria.

²⁴ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.10

²⁵ Daniel Young MLC, member of the Committee, and Ben Fahey, State Leader of Invasive Species, Parks Victoria, *Public Hearing*, 10 October 2016, p.10

2.3 Established invasive animal populations

Problems with invasive animals are experienced across Victoria. However, the particular species causing problems vary from one area to another. This section looks at the distribution and (where possible) population size of the invasive species that have been considered in this inquiry. Invasive species that are beyond the terms of reference and native pest animals are discussed in Section 2.4 of this chapter.

2.3.1 Deer

Deer were introduced to Victoria in the 1860s by acclimatisation societies for recreational hunting.²⁶ Deer were also released or escaped from deer farms between the 1970s and 1990s.²⁷ They have subsequently spread to many parts of the state. The key impacts of deer include the destruction of native vegetation, ecosystems, agricultural crops and farm pasture. They also damage farm fencing, are a hazard for motorists and have the potential to spread diseases to native animals and livestock.

The most established and widely distributed species of deer in Victoria is the sambar deer. The population is focussed on the heavily forested areas in the east and north-east of the state, covering an estimated 29 per cent of Victoria's land area²⁸ (see Figure 2.3 below). This area includes the Alpine National Park, the Snowy River National Park and large tracts of state forest. Smaller populations of sambar deer are also located at French Island, Mount Cole and Timboon.²⁹

Sambar deer have not yet reached the full extent of their potential distribution in Victoria. According to a report by the Arthur Rylah Institute, there is still potential for expansion 'west of the Hume Highway and along [the] Murray River'.³⁰ The Invasive Species Council has similarly noted that sambar deer have not yet occupied all suitable habitat in Victoria.³¹

26 Naomi E. Davis, Ami Bennett, David M. Forsyth, David M. J. S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), p.516

27 Rohan Bilney, 'The Protected Pest: Deer in Australia', *The Conversation*, 12 February 2013, p.1

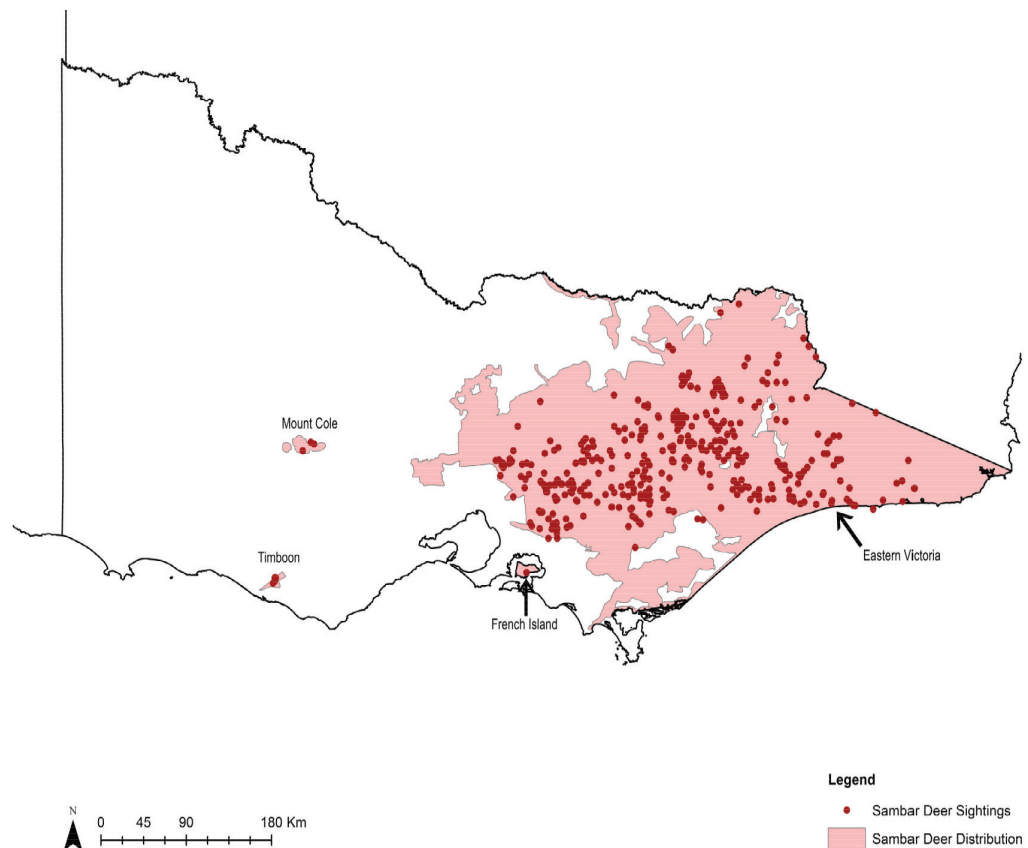
28 Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.16 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 18)

29 Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.8 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 18)

30 Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.16 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 18)

31 Invasive Species Council, *Submission 192*, p.3

Figure 2.3 The estimated distribution of sambar deer in Victoria



Source: Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.8 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 18)

Red deer, fallow deer and hog deer also have established populations in Victoria. These populations are smaller in distribution and density than the sambar deer population in the north-east. The Australian Deer Association outlined the extent of their distribution:

There is a long established red deer herd in the Grampians area and satellite herds (the result of illegal releases, which, in Victoria, commonly occur from failed deer farms) throughout the state. Likewise, fallow deer are present in pockets across the state, largely as a result of escape from deer farms or from illegal releases. Hog deer have a small population in the coastal strip in the east of the state extending from around Tooradin to Lakes Entrance.³²

The Arthur Rylah Institute considers that the populations of fallow and red deer are still expanding, while the hog deer population may have reached its full extent.³³

³² Australian Deer Association, *Submission 168*, p.5

³³ Department of Economic Development, Jobs, Transport and Resources, *Distributions of Sambar Deer, Rusa Deer and Sika Deer in Victoria* (2015), p.2 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 17)

As discussed in Section 2.2.1 of this chapter, the number of deer in Victoria is not definitively known. A number of witnesses gave the Committee their estimates of the deer population in Victoria. Mr Andrew Cox from the Invasive Species Council said ‘There are probably hundreds of thousands of sambar deer but possibly more, because there is no reliable count of those numbers.’³⁴ Mr Charlie Lovick from the Mountain Cattlemen’s Association of Victoria told the Committee ‘our local deer shooting groups estimate that there might be up to half a million deer. I do not think that is true; I think it is probably in the hundreds of thousands.’³⁵ The Victorian Hound Hunters estimated that there are over one million sambar deer in Victoria.³⁶

The Committee heard from a large number of witnesses in north-eastern Victoria and Gippsland that the deer population in Victoria is increasing and expanding. Mr Simon Toop from the Game Management Authority told the Committee:

In terms of deer populations, without having the data to support it, but certainly from strong anecdotal evidence it is clear that deer populations are expanding their range and increasing their density. I do not think there is any question about that.³⁷

Dr Dave Forsyth, formerly of the Arthur Rylah Institute, explained:

We do not know so much about the abundances of the various deer species in Victoria, but since at least 2009 the Game Management Authority and its predecessors have been conducting telephone surveys from which we have been able to estimate the numbers of deer that have been harvested and also the number of days that licensed hunters have spent hunting those deer species. From that we can estimate what is called the catch per unit effort index of deer abundance — so, the number of deer harvested per hunter day. Essentially the trend in that since those surveys began has been upwards, and quite significantly upwards, which suggests that the abundances of the deer species of Victoria have been steadily increasing, and my work on the distributions has also shown that distributions are increasing.

So if you take those two pieces of information together, there is little doubt that, in particular, distributions of and abundances of sambar deer are increasing in Victoria and also fallow deer are increasing in Victoria, and where I sit I can see no reason why that trend will not continue, at least in the next one to two decades.³⁸

The Committee received several submissions suggesting that the increase in the deer population was facilitated by major bushfires in the last two decades. It was suggested by some that the population may stabilise as the bush recovers. The submitters believed that vegetation re-growth following the fires increased the food supply for deer and enabled the population growth. Mr Ken Slee, for example, told the Committee:

In my opinion the major bushfires of the last 15 years are the major reason for the change in sambar deer density in the bush. It is well known that they respond to disturbance to the forest. Fire, logging and that sort of thing is what increases deer

³⁴ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.5

³⁵ Charlie Lovick, President, Mountain Cattlemen’s Association of Victoria, *Public Hearing*, 20 October 2016, p.2

³⁶ Victorian Hound Hunters, *Submission 81*, p.1

³⁷ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.7

³⁸ Dave Forsyth, *Public Hearing*, 10 October 2016, p.2

numbers. So we are actually seeing the results of a couple of million hectares of wildfires in the last 15 years, and deer numbers have responded dramatically to that fire.³⁹

Mr Anthony Carroll similarly told the Committee:

The expanding deer population has become much more pronounced following the 2003 and 2006/07 Great Alpine Fires. These fires significantly reduced the populations of deer and other animals in the affected areas but the rapid and heavy regrowth in the subsequent years provided perfect habitat for deer to breed and thrive.⁴⁰

Mr Slee argued that, as the forest becomes more established and there is less new growth for the deer to eat, the deer population may stabilise.⁴¹ However, others disagreed and anticipated continued growth in deer numbers.⁴²

FINDING 3: The lack of comprehensive data about deer in Victoria makes it difficult to accurately determine the reasons for changes in the deer population.

FINDING 4: The population of deer in Victoria has increased alarmingly in recent decades, causing a number of problems for native ecosystems and agricultural enterprises. While there is some debate about whether or not the population will continue to increase, deer will continue to be a problem, regardless of marginal increases or decreases in the population.

2.3.2 Feral and wild cats

Feral cats are cats that live in the wild and survive without the intentional assistance of humans. Feral cats are distinguished from stray cats, which live in populated areas and may depend on some assistance from humans.⁴³ Feral cats became established in Australia soon after European settlement. They are found in all of mainland Australia, Tasmania and many offshore islands.⁴⁴

Feral cats prey on a number of native species, including small mammals, birds and lizards. They are believed to have contributed to the extinction of more than 20 mammal species and are currently considered a key threat to 124 native species.⁴⁵ Feral cats spread diseases that affect humans, livestock and wildlife.⁴⁶

³⁹ Ken Slee, *Public Hearing*, 6 October 2016, p.5

⁴⁰ Anthony Carroll, *Submission 92*, p.1

⁴¹ Ken Slee, *Public Hearing*, 6 October 2016, pp.5, 7

⁴² See, for example, Dave Forsyth, *Public Hearing*, 10 October 2016, p.2; Mountain Cattlemen's Association of Victoria, *Submission 87*, p.2; see also Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.8

⁴³ Commonwealth Department of the Environment, *Background Document for the Threat Abatement Plan for Predation by Feral Cats* (2015), p.6

⁴⁴ Commonwealth Department of the Environment, *Background Document for the Threat Abatement Plan for Predation by Feral Cats* (2015), p.7

⁴⁵ Commonwealth Department of the Environment and Energy, *Frequently Asked Questions: Tackling Feral Cats and their Impacts* (n.d.), p.2

⁴⁶ Commonwealth Department of the Environment and Energy, *Frequently Asked Questions: Tackling Feral Cats and their Impacts* (n.d.), p.2

It is not known how many feral cats are in Victoria, as efforts to monitor their populations are hampered by the wary nature of feral cats:

Determining the success of feral cat control operations is problematic. Commonly used monitoring techniques (e.g., spotlighting, scat counts and sand-plot monitoring) for indexing changes in populations of other carnivores such as Red Foxes (*Vulpes vulpes*) or Dingos (*Canis lupus dingo*) are either inaccurate or limited (in their application to feral cats) to islands or sandy environments. Feral cats tend not to look towards spotlights and do not preferentially use roads or tracks.⁴⁷

Feral cats are one of the species being monitored through the FeralScan program (see Section 2.2.2 of this chapter).

The Committee is concerned that the current legislation, which restricts the methods that can be used to control feral cats (see Sections 3.4.3 and 8.7 of this report), has compounded their impacts in Victoria.

2.3.3 Feral and wild horses

Horses arrived in Australia with the First Fleet in 1788. The first escape of horses to the wild is recorded in 1804.⁴⁸ In Victoria, the population is concentrated in the north-eastern High Country and stretches into the Kosciuszko National Park in New South Wales. Horses can destroy vegetation (through trampling, soil compaction and other behaviour), damage water bodies and spread weeds.⁴⁹

An aerial survey conducted in 2014 estimated there were approximately 9,500 feral horses across the New South Wales and Victorian Alps.⁵⁰ According to the joint submission from government bodies:

The main Victorian population (est 3,800) is in the Eastern Alps. A smaller, isolated, population of around 50 animals occurs on the Bogong High Plains, and there have also been occasional reports of feral horses in the Moroka River headwaters. All populations occur in both the Alpine National Park and adjacent State forest, as well as nearby freehold land.⁵¹

The Committee heard higher estimates of the feral horse population in Victoria from submitters to this inquiry. The Mountain Cattlemen's Association of Victoria told the committee that they understand 'there are now in excess of 10,000 wild horses in the Alpine National Park.'⁵² Bushwalking Victoria noted similar estimates from 2012.⁵³

⁴⁷ Alan Robley, Andrew Gormley, Luke Woodford, Michael Lindeman, Bernard Whitehead, Ray Albert, Michael Bowd & Aileen Smith, *Evaluation of Camera Trap Sampling Designs Used to Determine Change in Occupancy Rate and Abundance of Feral Cats* (2010), p.3 (with sources)

⁴⁸ Independent Technical Reference Group, *Final Report of the Independent Technical Reference Group: Supplementary to the Kosciuszko National Park Wild Horse Management Plan*, report for the NSW Office of Environment and Heritage (2016), p.1

⁴⁹ Parks Victoria, *Greater Alpine National Parks Management Plan* (2016), p.38

⁵⁰ Australian Alps National Parks, *Wild Horse Management 2014 Aerial Survey and 2012 Catchments Impacts Assessment Factsheet* (2016), p.2

⁵¹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 16, p.4

⁵² Mountain Cattlemen's Association of Victoria, *Submission 87*, p.4

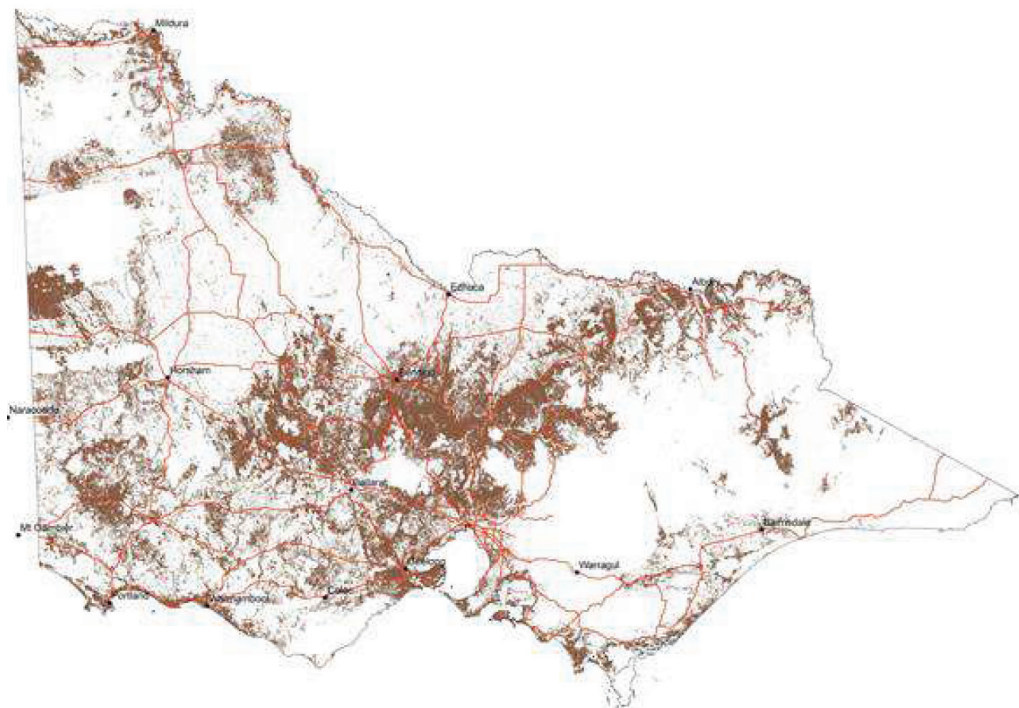
⁵³ Bushwalking Victoria, *Submission 131*, p.1

A number of submitters believed that the horse population had increased rapidly in recent years.⁵⁴

2.3.4 Feral and wild rabbits

Rabbits occur throughout Victoria except in alpine and closed forest environments (see Figure 2.4). Rabbits are particularly problematic because of their capacity to breed rapidly. According to Agriculture Victoria, 'In 1859, approximately seven rabbits were released at Barwon Park near Geelong. Just seven years later, 14,253 rabbits were shot on Barwon Park.'⁵⁵

Figure 2.4 The estimated distribution of European rabbits in Victoria



Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.4

The rabbit population in Australia has been reduced significantly since the mid-20th century by biological control programs. The release of the myxoma virus in the 1950s and the rabbit haemorrhagic disease virus in the 1990s achieved large population declines.⁵⁶ Subsequently, the rabbit population has stabilised as natural resistance to the viruses has built.

⁵⁴ Mountain Cattlemen's Association of Victoria, *Submission 87*, p.4; Bushwalking Victoria, *Submission 131*, p.1

⁵⁵ Agriculture Victoria, *European Rabbit (Feral or Wild)* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/european-rabbit>, viewed 8 December 2016

⁵⁶ CSIRO, *Case Study, Controlling Those Pesky Rabbits* <www.csiro.au/en/Research/BF/Areas/Managing-the-impacts-of-invasive-species/Biological-control/Controlling-those-pesky-rabbits>, viewed 12 December 2016

Though the rabbit population is smaller than it was previously, rabbits remain a problem in Victoria. Rabbits eat native vegetation, destroying native habitats, competing with native animals for food resources and, in some cases, causing soil erosion. They also consume crops and pasture, reducing agricultural yields. At least 156 threatened species are adversely impacted by rabbits.⁵⁷

During public hearings, the Committee heard that rabbits have reached the extent of their geographic spread in Victoria.⁵⁸

2.3.5 Foxes

The red fox is one of Victoria's most widespread pest animals. Foxes prey on a number of native animals, including birds, reptiles and mammals. They also kill livestock, including chickens, lambs and goat kids.⁵⁹ Agriculture Victoria has found that the fox is established 'in all terrestrial environments from inner urban areas to alpine heaths, rainforests, coasts and the Mallee. Victorian habitats are highly favourable for the red fox.'⁶⁰

According to Agriculture Victoria, 'European settlers introduced the red fox into Australia for sporting purposes in the 1850s, with most releases being around Melbourne. Foxes became established following two subsequent releases in 1871 at Ballarat and Geelong.'⁶¹ The joint submission from government bodies stated, 'densities can range from 1 to 4 adults [per] km² in rural areas (higher in some areas) of Victoria and it is estimated that there are over 1 million foxes in Victoria.'⁶²

2.3.6 Feral and wild goats

Goats arrived with the First Fleet in 1788. Feral populations subsequently spread across eastern Australia, reaching South Australia by 1836.⁶³ Goats damage native vegetation and compete with native animals for food resources.

The Committee was told:

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- 57 PestSmart, *RABFSI: Rabbit Factsheet* (2011), p.2
- 58 Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.3
- 59 PestSmart, *FXFSI: Fox Factsheet* (2011), pp.1-2
- 60 Agriculture Victoria, *Red Fox* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/red-fox>, viewed 13 December 2016
- 61 Agriculture Victoria, *Red Fox* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/red-fox>, viewed 13 December 2016
- 62 Department of Economic Development, Jobs, Transport and Resources, *Fox Control in Victoria, Code of Practice*, p.6 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 13)
- 63 Agriculture Victoria, *Goat (Feral or Wild)* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/goat-feral-or-wild>, viewed 8 December 2016

There is little information available regarding the distribution and density of feral goats in Victoria. However, anecdotal information suggests that the largest goat populations occur in areas where very large tracts of forested or semi-arid areas offer some protection from control and people.⁶⁴

Agriculture Victoria has identified a number of areas where populations of feral goats are known to be established, including the Grampians, Little Desert, Hattah Kulkyne, Murray Sunset and Alpine National Parks. Feral goats have also been sighted in many other parks and forests throughout Victoria.⁶⁵

Feral goats are considered to still be expanding into new parts of Victoria.⁶⁶

2.3.7 Feral and wild pigs

Pigs were also introduced to Australia with the arrival of the First Fleet in 1788. A feral population became established in New South Wales but Victoria did not have a recognised feral pig population until 1959.⁶⁷ A Commonwealth Government report stated that ‘Population sizes and spread have been enhanced by escapes from domestic populations and the illegal release of feral pigs for recreational hunting.’⁶⁸

Feral pigs are omnivores that eat native vegetation, as well as the eggs of ground-nesting birds, reptiles and amphibians. They also consume crops and can prey on livestock lambs. They have the potential to spread diseases to livestock, including foot-and-mouth. Pigs also damage the physical environment by digging up large areas of soil in search of food and by polluting water sources.⁶⁹

The majority of feral pigs in Victoria are found in isolated populations at various locations along the Murray River and near Mansfield, Kinglake, the Central Highlands and the Grampians.⁷⁰ However, feral pigs are considered to still be expanding into new parts of Victoria.⁷¹ Mr Jim Reside from Wildlife Unlimited told the Committee:

People are not really aware of the incursion of feral pigs into East Gippsland, but they seem to be coming down the Snowy River valley and then spreading out into that High Country area around Deddick-Bendoc country. They have occupied a lot [of]

64 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 16, p.2

65 Agriculture Victoria, *Goat (Feral or Wild)* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/goat-feral-or-wild>, viewed 8 December 2016

66 Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.3

67 Agriculture Victoria, *Pig (Feral or Wild)* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/pig-feral-or-wild>, viewed 8 December 2016

68 Commonwealth Government, Department of the Environment, *Background: Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs* (2015), p.3

69 PestSmart, *FPFSI: Feral Pig Factsheet* (2011), p.2

70 Agriculture Victoria, *Pig (Feral or Wild)* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/pig-feral-or-wild>, viewed 8 December 2016

71 Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.3; Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.29

that space down there. Now they are pushing further south, further down even below McKillops Bridge, so they are now down in close proximity to Wulgulmerang and the Gelantipy plateau, so they have made great inroads and they seem to be following these corridors very, very effectively. Although they are yet to have a significant impact on agricultural land, it is only a matter of time if that movement is not sort of impacted upon. If we do not do something to control these early numbers, once they get established it will be a huge problem.⁷²

2.3.8 Feral and wild dogs

Wild dogs are dog populations that have become established in the wild and survive without the intentional assistance of humans. Wild dogs pose a danger to children and adults through attacks (see Section 2.7.2 of this chapter) and the spread of disease. Wild dogs prey on native wildlife and farm animals, especially sheep and goats. In some cases, dogs may kill more animals than they need to eat, exacerbating the impact of a dog attack. However, wild dogs also kill some other invasive species (such as rabbits, foxes and cats) and species that may compete with livestock for pasture (such as kangaroos).⁷³ As a result, some have recommended that wild dog populations only be controlled near agricultural land (see Section 8.5.3 of this report).

Wild dogs and native dingos have interbred in some areas of Victoria and dog-dingo hybrids are also considered pest animals.⁷⁴

According to Agriculture Victoria:

Victoria has two main areas of wild dog activity. In the east of the state, wild dogs are present in the heavily timbered areas of the Eastern Highlands from the NSW border in the north and to the Healesville and Gembrook areas in the south. The north-west of the state has another population of wild dogs in the Big Desert region.⁷⁵

A number of people suggested to the Committee that wild dog problems are increasing.⁷⁶

FINDING 5: Numbers of feral and wild animals, including cats, horses, rabbits, foxes, goats, pigs and dogs have increased over time and have become a major issue in Victoria. They are causing substantial economic, environmental, agricultural and social issues through overpopulation, predation and competition for resources.

⁷² Jim Reside, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.4

⁷³ PestSmart, *WDFS9: Wild Dog Factsheet* (2016), pp.1-2

⁷⁴ Agriculture Victoria, *Wild Dog, Dingo-Dog Hybrids (Feral or Wild)* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/wild-dog-dingo-dog-hybrids-feral-or-wild>, viewed 18 December 2016

⁷⁵ Agriculture Victoria, *Wild Dog, Dingo-Dog Hybrids (Feral or Wild)* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/wild-dog-dingo-dog-hybrids-feral-or-wild>, viewed 18 December 2016

⁷⁶ Barry Tayler, *Public Hearing*, 6 October 2016, p.2; Brendan Mahoney, *Public Hearing*, 20 October 2016, p.5; Michael Watson, Watson's Mountain Country Trail Rides, *Public Hearing*, 20 October 2016, p.2; Name withheld, *Submission 30*, p.2; John Dol, *Submission 93*, p.1; Brendan Mahoney, *Submission 108*, p.1; Name withheld, *Submission 174*, pp.1-2

2.4 Species outside the terms of reference

2.4.1 Invasive animals that cannot be controlled through shooting

The terms of reference for this inquiry require the Committee to consider the use of recreational shooting as a tool to control invasive animal populations on Crown land. Consequently, the Committee decided to only consider animal species for which shooting may be a possible and practical control method.

As a result, the Committee did not consider insect species, aquatic animals, reptiles or amphibians. The Committee received evidence about a number of species in these categories (including the smooth newt,⁷⁷ the European shore crab⁷⁸ and the European wasp⁷⁹) and the Indian myna bird.⁸⁰ As shooting is not a practical option to control these species, they have not been considered in detail.

However, the Committee particularly notes the concerns about European wasps and Indian myna birds.

European wasps

The Committee was told by several witnesses that European wasps are a serious concern:

Their effect on the local environment bothers me a lot because I think they are doing tremendous damage to the other inhabitants of the area — the insects, small birds and this sort of thing. They are changing it because they are taking away a food source. If you have got the little blue wrens that feed on small insects and the wasps are there, the wasps will eat the insects. What does the blue wren eat? Nothing.⁸¹

The European wasps — we have managed to see a carcass almost totally eaten away within one week by wasps, and this is having an enormous impact on us in a very simple way — you cannot sit outside, you cannot have a barbecue. You know, restaurants had to close and now they have to have screening if you want to sit outside.⁸²

Indian myna birds

The Indian myna bird is another invasive species that was mentioned by a number of submitters and witnesses. The Committee received submissions expressing concern about the Indian myna's displacement of native birds through competition for resources:

⁷⁷ Andrew Cox, Executive Director, Invasive Species Council, *Public Hearing*, 5 September 2016, p.11

⁷⁸ See for example Ross Scott, *Submission 58*, p.1 and John Hermans, *Submission 173*, p.2

⁷⁹ See for example Dennis Keith, *Submission 11*, Attachment 3, p.2 and Roger Bilney, Gippsland Environment Group and Environment East Gippsland, *Public Hearing*, 6 October 2016, p.9

⁸⁰ See for example Roger Clements, *Submission 12*, p.1 and Peri Urban Group of Rural Councils, *Submission 149*, p.4

⁸¹ Dennis Keith, *Public Hearing*, 19 October 2016, p.4

⁸² John Atkins, President, Harrietteville Community Forum, *Public Hearing*, 19 October 2016, p.3

Indian mynahs are becoming an increasing problem. They dispossess native birds nesting sites and eat their young. On a visit to Rarotonga we found that every native species of bird has been rendered extinct by Indian mynahs which were introduced to control insects damaging the copra crop (Rarotonga's only export at the time)

Indian mynahs were originally a city bird (Melbourne and Sydney) but they have followed highways and encroached on Shepparton, where their numbers have increased dramatically.⁸³

Mitchell Shire Council also discussed Indian myna birds in its submission:

Mitchell Shire Council has also been concerned for some time about the impacts of Indian Myna birds on the natural ecology, as evidenced by a Council resolution made in March 2010 to *write to the relevant department in State Government highlighting Council's concern with the growth in population of Myna birds and requesting they provide advice and consider the issue.*

This was followed by a Municipal Association of Victoria resolution in May 2014 to *advocate to the Department of Environment and Primary Industries for the development and implementation of a statewide control program of the Indian Myna bird with the objective to reduce their numbers and limit their spread throughout Victoria.*⁸⁴

According to the Department of Environment, Land, Water and Planning, the Indian myna bird is not listed as a pest animal because there are no practical means available for broad-scale population management.⁸⁵

It is possible to shoot Indian myna birds but:

Shooting as a lethal method can be effective in reducing localised populations of birds when low numbers are involved. However, it is labour intensive, costly and rarely effective in achieving long-term reductions in bird numbers or associated damage. Other birds will often move into an area to take the place of those that are killed. Also, some species of bird, particularly parrots, learn to avoid shooters.⁸⁶

Indian myna birds are also generally found in urban environments or other settled areas. As a result, shooting is rarely a practical option.⁸⁷

FINDING 6: European wasps pose serious threats to biodiversity, agriculture and community safety in Victoria. Indian myna birds may also impact on native bird populations through competition for resources. The Committee recognises the importance of controlling these animals, though it acknowledges they are outside the terms of reference for this inquiry.

⁸³ Roger Clements, *Submission 12*, p.1

⁸⁴ Mitchell Shire Council, *Submission 125*, pp.1-2

⁸⁵ Agriculture Victoria, *Non-indigenous Bird Management Policy* <www.agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/protecting-victoria-from-pest-animals-and-weeds/legislation-policy-and-permits/policies-and-strategies/non-indigenous-bird-management-policy>, viewed 10 February 2017

⁸⁶ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure BIR001: Shooting of Pest Birds* (2012), p.2

⁸⁷ New South Wales Department of Primary Industries, *Myna Birds* <www.dpi.nsw.gov.au/biosecurity/vertebrate-pests/pest-animals-in-nsw/pest-birds/myna-birds>, viewed 20 February 2017

2.4.2 Native animals

The Committee also heard from some submitters and witnesses about overabundant native animals having negative impacts on agriculture and safety in Victoria:

Since colonisation and the establishment of cleared land for farming which was and is now planted with grasses/crops for domestic stock/human consumption and with the construction of tens of thousands farm dams for domestic stock and irrigation – meat and crop production – the kangaroo population has increased exponentially and is now in plague numbers and well exceeds its pre colonisation numbers by many factors.⁸⁸

... if kangaroos have unfettered access to private land, they breed much more rapidly than they would in the natural environment because they have access to water and to improved pastures et cetera. So the result is that whilst they are harboured in the public land, they actually then, because of their increased numbers, cause problems on the public land as well.⁸⁹

... vehicle collision data shows that Kangaroos are the leading cause of impact collisions with cars in Victoria. These same animals reside in the National Parks and Crown Land only to invade farmland on dusk to feed – unlike deer there is no control or management of these native animals when they are located on Crown Land. The DSC [Deerstalkers Club] would suggest that equal weight be placed on the management of native species like the Eastern Gray kangaroo and the common Wombat.⁹⁰

These issues are acknowledged by the Department of Environment, Land, Water and Planning, which has noted that:

While kangaroos are an important part of Victoria's natural ecosystems, they require management in some situations ... The arrival of European settlers has had a significant impact on macropods in Victoria, through habitat destruction or modification, the removal of predators, and the addition of introduced species like foxes and rabbits. Several Victorian species, such as the Eastern Grey Kangaroo, Western Grey Kangaroo and Swamp Wallaby have drastically increased in numbers due to improved pastures and reliable water sources.⁹¹

The Committee also heard that overabundant native birds such as corellas and cockatoos may cause damage to native vegetation and crops.⁹² In 1995, the Environment and Natural Resources Committee of the Victorian Parliament produced a report titled *Problems in Victoria Caused by Long-Billed Corellas, Sulphur-Crested Cockatoos and Galahs*, which acknowledged these problems and recommended management strategies to address them.

⁸⁸ Dennis Keith, *Submission 11*, Attachment 1, p.2

⁸⁹ Gerry Leach, Chair, Land Management Committee, Victorian Farmers Federation, *Public Hearing*, 10 October 2016, p.11

⁹⁰ Sporting Shootings Association of Australia Deerstalkers Club, *Submission 63*, pp.2-3; Trevor Dennis, *Submission 45*, p.2

⁹¹ Department of Environment, Land, Water and Planning, *Kangaroos* <www.wildlife.vic.gov.au/our-wildlife/kangaroos>, viewed 30 May 2017

⁹² See for example Vicki Boyle, *Submission 105*, p.1 and Shooting Sports Council of Victoria, *Submission 202*, p.9

The Committee recognises the importance of managing the impacts of native species but native animals do not fall within the definition of ‘invasive animals’ used for this inquiry (see Section 1.4.2 of this report). Therefore the Committee does not consider controlling them to be within the terms of reference.

Nonetheless, native animals should be considered as part of any holistic strategy to control invasive animals (see further discussion on an invasive animals strategy in Section 10.2 of this report). The Committee also notes that control methods outlined in this report, such as shooting, should be considered in management plans for some native animals.

2.4.3 Weeds

A number of submitters also noted negative impacts from invasive weed species. The Committee recognises that invasive plants can have a significant impact on both the natural environment and agriculture. However, weed control requires different strategies to animal control and would need to be considered as part of a separate inquiry or investigation.

2.5 Impacts of invasive animals on natural environments

Victoria has a rich and diverse natural environment. Victoria’s Crown land is home to many areas of natural beauty, including 70 state and national parks.⁹³ Several Victorian wilderness areas are included on Australia’s National Heritage List.

The Committee was told that invasive animal species are a key threat to Victoria’s biodiversity. Biodiversity includes ‘all components of the living world: the number and variety of plants, animals and other living things, including fungi and micro-organisms, across our land, rivers, coast and ocean. It includes the diversity of their genetic information, the habitats and ecosystems within which they live, and their connections with other life forms and the natural world’.⁹⁴

The joint submission from government bodies states that invasive animals are an issue in 87 per cent of Victoria’s parks and that:

Forty per cent of Victoria’s parks (54 per cent of the area of the parks network) reported that the impact of invasive animals was moderate, with 16 per cent of parks (30 per cent of the parks network area) reporting that the impact of invasive animals was major or severe.⁹⁵

⁹³ Parks Victoria, *National and State Parks* <www.parkweb.vic.gov.au/explore/find-a-park/national-and-state-parks>, viewed 10 January 2017

⁹⁴ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.4

⁹⁵ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.4

Mr Andrew Cox from the Invasive Species Council told the Committee:

... invasive species are a major threat to Australia's wildlife and scientists equate it regularly as equal to or the same level of priority as habitat loss and climate change. For things like mammals it is the top threat; it is the thing that has caused most of our extinctions and it is the thing that is causing ongoing threats.⁹⁶

Invasive animals impact on native animals in a number of ways. These include damage to native vegetation and the environment, competition with native animals for food, hampering human efforts to revegetate, spreading harmful diseases and predation on native animals.

2.5.1 Damage to native vegetation and the environment

Invasive animals can contribute to habitat loss for native animals by damaging native vegetation and through degradation of soil and waterways.

The Committee received a large number of submissions from members of the public regarding the damage caused by deer to native vegetation:⁹⁷

Vegetation is destroyed in several ways. The older male deer rub their antlers on trees effectively ring barking them. As well emerging native vegetation is either eaten or trampled. This [Bunyip River] is an area that was severely affected by the Black Saturday fires in 2009 and the many hundreds of trees planted along the river have been totally destroyed by these marauding animals.⁹⁸

Hog deer have formed well-worn paths when they emerge from shelter in thick scrub surrounding Tidal River to graze on the grass and young plants in the camp ground. Scouring occurs where these paths go up and down the sandy dune slopes, undermining and destroying any vegetation in their way.⁹⁹

The deer are well entrenched in the Alpine National Park, they have become a well-documented ecological problem for specific plant and animal species in these areas. In particular the destruction of many trees during the rut when the stags use their antlers to thrash and ring bark trees. Sambar deer are hard hooved and regularly wallow in soaked ground, causing irreversible damage to sphagnum bogs in alpine environments. There has been a loss of whole plant communities due to the robust behaviour of the deer.¹⁰⁰

Efforts to undo this damage, even in relatively small areas, can be expensive. The Friends of the Prom calculated that the revegetation program to repair deer damage at Tidal River on Wilsons Promontory accounted for 750 volunteer hours per year, 200 hours of park rangers' time and an additional \$3,000 of expenditure from Parks Victoria's budget.¹⁰¹

⁹⁶ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.2

⁹⁷ See also discussion of the published literature in Naomi E. Davis, Ami Bennett, David M. Forsyth, David M.J.S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), p.520

⁹⁸ Jaan Enden, *Submission 7*, p.1

⁹⁹ Friends of the Prom, *Submission 180*, p.3

¹⁰⁰ Victorian Hound Hunters, *Submission 81*, p.2

¹⁰¹ Friends of the Prom, *Submission 180*, pp.3, 8

Where this damage is not repaired, it can alter the make-up of native ecosystems. The East Gippsland Rainforest Conservation Management Network told the Committee:

... in rainforest communities, the tree canopy plays a disproportionate role in the regulation of ecosystem function via its creation of a ‘micro-climate’ in which moisture levels are held high and dependant fauna and flora exist. When deer rub, ring bark and ultimately kill canopy species, impacts can result on the entire rainforest ecosystem via changes in moisture and temperature regimes.

Browsing by sambar deer of rainforest plants, especially tree seedlings, is also posing an ever increasing threat to rainforests in East Gippsland. As when deer systematically eat a majority of, or in some cases all, the small ‘seedling’ trees, when a canopy gap is created by the death of an old tree, wind through, deer rubbing or otherwise, there is nothing to take its place. The natural ‘repair response’ of the vegetation is severely curtailed, leaving a gap to persist, effecting the forests structural integrity and allowing increased levels of sunlight to penetrate under the canopy. This encourages sun loving species, such as Eucalypts, to germinate which are naturally far more fire prone than rainforest species, elevating the likelihood that future fire events will impact the now increasingly modified rainforest areas.¹⁰²

A number of witnesses and organisations noted the damage to peatlands as a particular concern in the Alpine National Park. The protection of these peatlands is one of the goals of the deer control trials currently underway in the Alps (see Section 6.5.2 of this report). Parks Victoria has explained:

Alpine peatlands are boggy wetlands which occur at the headwaters of waterways in the Alps. They play an important role in maintaining the healthy functioning of water catchments in the Alps and provide critical habitat for a number of important native plants and animals.

“This trial control program is a positive step towards preserving the headwaters of many of Victoria’s major rivers and protecting critical habitats for native species in the park, including the endangered Alpine Water Skink” [said Acting Chief Executive for Parks Victoria, Chris Rose] ...¹⁰³

Research by the Arthur Rylah Institute found that deer activity was present in nearly one-third of 105 mossbeds assessed in the Victorian Alps in 2008.¹⁰⁴ This activity included the creation of scats, hoof prints, tracks and wallows.¹⁰⁵ Feral horses were also a problem in these areas, with the investigation finding feral horse activity, including trampling, in 70 of the 105 sites visited.¹⁰⁶

¹⁰² East Gippsland Rainforest Conservation Management Network, *Submission 170*, p.3; see also Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.3

¹⁰³ Parks Victoria, ‘Deer Control Trial for a Healthier Alpine National Park’ (media release), 27 July 2015

¹⁰⁴ Arn Tolsma (Arthur Rylah Institute for Environmental Research), *An Assessment of the Management Needs of Mossbeds in Victoria’s Alps, 2004-2008*, report produced for Parks Victoria (2008), p.38

¹⁰⁵ Arn Tolsma (Arthur Rylah Institute for Environmental Research), *An Assessment of the Management Needs of Mossbeds in Victoria’s Alps, 2004-2008*, report produced for Parks Victoria (2008), p.38

¹⁰⁶ Arn Tolsma (Arthur Rylah Institute for Environmental Research), *An Assessment of the Management Needs of Mossbeds in Victoria’s Alps, 2004-2008*, report produced for Parks Victoria (2008), p.40

Concerns were also raised that the exposure of the soil by deer would facilitate the spread of invasive plant species.¹⁰⁷

In addition, deer activity can foul waterways through damaging river and stream banks:¹⁰⁸

Small streams have become badly eroded with a loss of vegetation and wet areas have been turned into wallows destroying these important areas. After heavy rain we are seeing more silt and colouration of the rivers and streams. Deer trails are subjecting steeper areas to erosion and slips adding to the above.¹⁰⁹

[Issues with deer include:] Muddying of creeks and therefore destruction of waterways for the aquatic life. Our waterways have enough trouble sustaining their aquatic life for their trip to western port Bay without damage by deer. The deer make dams along the creeks by lying in the ponds and firming the muddied edges to form a small billabong bath.¹¹⁰

The Committee also received submissions about similar damage to native vegetation caused by other invasive animal species. For example:

Feral goats cause considerable environmental impacts in Victoria. Feral goats cause land degradation through soil damage, over grazing and strip browsing. The soil's crust and its protective cover of vegetation are disturbed through trampling by the goat's hooves. As a selective browser, feral goats can impact on specific plant communities over a relatively short period. Feral goat populations affect long lived plants by eating established plants and preventing the recruitment and growth of seedlings.¹¹¹

The impact of pigs is quite counterproductive to GB CMA [Goulburn Broken Catchment Management Authority] efforts to stabilize banks, establish vegetation and reduce sediment transport. Feral pigs are considered an environmental pest due to their selective feeding, trampling and rooting for underground parts of plants and invertebrates, as well as predation on, competition with, or disturbance of a range of native animal species¹¹²

By wallowing and rooting around the waterline, they [pigs] destroy the riparian vegetation which provides food and nesting sites for native wildlife and helps to prevent soil erosion. Water quality is also affected and their diggings may spread undesirable plant and animal species, and plant diseases in these areas.¹¹³

¹⁰⁷ Invasive Species Councils, *Submission 192*, p.4; Cardinia Catchment Landcare Group, *Submission 195*, p.1; see discussion in relation to deer in Naomi E. Davis, Ami Bennett, David M. Forsyth, David M.J.S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), p.520

¹⁰⁸ See also discussion of the published literature in Naomi E. Davis, Ami Bennett, David M. Forsyth, David M.J.S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), pp.523-4

¹⁰⁹ Harrierville Community Forum, *Submission 204*, p.2

¹¹⁰ Elizabeth Frazer, *Submission 110*, pp.1-2

¹¹¹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 16, p.1; see also Goulburn Broken Catchment Management Authority, *Submission 145*, p.2

¹¹² Goulburn Broken Catchment Management Authority, *Submission 145*, p.2

¹¹³ Goulburn Broken Catchment Management Authority, *Submission 145*, pp.2-3 (with sources)

In dry times a rabbit will target the succulent seedlings of native trees, shrubs and perennial grasses for its moisture requirements, these may only be a few millimetres high, they are eaten to below ground level and destroyed leaving the area vacant for fast growing exotic species such as thistles, tumbleweed and pattersons curse.¹¹⁴

2.5.2 Competition with native species

Invasive species also compete with native animals for limited food resources,¹¹⁵ which may force native animals out of their habitat and reduce their numbers. The Game Management Authority has noted that hog deer compete with kangaroos, wallabies and wombats for food on Wilsons Promontory.¹¹⁶ Similarly, the Invasive Species Council told the Committee that ‘Herbivores like goats and rabbits compete with wildlife for food and habitat resources’.¹¹⁷

The modification of native vegetation (either through consumption or destruction) may also reduce the amount of shelter and nesting sites for other species.¹¹⁸

2.5.3 Revegetation

A number of groups involved with revegetation noted that deer can make revegetation work harder. Deer tend to eat young plants and can damage larger trees by rubbing their antlers on them. The Peri Urban Group of Rural Councils estimated that the presence of deer and kangaroos in some areas has reduced tree survival rates in revegetation areas from 80 per cent to 40 per cent.¹¹⁹ Some Landcare groups in north-eastern Victoria indicated that they have completely lost some revegetation projects as a result of deer.¹²⁰

Deer have also made revegetation efforts more expensive. To prevent deer damage, it is necessary to install larger and sturdier protection for vulnerable plants.¹²¹ As the Friends of the Prom explained:

Before the hog deer invaded Tidal River, 450 mm high plastic sleeves supported by stakes were used to protect newly planted seedlings. These are no longer adequate to protect against hog deer and we have resorted to using more expensive heavy duty mesh tree guards up to 900 mm high. These need to be firmly tied to stakes with cable ties – all very time-consuming when there are thousands of plants to go in.¹²²

¹¹⁴ Neil Gillies, *Submission 126*, p.1

¹¹⁵ See discussion of the published literature in Naomi E. Davis, Ami Bennett, David M. Forsyth, David M.J.S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, ‘A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia’, *Wildlife Research* 43 (2016), p.522

¹¹⁶ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program* (2015), p.4

¹¹⁷ Invasive Species Council, *Submission 192*, p.4

¹¹⁸ Naomi E. Davis, Ami Bennett, David M. Forsyth, David M.J.S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, ‘A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia’, *Wildlife Research* 43 (2016), p.522

¹¹⁹ Peri Urban Group of Rural Councils, *Submission 149*, p.3; Murrindindi Shire Council, *Submission 155*, p.2

¹²⁰ Lachlan Campbell, ‘Communities Meet to Discuss Deer Control’, *Victorian Landcare and Catchment Management* 66 (2016), p.11

¹²¹ Arthur Muchow, *Submission 65*, p.1; Goulburn Broken Catchment Management Authority, *Submission 145*, p.1; Friends of the Prom, *Submission 180*, pp.2-3; Cardinia Catchment Landcare Group, *Submission 195*, p.1

¹²² Friends of the Prom, *Submission 180*, pp.2-3

Murrindindi Shire Council estimated that preventing deer damage adds approximately 40 per cent to the cost of revegetation.¹²³

2.5.4 Disease

Another threat to biodiversity are the bacteria, viruses and parasites carried by invasive animals. Feral cats, pigs, goats and dogs are known to be carriers of pathogens and parasites that can harm native animal populations.¹²⁴ Some of these are specifically spread by invasive animals.

Toxoplasma gondii, for example, is a parasite that can only reproduce in cats. However, it can infect a range of other animals.¹²⁵ In native animals, it can cause 'poor coordination, blindness, lethargy, respiratory and enteric distress, and often sudden death.'¹²⁶ Signs of *Toxoplasma gondii* infection have been found in 'at least 30 species of native mammals', as well as several species of native birds in Australia.¹²⁷

Another significant parasite is the tapeworm *Echinococcus granulosus*, which can be spread by dogs, foxes and other canids.¹²⁸ The parasite has high infection rates in macropods. A 2003 study found 57 per cent of swamp wallabies in the Kosciuszko National Park were infected, along with smaller numbers of red necked wallabies and eastern grey kangaroos.¹²⁹ Infected wallabies can suffer from cysts in their lungs which affect lung function and increase their risk of predation.¹³⁰

2.5.5 Predation

The joint submission from government bodies noted that 'After habitat loss, predation by introduced species (mostly foxes and feral cats) is regarded as being the major threat to endangered terrestrial native animals.'¹³¹ Predation by foxes and feral cats has put significant pressure on a number of native species. The Commonwealth Government has estimated that fox predation is a threat to 14 bird species, 48 mammal species, 12 reptile species and 2 amphibian species

¹²³ Murrindindi Shire Council, *Submission 155*, p.2

¹²⁴ Invasive Animals Cooperative Research Centre, *Pathogens in Invasive Animals of Australia*, report prepared by Wendy Henderson (2009), pp.11-17, 20-2

¹²⁵ Invasive Animals Cooperative Research Centre, *Pathogens in Invasive Animals of Australia*, report prepared by Wendy Henderson (2009), pp.12-13

¹²⁶ Invasive Animals Cooperative Research Centre, *Pathogens in Invasive Animals of Australia*, report prepared by Wendy Henderson (2009), p.13

¹²⁷ Invasive Animals Cooperative Research Centre, *Pathogens in Invasive Animals of Australia*, report prepared by Wendy Henderson (2009), p.13

¹²⁸ Department of Health and Human Services, Health.vic, *Hydatid Disease (Echinococcosis)* <www2.health.vic.gov.au/public-health/infectious-diseases/disease-information-advice/hydatid-disease>, viewed 27 February 2017; WoolProducers Australia, *National Wild Dog Action Plan* (2014), p.17

¹²⁹ DJ Jenkins & B Morris, 'Echinococcus Granulosus in Wildlife in and Around the Kosciuszko National Park, South-Eastern Australia' *Australian Veterinary Journal* 81(1 & 2) (2003), p.83

¹³⁰ WoolProducers Australia, *National Wild Dog Action Plan* (2014), p.19

¹³¹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.5

across Australia.¹³² The animals most at risk from foxes are small mammals and ground-nesting birds, many of which are endangered or vulnerable.¹³³ Likewise, feral cats are considered a threat to 40 mammal species, 40 bird species, 21 reptile species and 4 amphibian species.¹³⁴

Other invasive species also prey on native animals. Wild dogs in Victoria hunt native animals, often larger than the small mammals preyed on by foxes. This includes wallabies, brushtail possums and wombats.¹³⁵ Feral pigs consume bird chicks, reptiles, reptile and bird eggs, frogs, earthworms and other invertebrates.¹³⁶

Foxes, feral cats and feral pigs are listed under the *Environment Protection and Biodiversity Conservation Act 1999* as key threatening processes as a result of their predation on native animals.¹³⁷

FINDING 7: Invasive animals pose a serious problem for Victoria's native flora and fauna and therefore require urgent action.

2.6 Impacts of invasive animals on agriculture

The impacts of invasive animals on agriculture in Victoria include predation on livestock, competition for pasture, consumption of crops, damage to fences and significant time requirements from some farmers to control the invasive animals. They also pose a threat if a disease outbreak should occur, as invasive animals have the potential to spread a number of harmful diseases to livestock.

In many cases, the invasive animals affecting farms come from Crown land. In some cases, the invasive animals may move from Crown land to private land temporarily to feed. In other cases, invasive animals from Crown land may re-invade private land after farmers have controlled the invasive animals living on their land.

¹³² Commonwealth Government, Department of the Environment and Energy, *Background Document for the Threat Abatement Plan for Predation by the European Red Fox* (2008), p.2

¹³³ Commonwealth Government, Department of the Environment and Energy, *Background Document for the Threat Abatement Plan for Predation by the European Red Fox* (2008), p.2

¹³⁴ Commonwealth Government, Department of the Environment and Energy, *Background Document for the Threat Abatement Plan for Predation by Feral Cats* (2015), p.8

¹³⁵ Naomi E. Davis, David M. Forsyth, Barbara Triggs, Charlie Pascoe, Joe Benshemesh, Alan Robley, Jenny Lawrence, Euan G. Ritchie, Dale G. Nimmo & Lindy F. Lumsden, 'Interspecific and Geographic Variation in the Diets of Sympatric Carnivores: Dingoes/Wild Dogs and Red Foxes in South-Eastern Australia' *PLoS ONE* 10(3) (2015), p.1

¹³⁶ Commonwealth Government, Department of the Environment, *Background: Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs* (2015), p.5

¹³⁷ Commonwealth Department of the Environment and Energy, *Species Profile and Threats Database, Listed Key Threatening Processes* <www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>, viewed 22 February 2017

2.6.1 Predation of livestock

Foxes and wild dogs were a particular concern to farmers because of their tendency to prey on livestock, especially sheep. The Committee heard from a number of farmers in north-east Victoria and Gippsland about problems with wild dogs. Some considered that the problem with dogs was becoming worse:

In recent times (the last five years) I have trapped and destroyed 5 wild dogs. These dogs are coming out of the bush about four or five kilometres to kill sheep. In my forty years of hunting this is new. Wild dogs don't normally come out of wooded areas more than one kilometre. The dog population is at an unsustainable level ...¹³⁸

Today's dogs are bigger and stronger and more intelligent and fearless than they have been before. This intelligence makes them more elusive. They maul and torture and leave animals alive while they move on to another. They can wipe out a whole flock of sheep when they only need food for a few.¹³⁹

Foxes were also identified as a problem. The Victorian Government has stated:

The principal economic impact of foxes mainly involves newborn lambs. Study conclusions have ranged from the causes of lamb loss due to foxes being insignificant on a State or national level, through to foxes taking from 10-30% of lambs in some areas.¹⁴⁰

A particular problem with foxes and wild dogs is a behaviour referred to as 'surplus killing', in which foxes and dogs kill more animals than they can eat. This increases the impact of attacks from these animals on farm livestock.¹⁴¹

The Committee heard of farmers who had been forced to switch from sheep farming to other, less productive uses of the land because of predation by wild dogs:

I can assure you that there are farmers that I know in East Gippsland who have gone out of sheep altogether, and they used to run two and three thousand mob of sheep. They have just given it away because they would lose them.¹⁴²

... [wild dog problems] often ... force the farmer out of what would otherwise be the most productive form of enterprise. At the moment that is the sheep industry. So there are farmers who have gone out of sheep and into cropping, for example, which is more marginal in those areas.¹⁴³

The Committee was also told that the threat of predators such as wild dogs on farms could cause a significant amount of stress:

¹³⁸ Brendan Mahoney, *Submission 108*, p.1

¹³⁹ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.3

¹⁴⁰ Department of Economic Development, Jobs, Transport and Resources, *Fox Control in Victoria: Code of Practice* (2016), p.13 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 13)

¹⁴¹ Tim Bloomfield, *Submission 175*, p.4; WoolProducers Australia, *National Wild Dog Action Plan* (2014), p.13

¹⁴² Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.3

¹⁴³ Gerry Leach, Chair, Land Management Committee, Victorian Farmers Federation, *Public Hearing*, 10 October 2016, p.4

The psychological affect/cost was high in all my time farming sheep it was the most harrowing time being on guard 24/7 at any disturbance, plus the frustration of having to deal with departmental protocol plus trying to comply with a rabbit compliance program at the same time nearly push us over the edge.¹⁴⁴

There was a fellow in Swifts Creek last week. He went out and found 42 [sheep] maimed, wounded, injured. He had to put them down — and the farmers are waking up to that every day. So if you have got sheep or goats or anything like that, you are waking up to that every day, and it is bound to get to you in the end.¹⁴⁵

One study of farmers experiencing wild dog attacks found that nearly 70 per cent of farmers felt distressed and anxious after attacks, with significant levels of trauma experienced by farmers suffering prolonged attacks.¹⁴⁶

2.6.2 Consumption of pasture and crops

Deer also cause problems for farmers by entering farms from Crown land to eat pasture that was intended for livestock or to eat crops.

The Harrietville Community Forum described the impact of deer on farms in the Harrietville area:

... deer continue to compete for grass, take out crops and impact on fencing. One farmer in our local area has to stay with his cattle after feeding out hay to ensure they get it and not the deer that readily will come and compete with the cattle for it. This impact goes across a range of agricultural industries, damage to chestnut trees and reduction of chestnut harvest is one example. Another local case concerns a local grower of advance trees, deer constantly causing damage and loss through grazing and rubbing young trees. The Local Trout Farm had to totally fence its large property to prevent deer entering causing damage to ponds and each time it rains they have problems with highly silted inflows. This is a small example of the 10,000's of dollars been lost each year because of deer.¹⁴⁷

Mr James Findlay, a sheep farmer with Crown land on three sides of his property, explained:

If I rest a paddock, it just gets grazed by the deer. If I sow a paddock to improved pasture, the deer graze it before it gets my stock get to. This all leads to a loss of productivity in my ability to farm. One adult deer must be the equivalent of at least 3 to 4 Sheep. So if I am seeing 20-30 deer that's 100-120 sheep I'm not able to feed.¹⁴⁸

Graham's Factree, a wholesale nursey business in Hoddles Creek, described the problems it has experienced as a result of deer:

¹⁴⁴ Harvey Benton, *Submission 109*, p.2

¹⁴⁵ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.4

¹⁴⁶ WoolProducers Australia, *National Wild Dog Action Plan* (2014), p.20; see also Santhi Wicks, Kasia Mazur, Patricia Please, Saan Ecker & Benjamin Buetre, *An Integrated Assessment of the Impact of Wild Dogs in Australia*, Australian Bureau of Agricultural and Resource Economics and Sciences Research Report No. 14.4 (2014), pp.54-5

¹⁴⁷ Harrietville Community Forum, *Submission 204*, p.2

¹⁴⁸ James Findlay, *Submission 14*, p.1

For several years, we have been experiencing extensive damage to our nursery production stocks and to our orchard trees / fruit from invasive animals that enter our production properties from Crown land. Predominantly, this is in the form of wild deer invasion. We have seen this problem dramatically increasing over recent years to the stage where we now consider that the populations of deer are reaching plague proportions.¹⁴⁹

The company explained the consequences of its deer problems:

The damage that these wild deer are inflicting on our production stocks and orchard is substantial and they have the ability to essentially devastate and destroy large sections of crop. As a result, we are incurring substantial losses to valuable and important production crops as well as this damage adversely impacting on other aspects of our business.

The damage to current production crops also causes severe impacts to our commercial orchard customers who are relying on the supply of specifically ordered cultivars from the nursery. The very nature of the product that we produce and supply, where it can take several years to get a cultivar to its final stage of maturity ready for supply to a commercial orchardist, means that when such important and specific cultivars are suddenly destroyed by invasive deer that this presents a substantial delay for the nursery to start this growing process over to regrow such damaged and destroyed cultivars. As you will appreciate, such impacts from the destruction caused by the wild deer causes severe financial and operational issues to the commercial orchardist, not to mention the customer relations aspect of our business when cultivars that a grower has ordered and prepared ground for are suddenly wiped out by such invasive deer.¹⁵⁰

2.6.3 Damage to fences

The Committee received a considerable number of submissions from farmers, mostly in the north-east of Victoria and Gippsland, about the damage to fences caused by deer. For example, Mr Stuart Stagg explained, 'Deer wreck fences by crashing through them or twisting wires off with their antlers, constant maintenance and repairs are required.'¹⁵¹

The Peri Urban Group of Rural Councils stated:

The deer are causing economic hardship to private landowners who are faced with repeated expense to revegetate and re-fence, which is not a deterrent to deer. Deer proof fencing is very expensive and not economically viable at the scale required to mitigate the impacts of the deer.¹⁵²

The costs and limitations of fences are discussed further in Section 7.6.1 of this report.

¹⁴⁹ Graham's Factree, *Submission 34*, p.1

¹⁵⁰ Graham's Factree, *Submission 34*, p.2

¹⁵¹ Stuart Stagg, *Submission 186*, p.1

¹⁵² Peri Urban Group of Rural Councils, *Submission 149*, p.3

BOX 2.1: Site visit – Harry and Sue Ryder’s farm

The Committee was invited to the beef cattle farm of Mr Harry and Mrs Sue Ryder, in the north-east of Victoria. The property shares a boundary of approximately eight kilometres with the Alpine National Park and State Forrest. Mr Ryder told the Committee that deer first arrived in the district around 30 years ago and that their numbers have been increasing since then. Mr Ryder took the Committee members to his boundary fencing to show them the damage caused by deer. The Committee saw how deer push under the fence and enter his paddocks from the adjoining Crown land to graze.

Mr Ryder told the Committee that deer compete for pasture with his cattle. The deer come at night during the winter months to graze. He estimated deer were taking the equivalent amount of pasture as 36 head of cattle. To pay for a similar amount of pasture would cost approximately \$10,000 per year. Mr Ryder said that the cost of labour and materials to control the deer was significant and increasing each year.

The Committee is grateful to Harry and Sue for taking the time to show the Committee their property.



The Committee inspects damage caused by deer to a fence at Harry and Sue Ryder’s farm

2.6.4 Disease

A number of submitters and witnesses expressed concern about the risk of invasive animals spreading diseases (particularly foot-and-mouth disease) to livestock in the event of an outbreak.¹⁵³

Feral animals also represent a major disease risk to domestic livestock. Many of the significant diseases that affect domestic livestock also affect feral herbivores e.g. TB, foot and mouth disease, etc. In the event of a major livestock disease outbreak in Australia, the presence of a potential reservoir for the disease in feral herbivores would make eradication of the disease exponentially more difficult and costly.¹⁵⁴

If you get a pretty major infectious disease outbreak in the deer population that is transmissible between cows and sheep, how is that going to affect our agricultural industry? If you had been to England when foot-and-mouth was on — it is disastrous, it really is.¹⁵⁵

Feral pigs are known to be vectors for a number of serious endemic and exotic diseases that have the potential to devastate commercial pig operations, as well as transmit to other animals and humans. Examples include foot and mouth disease virus, leptospirosis, brucellosis, meloidosis and Japanese encephalitis.¹⁵⁶

Feral goats are known to be susceptible to several diseases of livestock including Ovine Johne's Disease, foot-and-mouth, rinderpest, rabies and blue tongue. Unchecked wild herds could potentially play a major role in the spread of disease and act as a reservoir for these and other livestock diseases if diseases are introduced into Australia.¹⁵⁷

The potential direct cost of a foot-and-mouth disease outbreak in Australia has been estimated at between \$5.6 billion and \$52.2 billion over 10 years.¹⁵⁸

The current inability to control invasive animals would make it difficult to contain any disease which is carried by invasive animals once an outbreak occurs.

2.6.5 Costs of invasive animals to farmers

The joint submission from government bodies stated, 'The cost of managing invasive animals on farms [in Victoria] is estimated at \$12,198 per 1000 hectares. Feral cats, rabbits and feral pigs each cost the nation over \$100 million per year.'¹⁵⁹

¹⁵³ See also discussion of the published literature in relation to deer in Naomi E. Davis, Ami Bennett, David M. Forsyth, David M.J.S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), p.523

¹⁵⁴ Euan Moore, *Submission 203*, p.3

¹⁵⁵ James Findlay, *Public Hearing*, 20 October 2016, p.4

¹⁵⁶ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 16, p.1

¹⁵⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 16, p.2

¹⁵⁸ Benjamin Buetre, Santhi Wicks, Heleen Kruger, Niki Millist, Alasebu Yainshet, Graeme Garner, Alixaandrea Duncan, Ali Abdalla, Charlene Trestrail, Marco Hatt, Lyndal-Joy Thompson & Michael Symes, *Potential Socio-Economic Impacts of an Outbreak of Foot-and-Mouth Disease in Australia*, Australian Bureau of Agricultural and Resource Economics, Research Report 13.11 (2013), pp.ix, 25

¹⁵⁹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.5

In 2009, the Invasive Animals Cooperative Research Centre estimated the impact on agriculture across Australia from foxes, rabbits, wild dogs and feral pigs, plus the impact of birds on horticulture and mice on grain. The loss to agriculture from these species was estimated at \$620.8 million per year, with an additional \$122.7 million spent on management, administration and research by governments and landholders.¹⁶⁰ The Committee notes that the losses from deer were not included in those figures.

A number of farmers provided the Committee with estimates of the financial costs they incur from invasive animals. One source of loss is the animals killed by wild dogs or foxes:

We have just had our first wild dog activity and it has had a severe impact on our livelihood ... Our lambing percentage is usually around 100%. This year all mobs had a lambing percentages of around 100% except for the three mobs whose paddock backs onto bush, these had percentages of 45, 65 and 70%. In effect, this means we will have about 240 less lambs to sell this season. At the moment we could expect those lambs to sell for \$120 per head, hence our gross income has been reduced by \$28,000 this financial year.¹⁶¹

The cost financially to us is hard to put figure on we lost 8 sheep in total @ \$100 but including neighbours the tally is about 120 head that was over a 10 month period, you have to add loss of production to the balance of the flock being continually disturbed.¹⁶²

Mr James Findlay, a farmer in the King Valley, estimated the losses on his farm based on the reduced number of sheep he can support due to deer eating the pasture:

I started looking at economic impacts. These are my assumptions. This is me sitting down, working it out and going, 'Righto, what does one deer cost me?'. It is somewhere around \$300 to \$400 per deer. If I have 20 to 50 deer, I am looking at a loss of \$6000 to \$19 000 per year in competition with those deer.¹⁶³

Other farmers also noted the amount of time spent controlling invasive animals which might otherwise be spent on other productive activities:

The last dog I caught cost me 28 days trapping, 3 hours a day @ \$90/hr = \$7,560.00 and 28 lambs @ \$120.00=\$3360.00 for a total of \$10,920.00 Where do I send my invoice to?¹⁶⁴

... it is not uncommon to get 12 [deer] or more a night using a spotlight. This costs money and time, returning home at 3 in the morning after hunting deer all night limits the amount of work which can be done the following day.¹⁶⁵

¹⁶⁰ Invasive Animals Cooperative Research Centre, *The Economic Impacts of Vertebrate Pests in Australia*, report prepared by Wendy Gong, Jack Sinden, Mike Braysher & Randall Jones (2009), pp.1-2; noted by Firearm Owners United, *Submission 146*, p.3; Peri Urban Group of Rural Councils, *Submission 149*, p.1; Victorian Farmers Federation, *Submission 184*, p.10

¹⁶¹ Name withheld, *Submission 174*, p.1

¹⁶² Harvey Benton, *Submission 109*, p.2

¹⁶³ James Findlay, *Public Hearing*, 20 October 2016, p.2; details of the calculation were provided in his presentation

¹⁶⁴ Brendan Mahoney, *Submission 108*, p.3

¹⁶⁵ Stuart Stagg, *Submission 186*, p.1

Overall, the Committee recognises that invasive animals are having a significant financial impact on farmers in some parts of Victoria. The potential gains to agricultural production from effective invasive animal control should be an important consideration for the government in developing invasive animal strategies.

FINDING 8: Public land managers are failing to control invasive species on public land. As a result, the animals are expanding onto private land, causing problems for private individuals. It can be time-consuming and costly for farmers to protect their land from invasive animals, particularly when they are not controlled on neighbouring public land.

2.7 Other impacts of invasive animals

Along with the environmental and agricultural costs of invasive animals, the Committee heard about several broader community impacts.

2.7.1 Vehicle accidents

A number of submissions noted the threat of vehicles hitting deer on roads at night. Mr John Atkins of the Harrietville Community Forum said:

By the danger they now present to motorists and motor cyclists on our roads. It is now dangerous to travel the Great Alpine Road at night. Most locals will try and avoid night travel or travel at 80 KPH or less to give more time to avoid an accident. However tourists are seemingly unaware despite the signs and vehicle impacts and dead or injured deer are a regular occurrence between Harrietville and Bright. Various counts of deer along or adjacent to the road has been attempted by locals using torches one person counted 71 from Freeburgh to Harrietville. Multiple sightings are common at night and occasionally during the day.¹⁶⁶

Mr Steven Tucker of the Alpine Shire Council told the Committee that the increase in accidents had been noticed by the Council: ‘This year alone a local smash repair business is reporting a marked increase in the number of vehicles presenting following deer strike. Largely local vehicles, roughly 50 per cent, have sustained damage to warrant them being written off.’¹⁶⁷ He also told the Committee that during the peak season in winter, on average approximately one vehicle a week with deer strike damage presented to one smash repair business in Bright.¹⁶⁸

The Committee heard similar stories in Gippsland:

The incidents of vehicle accidents with sambar [deer] are increasing. This is being exacerbated by Government policy of clearing the verges of the Princes Highway east of Bairnsdale and the clearing of major forestry roads to assist with fire fighting and dangerous tree removal. The opening up of these corridors is increasing the presence of herbivores such as wallaby, wombat and sambar deer, with Wild Dog Controllers

¹⁶⁶ Harrietville Community Forum, *Submission 204*, p.2

¹⁶⁷ Steven Tucker, Project Officer, Environment, Alpine Shire Council, *Public Hearing*, 19 October 2016, p.2

¹⁶⁸ Steven Tucker, Project Officer, Environment, Alpine Shire Council, *Public Hearing*, 19 October 2016, p.5

even reporting a change in behaviour of wild dog movement through these corridors. There are residents of East Gippsland who have now had more than one car written off by insurance assessors due to a collision with sambar. These incidents will increase. The chances of a person being killed by a collision with a large herbivore weighing up to 300kg is very real, and Government policy is increasing this danger and threat, which is far greater than being killed by a fallen tree.¹⁶⁹

The RACV received 76 insurance claims for deer accidents in 2015-16 and 89 in 2014-15.¹⁷⁰ The RACV claims it paid more than \$24 million to members involved in more than 5,300 animal collisions in 2015-16 (with the average cost of claims up 2.1 per cent compared to the previous year).¹⁷¹ The Committee notes that the RACV has tried to raise awareness of the risk of collisions with deer (and other animals) and to educate drivers about how to avoid them.¹⁷² The RACV, in partnership with Wildlife Victoria, delivers the 'RACV Wild Bytes – Stories from Your Backyard' event aimed at providing education on driver safety in highly populated wildlife areas. The RACV also provides advice through the media and its own publications on how to avoid collisions with wildlife and what to do if one occurs.¹⁷³

2.7.2 Personal safety

Another concern reported to the Committee was the risk of wild dogs attacking people. Some submitters described incidents they had experienced:

I had an encounter with a group of 3 of them [wild dogs] whilst camped at the bottom of the Zekka Spur track on the Wonnangatta River in the Wonnangatta Valley. I was there to hunt deer and had I not had the appropriate tool on hand to ward them off, it may have been a different outcome.¹⁷⁴

Some years ago the Border Mail newspaper reported with a main story about one particular experience I had with three “dingo looking” wild dogs. Whilst out hunting deer on my own – my gun dogs stayed at home this day – they attacked me one after the other and I shot them at close range of some five to ten metres one after the other as they attacked.¹⁷⁵

Concerns about these sorts of encounters can deter people from travelling to areas with wild dogs. Ms Cathy Roberts told the Committee that, after discovering wild dogs near her property, 'I have four Grandchildren under the age of 7 and we cannot enjoy our area, we once went fishing and bushwalking however [now we] fear for our safety.'¹⁷⁶ Concerns about wild dogs attacking tourists and farm workers were also noted in a survey of eastern Victoria.¹⁷⁷

¹⁶⁹ Gippsland Environment Group, *Submission 172*, p.2

¹⁷⁰ RACV, 'Risk of Animal Collisions Increases Warns RACV' (media release), 1 September 2016, noted by Anthony Carrol, *Public Hearing*, 19 October 2016, p.10

¹⁷¹ Anastasia Karalis, Corporate Communications, RACV, correspondence received 3 May 2017

¹⁷² RACV, 'Risk of Animal Collisions Increases Warns RACV' (media release), 1 September 2016

¹⁷³ Anastasia Karalis, Corporate Communications, RACV, correspondence received 3 May 2017

¹⁷⁴ John Dol, *Submission 93*, p.1

¹⁷⁵ Dennis Keith, *Submission 11*, Attachment 1, p.5

¹⁷⁶ Cathy Roberts, *Submission 20*, p.2

¹⁷⁷ Santhi Wicks, Kasia Mazur, Patricia Please, Saan Ecker & Benjamin Buetre, *An Integrated Assessment of the Impact of Wild Dogs in Australia*, Australian Bureau of Agricultural and Resource Economics and Sciences Research Report No. 14.4 (2014), p.21

Wild dogs have also been known to attack and kill domestic dogs.¹⁷⁸

2.7.3 Impacts on urban environments

The Committee also heard from a number of people about deer damaging private property (especially gardens) within urban areas. In Harrietteville, which is surrounded by Crown land with significant deer populations:

Many beautiful old gardens have been decimated by deer over the last few years, and each year the pressure is growing as deer numbers increase. Various methods of control are often ineffective as deer readily become used to lights, noises etc. Some have gone to the trouble of placing wire around at risk trees and shrubs. The use of electric fencing can give some benefit but deer will push through if pressured. It's not practical or desirable that each house or large block construct their own deer fence. Apart from cost, the look is terrible and the psychological impact of coming to live a rural environment and then build high fences is counterproductive and simply would not be the look as a community we want.¹⁷⁹

The Peri Urban Group of Rural Councils raised concerns about foxes in urban areas, stating, 'Foxes have continued to adapt to urban areas, and encroach into urban townships to kill domestic animals and juvenile stock (lambs). Crown and Council reserves often provide refuge for foxes.'¹⁸⁰

2.7.4 Impacts on tourism

The health of Victoria's natural environment is also important to the tourism industry. Approximately 42 per cent of international overnight visitors to Victoria in 2013-14 visited a national park or state park.¹⁸¹ Tourist visits to Victoria's parks have been estimated to add \$1 billion (gross value added) to Victoria's economy and to support 14,000 jobs.¹⁸² In Victoria's High Country, where the sambar deer population is concentrated, tourism accounted for 7.8 per cent of the economy in 2013-14.¹⁸³

The Committee was told that the environmental damage caused by the sambar deer in this region was a threat to the tourism sector. Mr Steven Tucker from Alpine Shire told the Committee:

The shire is a drawcard for thousands of visitors who undertake annual active and passive recreational pursuits. Tourism is our key economy and attracts over 1 million annual visitors.

¹⁷⁸ Jarrard Potter, 'Wild Dogs Attack. Resident Warns a Child Could Be Next', *The Daily Examiner*, 14 March 2016, noted by Field & Game Australia, *Submission 207*, p.5

¹⁷⁹ Harrietteville Community Forum, *Submission 204*, pp.2-3

¹⁸⁰ Peri Urban Group of Rural Councils, *Submission 149*, p.3

¹⁸¹ Committee calculation based on Tourism Victoria, *Nature-based Tourism Market Profile Year Ending June 2014* (2014), pp.1-3

¹⁸² Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.5

¹⁸³ Tourism Victoria, *Value of Tourism to Victoria's High Country 2013-14* (2014), p.2

The control of deer is a key management problem impacting both residents and tourists alike.¹⁸⁴

Similarly, Mr John Atkins from the Harrietville Community Forum told the Committee that sambar deer are a threat to the area's pristine image:

Harrietville is a nature-based tourism destination, and most of our town income comes from that source. Deer are hurting our pristine brand and image. Deer are degrading our local waterways and gullies with heavy wallowing, local walking tracks are being eroded from heavy deer traffic and deer shooters sometimes leave dead animals near the walking tracks and along rivers.¹⁸⁵

FINDING 9: Invasive animals in Victoria cause road accidents, threaten the personal safety of people in bush areas, cause damage to urban environments and risk damage to Victoria's tourism industry.

184 Steven Tucker, Project Officer, Environment, Alpine Shire Council, *Public Hearing*, 19 October 2016, p.2

185 John Atkins, President, Harrietville Community Forum, *Public Hearing*, 19 October 2016, p.3

3

Current approaches to invasive animal control in Victoria

3.1

Introduction

Invasive animal management in Victoria is undertaken by a broad range of stakeholders, including private landowners, recreational hunters, professional pest controllers, government, community organisations and Landcare groups. Invasive animal management is governed by multiple sources of policy, legislation and regulation. All three levels of government are involved, with sometimes overlapping policies and responsibilities.

The current Victorian legislative framework for invasive species management is convoluted and confusing. There are multiple sources of regulation relating to land management, invasive species management (including control methods available) and wildlife and game management. The joint submission from government bodies to this inquiry provides an overview of the various pieces of legislation and what role they play in invasive animal control in Victoria.¹⁸⁶

Figure 3.1 below, developed by the government as part of a paper on Invasive Plant and Animal Conventions, Agreements, Legislation, Strategies and Policies, shows the relationship between the different pieces of Victorian legislation and how they addition to this, Commonwealth legislation and intergovernmental agreements also impact on the management of invasive plants and animals.¹⁸⁷

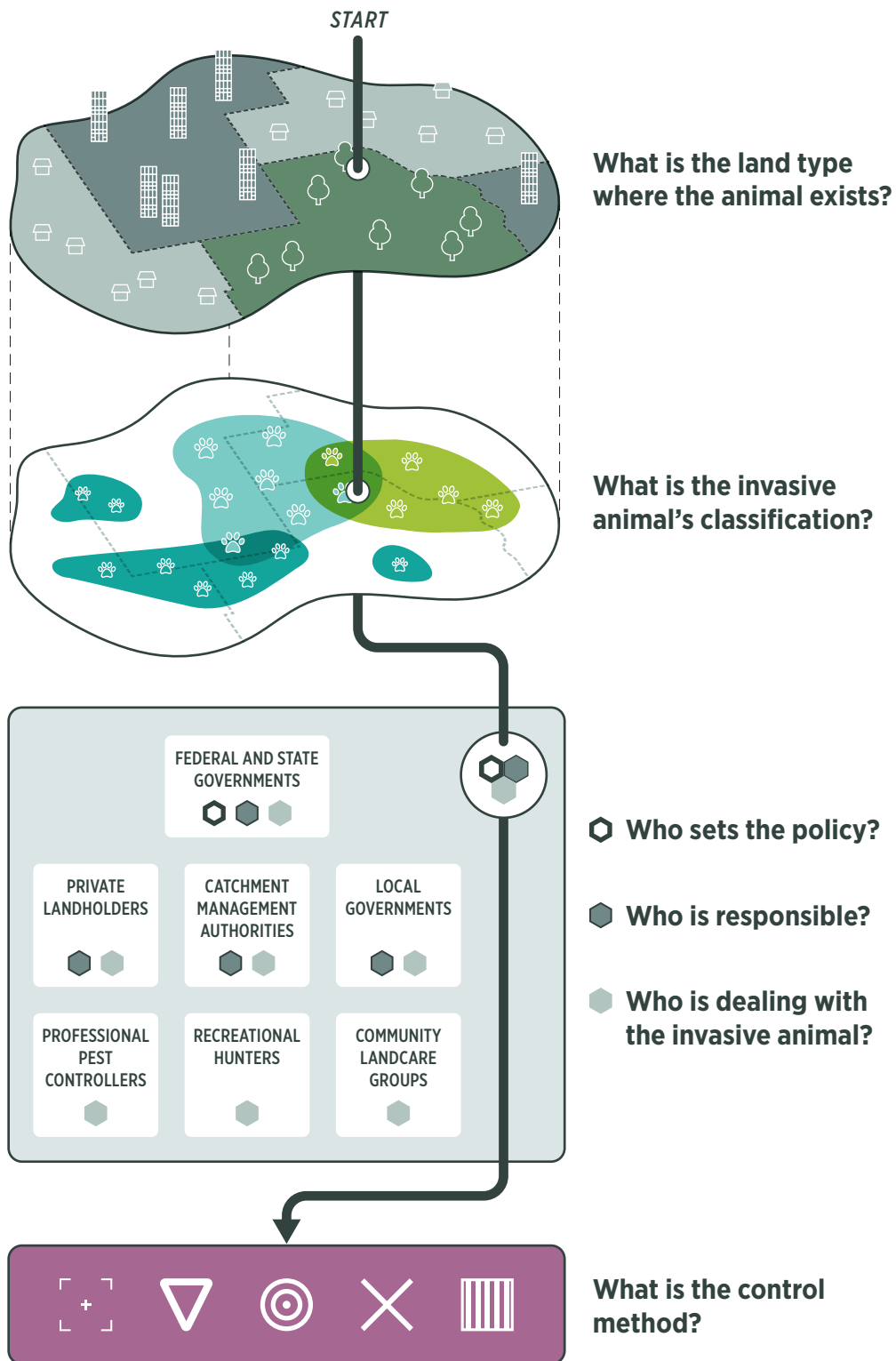
The extent to which a person or entity is obliged by law to do something about invasive animals and the control options available to them vary depending on the interaction of these factors:

- who you are – individuals, departments, organisations or authorities undertaking management and control work
- the land type – the category of land on which management and control work is required
- how the species has been classified in legislation – for instance as pests, wildlife or domestic animals.

¹⁸⁶ See Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, pp.7-8 and Attachment 4 (Department of Primary Industries, *Background Paper: Summary of Relevant Invasive Plant and Animal Conventions, Agreements, Legislation, Strategies and Policies* (n.d.)); Attachment 5, Attachment 8 and Attachment 9

¹⁸⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.7

Figure 3.2 Relationship between land manager, land type and species classification in relation to invasive species management



Source: Environment, Natural Resources and Regional Development Committee

Sections 3.2 to 3.4 of this chapter explain the different categories within each of these three variables. Sections 3.5 to 3.8 explore how these categories interact to determine permitted control methods, who is responsible, who makes policy and what is currently being done in Victoria.

3.2 Who you are

Responsibility for invasive species control in Victoria is distributed between a number of government bodies, non-government organisations and individuals. The Victorian Auditor-General examined this division in 2010 and found that ‘Unnecessarily complicated governance arrangements have hindered coordination and control of invasive species’.¹⁸⁸ Figure 3.3 outlines the division of responsibilities in relation to invasive species at the time of that report.

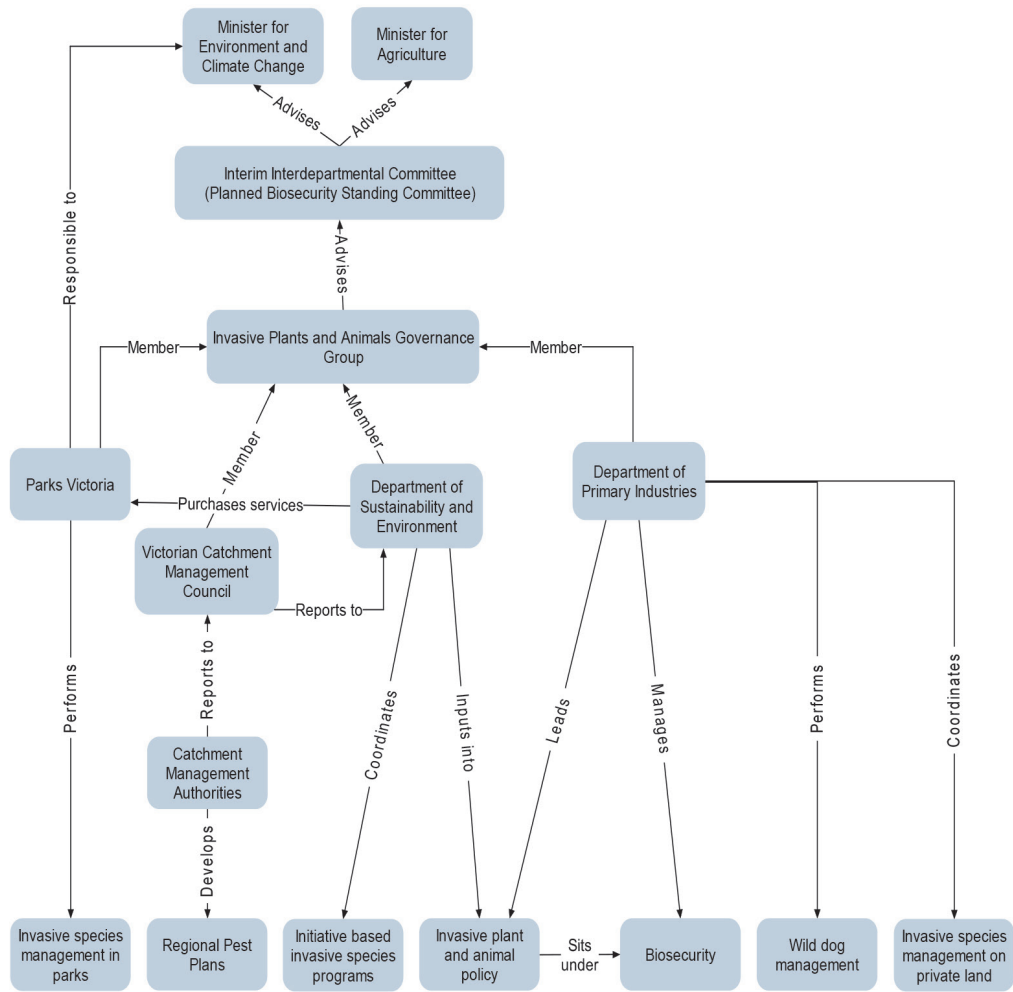
A number of machinery-of-government changes have occurred since then (such as the creation of the Department of Environment, Land, Water and Planning, the Department of Economic Development, Jobs, Transport and Resources and the Game Management Authority). However, the complex division of powers and responsibilities remains. A number of submitters and witnesses informed the Committee that some of the problems identified by the Auditor-General continue to be issues (see Section 10.3.1 of this report).

The following all have a role in the control of invasive species in Victoria:

- Department of Economic Development, Jobs, Transport and Resources
- Department of Environment, Land, Water and Planning
- Parks Victoria
- Game Management Authority
- private landowners
- catchment management authorities
- local government
- landcare and community groups
- professional pest controllers
- recreational hunters.

188 Victorian Auditor-General's Office, *Control of Invasive Plants and Animals in Victoria's Parks* (2010), p.8

Figure 3.3 Governance arrangements for invasive species in Victoria in 2010



Source: Victorian Auditor-General's Office, *Control of Invasive Plants and Animals in Victoria's Parks* (2010), p.9

3.3 Land type

Victoria covers 22.8 million hectares of land. Approximately 37 per cent of Victoria is public land and 63 per cent is private land (including leased and licenced Crown land).¹⁸⁹ There are approximately 66,000 kilometres of interface between Crown and private land in Victoria.¹⁹⁰

The responsibility for invasive species control changes depending on land ownership and land category.

¹⁸⁹ Victorian Environmental Assessment Council, *Statewide Assessment of Public Land Discussion Paper* (2016), p.16

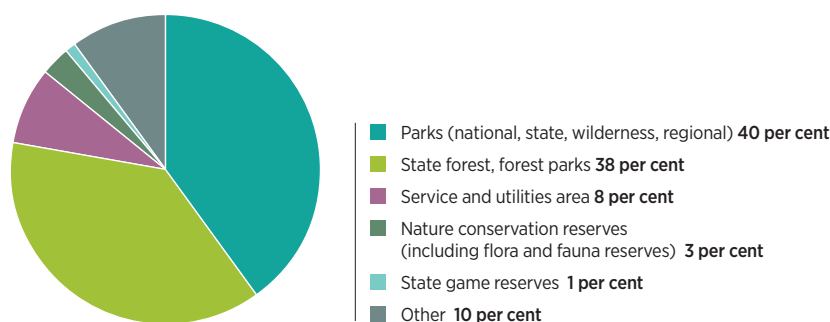
¹⁹⁰ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.1

There are several land tenure categories in Victoria. In addition to private land, public land is divided into a number of categories, including:

- national, state, coastal, wilderness and regional parks
- state forests and forest parks
- state game reserves
- services and utilities areas (including road reserves)
- Melbourne water catchment areas
- flora and fauna reserves and nature conservation reserves
- alpine resorts.¹⁹¹

Figure 3.4 outlines the proportion of public land covered by different categories.

Figure 3.4 Proportions of Victoria's public land broken down by category



Sources: Committee calculations based on Victorian Environmental Assessment Council, *Statewide Assessment of Public Land Discussion Paper* (2016), p.17; Game Management Authority, *An Audit of Victoria's State Game Reserves* (2016), p.35; Mark Winfield, Senior Project Manager, Victorian Environmental Assessment Council, correspondence received 12 April 2017

3.4 Species classification

There are various species classifications in Victoria. Each carries different rules and regulations around the animals' treatment, protection and management. Some species can have multiple classifications. For instance, deer are categorised as wildlife, classified as game for the purposes of hunting (but are not declared game for the purposes of food consumption under the *Meat Industry Act 1993*) and are considered an invasive species due to their abundance and the level of damage they cause.

Government policy refers to 'invasive species', but Victorian legislation does not categorise animals as 'invasive'. As outlined in Chapters 1 and 2 of this report, an invasive species is 'a species occurring beyond its accepted normal distribution and which threatens valued environmental, agricultural or other social resources

¹⁹¹ Victorian Environmental Assessment Council, *Statewide Assessment of Public Land Fact Sheet* <veac.vic.gov.au/documents/VEAC-SAPL_Factsheet_masthead%20template%20FINAL.pdf>, viewed 22 March 2017

by the damage it causes.¹⁹² The eight invasive species considered in this inquiry (see Section 2.3 of this report) are classified as pest animals, wildlife or domestic animals.

3.4.1 Pest animals

The *Catchment and Land Protection Act 1994* is the main legislation covering pest animal management in Victoria. Animals are declared as pest animals by order, published in the Government Gazette.¹⁹³

Pest animals are classified by the extent to which they have established themselves in the wild and the threat they pose. A declaration can be made in one of four categories:

- prohibited pest animals
 - controlled pest animals
 - regulated pest animals
 - established pest animals.¹⁹⁴
- } collectively defined as ‘restricted pest animals’

Restricted pest animals

Restricted pest animals (the collective term for prohibited, controlled and regulated pest species) are animals that were not established in the wild in Australia prior to European settlement and which are a threat (or potential threat) to primary production, Crown land, the environment or community health in Victoria.¹⁹⁵

It is illegal to own, sell or import prohibited pest animals without a permit.¹⁹⁶ These include a number of farm animals, such as cattle, sheep and horses (which require a permit to keep, breed or trade).¹⁹⁷

Controlled pest animals may be kept in Victoria but only in approved high security collections.¹⁹⁸ These include many non-native animals kept in zoo or animal sanctuary collections, such as giraffes, red pandas, lions, tigers and various turtles and tortoises.

¹⁹² Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.2

¹⁹³ *Catchment and Land Protection Act 1994*, s.58

¹⁹⁴ *Catchment and Land Protection Act 1994*, ss.64-7

¹⁹⁵ *Catchment and Land Protection Act 1994*, ss.64-7

¹⁹⁶ *Catchment and Land Protection Act 1994*, s.64(c)

¹⁹⁷ Victoria Government Gazette, No. S 399, *Declaration of Certain Animals to Be Prohibited Pest Animals, Controlled Pest Animals, Regulated Pest Animals or Established Pest Animals*, 1 October 2010, Schedule 1

¹⁹⁸ *Catchment and Land Protection Act 1994*, s.65(c)

Regulated pest animals may be kept in approved collections or premises which do not need high security.¹⁹⁹ These include the American bison, water buffalo and blackbuck antelope.²⁰⁰

Established pest animals

Established pest animals are those which are already established in the wild in Victoria. However, due to the harm they do, efforts should be made to prevent their spread or to eradicate them.²⁰¹

The established pest animals in Victoria are the European hares, European rabbits, red foxes and feral or wild goats, pigs, dogs and dingo-dog hybrids.²⁰²

Deer and feral cats are not classified as pest animals in Victoria.

3.4.2 Wildlife

Wildlife in Victoria are defined under the *Wildlife Act 1975* as ‘Any animal of a vertebrate taxon other than mankind which is indigenous to the whole or part or parts of Australia or its territories or territorial waters, whether or not it occurs elsewhere’.²⁰³

All wildlife are classified as protected wildlife under the Act (unless they have been classified as a pest animal or declared unprotected). It is illegal to disturb or destroy wildlife without approval (for example, by obtaining an Authority to Control Wildlife from the Department of Environment, Land, Water and Planning).

As well as native animals, the Wildlife Act also lists a small number of introduced species (deer, non-indigenous quail, pheasants and partridges) that are considered wildlife and given the same protection as native animals.²⁰⁴

Under the Wildlife Act, the Governor in Council may declare protected wildlife as unprotected.²⁰⁵ In 2013, ‘in response to the community concern about the impact of deer on private land’, some species of deer²⁰⁶ were declared unprotected on private property.²⁰⁷

¹⁹⁹ *Catchment and Land Protection Act 1994*, s.66(c)

²⁰⁰ Victoria Government Gazette, No. S 399, *Declaration of Certain Animals to Be Prohibited Pest Animals, Controlled Pest Animals, Regulated Pest Animals or Established Pest Animals*, 1 October 2010, Schedule 3

²⁰¹ *Catchment and Land Protection Act 1994*, s.67

²⁰² Victoria Government Gazette, No. S 399, *Declaration of Certain Animals to Be Prohibited Pest Animals, Controlled Pest Animals, Regulated Pest Animals or Established Pest Animals*, 1 October 2010, Schedule 4A – 4B

²⁰³ *Wildlife Act 1975*, s.3(1)(a)

²⁰⁴ *Wildlife Act 1975*, s.3(1)(b)

²⁰⁵ *Wildlife Act 1975*, s.7A

²⁰⁶ These species are chital, red (including Wapiti), sika, fallow, rusa and sambar deer and sika deer-red deer hybrids.

²⁰⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.13

The Wildlife Act provides for a species to be declared a game animal for the purposes of recreational hunting.²⁰⁸ Chital, hog, fallow, red, rusa and sambar deer, as well as quail, pheasants, partridges and some species of ducks have been declared game animals in Victoria.²⁰⁹ This categorisation allows for hunting at certain times and places (see Section 4.2 of this report). Deer are protected wildlife on public land except where game hunting is permitted or where an authority to control wildlife has been issued.

Due to these classifications, when conducting co-ordinated deer control programs (outlined in Section 6.5 of this report), Parks Victoria is required to obtain an authority to destroy wildlife (or an authority to destroy game in areas where hunting is permitted) from the Department of Environment, Land, Water and Planning or the Game Management Authority.

3.4.3 Domestic animals

Cats (even those living in the wild) are not categorised as a pest or wildlife. Their management is prescribed under the *Domestic Animals Act 1994* and *Wildlife Act 1975*, which do not differentiate feral cats from pet cats. Dogs are covered by the same or similar provisions, but an order of the Governor in Council has declared dogs to be ‘established pest animals’ if they are feral or wild.²¹⁰ The same has not been done for cats.

3.5 Invasive species control methods

Chapter 6 of this report outlines the use of shooting (by recreational hunters and paid professional shooters) as a means of invasive animal management. Other control methods that are available for invasive animal management, including trapping, baiting, biological control, warren destruction, harbour destruction, fencing and deterrents, are outlined in Chapter 7 of this report.

Any management technique utilised must be carried out in accordance with the provisions of legislation relating to animal protection and humane treatment of animals, including the *Prevention of Cruelty to Animals Act 1986* and the *Agricultural and Veterinary Chemicals (Control of Use) Act 1992*.

Whether or not a person is permitted to use a method will depend on the three categories described above – who they are, the type of land they are implementing the control on and the classification of the invasive animal.

²⁰⁸ *Wildlife Act 1975*, s.3(1)

²⁰⁹ Victoria Government Gazette, No. 4, 26 January 1977, p.195

²¹⁰ Victoria Government Gazette, No. S 399, *Declaration of Certain Animals to Be Prohibited Pest Animals, Controlled Pest Animals, Regulated Pest Animals or Established Pest Animals*, 1 October 2010, Schedule 4B

3.5.1 Trapping

Trapping can be used by private landowners and public land managers to control a variety of invasive animals (see Section 7.4.1 of this report). Restrictions apply to the land category and type of trap permitted to be used for certain animals.

For instance, the use of large leghold traps is permitted for foxes and wild dogs in certain areas (as specified by the Minister for Agriculture).²¹¹ Small leghold traps are permitted for rabbit control, but not on Crown land or in an urban area²¹² (unless consent is granted by the Minister for Agriculture or the land is mainly used for agriculture).²¹³

Confinement and net traps may be used on any land with the landowner's or manager's consent, provided they comply with the Prevention of Cruelty to Animals Regulations.²¹⁴

Private landowners may undertake trapping programs for wild dogs on their property. Trapping programs can also be undertaken on public land within a buffer zone of three kilometres from any private land boundary (in certain areas of the state) by:

- employees of the Department of Environment, Land, Water and Planning or Parks Victoria
- professional pest controllers contracted by government
- private landowners, as part of an organised government program.²¹⁵

Landowners are permitted to trap a cat that has trespassed on their property more than once (and then must alert the council for its removal).²¹⁶ In relation to public land, an authorised wildlife officer, under the Wildlife Act, may destroy a cat at large under certain circumstances (see Section 8.7 of this report). Otherwise they are required to capture and deliver the cat to the local council.

3.5.2 Baiting

The use of poison in the control of invasive species is discussed in Section 7.2 of this report. Baiting can be used by private landowners and public land managers to control rabbits, foxes, wild dogs and wild or feral pigs.

²¹¹ Prevention of Cruelty to Animals Regulations 2008, Regulations 28, 31

²¹² Under the Prevention of Cruelty to Animals Regulations 2008, an urban area means an area of land that is predominantly—
 (a) subdivided into allotments that, in the case of land used or to be used for residential purposes, are not larger than 0-4 hectares; and
 (b) able to be used or developed under a planning scheme or interim development order for residential, industrial or commercial purposes; and
 (c) provided with constructed streets and public utility services.

²¹³ Prevention of Cruelty to Animals Regulations 2008, Regulations 25, 27

²¹⁴ Prevention of Cruelty to Animals Regulations 2008, Regulations 33-40

²¹⁵ Victorian Government Gazette, No. S 399, 1 October 2010, pp.28-9; Victorian Government Gazette, No. G 39, 26 September 2013, p.2443

²¹⁶ *Domestic Animals Act 1994*, s.23

The most common poisons are 1080 (registered for use on foxes, wild dogs, rabbits and feral pigs) and PAPP (registered for use on foxes and wild dogs).

To purchase and use 1080 and PAPP products on land under their control, a person must have one of the following:

- an agricultural chemical users permit with a 1080 endorsement
- a commercial operators licence with a vermin destroyer endorsement
- a licence to use pesticides with an authorisation for the control of pest animals
- a pilot (chemical rating) licence and successful completion of the course in minimising risks in the use of 1080 pest animal bait products for vertebrate pest control.²¹⁷

Private landowners may undertake baiting programs for wild dogs on their property. The three-kilometre livestock protection buffer zone (outlined in Section 3.5.1 of this chapter in relation to trapping) also applies to baiting as well and permits the people outlined in that section to carry out baiting work on certain areas of Crown land.²¹⁸

Public land managers are able to use aerial baiting, but are only permitted to target the three-kilometre buffer zone.

3.5.3 Shooting

Shooting is another management option available for various invasive species. It is of particular importance for this inquiry, as the terms of reference specifically require the Committee to consider the use of community hunting organisations and individuals as a method of controlling invasive animals.

Whether or not shooting is allowed depends on the target species and land type. For example, hunting *pest* species is permitted on private property and on leased and licensed Crown land (with the landowner's or manager's consent), in state forests and forest parks and in sanctuaries (see Section 4.2.2 of this report). Hunting *game wildlife* species is permitted (by licenced game hunters) in different specified areas, including state forests, forest parks, state game reserves, private land (with permission) and in some areas of specified national parks during prescribed hunting seasons (see Chapter 4 of this report). Deer can also be shot by people without a game licence on private land (with permission of the landowner).

²¹⁷ Agriculture Victoria, *Information on 1080 and PAPP Pest Animal Bait Products* <agriculture.vic.gov.au/agriculture/farm-management/chemical-use/agricultural-chemical-use/bait-use-and-1080>, viewed 29 March 2017

²¹⁸ Victorian Government Gazette, No. S 399, 1 October 2010, pp.28-9; Victorian Government Gazette, No. G 39, 26 September 2013, p.2443

Spotlights can be used for pest species and deer on private property and on Crown land within 250 metres of the boundary between private and Crown land (by landowners, managers or people authorised by the landowner). In contrast, spotlights are not permitted on public land without specific authorisation (see further discussion in Sections 4.2.4 and 9.3.3 of this report).

Shooters may be given permission to hunt invasive species in other areas and to use normally restricted equipment when taking part in management programs co-ordinated by government bodies (see Chapter 6 of this report).

3.5.4 Other methods

Other management methods available to landowners and land managers include warren and harbour destruction for rabbits and foxes, den fumigation for foxes and mustering for goats and horses (see Sections 7.5 and 7.4.2 of this report).

Exclusion fencing and repellents can be utilised by anybody to protect assets from invasive animals. However, these methods are often impractical and expensive (see Section 7.6 of this report).

3.6 Who is responsible?

Depending on the land type and species classification, there are certain legislative responsibilities and requirements in relation to invasive species management. There is a complex relationship between government bodies, non-government organisations and individuals in relation to their responsibilities. Overlapping authorities and contingent circumstances can make roles, obligations and accountability unclear.

In relation to *restricted* pest species (that is, pest species which are not currently established in the wild), the Department of Economic Development, Jobs, Transport and Resources ‘must take all reasonable steps’ to control them on both public and private land.²¹⁹

For *established* pest species (including wild rabbits, foxes, goats, pigs and dogs), the legislation specifies that landowners are responsible.²²⁰ This means the following individuals and bodies are legally responsible to take all reasonable steps to prevent the spread of, and as far as possible eradicate, established pest animals (in relation to the specified land category):

219 *Catchment and Land Protection Act 1994*, s.21(1A)

220 *Catchment and Land Protection Act 1994*, s.67

- Department of Environment, Land, Water and Planning on Crown land²²¹
- Parks Victoria on parks and reserves estate²²²
- local councils on land that they manage (for instance, municipal roadsides)²²³
- private landowners on their property.²²⁴

While these individuals and bodies are responsible for invasive animal management, they may use others to undertake the actual animal control work. Professional pest controllers are employed by government bodies, private landholders and community groups to use a variety of methods to control invasive animals. Recreational hunters also volunteer their time to undertake shooting work on behalf of landowners or managers.

Under the Catchment and Land Protection Act, a 'directions notice' may be issued to a landowner (including a municipal council²²⁵), outlining measures to be taken on their land for the control and eradication of specific established pest animals.²²⁶ Failure to comply with a directions notice is considered an offence which can attract 20 penalty units (currently \$3,109.20).²²⁷ A land management notice may not be served on the Secretary of the Department of Environment, Land, Water and Planning.²²⁸

As feral cats are not classified as pests, local councils are responsible for their management in all areas.²²⁹ As deer are not classified as pests, there is no obligation for private landowners to control them (though the Department of Environment, Land, Water and Planning has an overall responsibility for protecting indigenous flora and fauna and controlling or exterminating exotic fauna in national and state parks²³⁰).

221 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.9; Several pieces of legislation invest this responsibility on the Secretary of the Department of Environment, Land, Water and Planning, including the *Forests Act 1958*, *Crown Land (Reserves) Act 1978* and *Conservation, Forests and Lands Act 1987*.

222 The Chief Executive Officer of Parks Victoria is the landowner responsible for any parks listed in Schedule 2 of the *National Parks Act 1975*.

223 Under section 22A of the *Catchment and Land Protection Act 1994*, local councils may be required by the Minister for Energy, Environment and Climate Change to prepare a 'roadside weed and pest animal management plan'; Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 9, p.2

224 *Catchment and Land Protection Act 1994*, s.20

225 A directions notice may only be served on a municipal council if an approved roadside weed and pest animal management plan is in operation in respect of the municipal district (which may be required by the Minister under section 22A of the *Catchment and Land Protection Act 1994*).

226 *Catchment and Land Protection Act 1994*, s.70B

227 *Catchment and Land Protection Act 1994*, s.70C

228 *Catchment and Land Protection Act 1994*, s.37(2)

229 This does not apply in areas with no local councils (such as alpine resorts and French Island).

230 *National Parks Act 1975*, s.17(2)(a)

The Game Management Authority is responsible for regulating, overseeing and promoting sustainable game hunting in Victoria. It is required to develop plans and procedures to address the negative impacts of hunting on non-game wildlife and the conservation of wildlife habitats. It also makes recommendations to government in relation to game hunting, game management and pest control.²³¹

The Department of Environment, Land, Water and Planning is responsible for consulting with communities in relation to invasive species impacting on private land. It is also responsible for the governance of the catchment management authorities and the Victorian Catchment Management Council.²³²

Catchment management authorities are responsible for developing regional catchment strategies and prioritising actions to address animals in their landscapes. They co-ordinate and monitor the implementation of these strategies and promote the co-operation of agencies, communities and industry involved in land and water management in their region.²³³ The catchment management authorities indicated to the Committee that they play a key role in bringing stakeholders together,²³⁴ though some witnesses to the inquiry indicated that there was scope for improvement.²³⁵

The Department of Environment, Land, Water and Planning is responsible for the protection and management of wildlife.

Parks Victoria is responsible for research into and monitoring the effectiveness and humaneness of control methods they are utilising.²³⁶

Some of the problems encountered by the community when trying to find the right government body to help with a problem or when trying to collaborate with government bodies are discussed in Chapter 10 of this report. Chapter 10 also discusses some of the problems that have been noted in terms of prioritising and co-ordinating action across the multiple government bodies responsible for invasive animal management and in monitoring and reporting on animal control activities.

FINDING 10: While the responsibility for invasive animal control on private land is clear, the responsibility for public land is divided between multiple parties, with sometimes overlapping roles. There is no body with an overall responsibility for invasive animal control.

²³¹ *Game Management Authority Act 2014*, s.6

²³² Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources, and Parks Victoria, *Submission 210*, p.9

²³³ *Catchment and Land Protection Act 1994*, s.12

²³⁴ Dan Garlick, Planning & Delivery Manager, West Gippsland Catchment Management Authority, *Public Hearing*, 7 October 2016, p.3; Shane Heywood, Land Team Leader, West Gippsland Catchment Management Authority, *Public Hearing*, 7 October 2016, p.7; Neil McCarthy, Chief Executive Officer, North East Catchment Management Authority, *Public Hearing*, 19 October 2016, pp.3-4; David Brennan, Chief Executive Officer, Wimmera Catchment Management Authority, *Public Hearing*, 30 November 2016, pp.2-3

²³⁵ Gerry Leach, Chair, Land Management Committee, Victorian Farmers Federation, *Public Hearing*, 10 October 2016, p.5; see also Charlie Lovick, President, Mountain Cattlemen's Association of Victoria, *Public Hearing*, 20 October 2016, p.5

²³⁶ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.9

3.7 Invasive species policy

3.7.1 Responsibility for policy development

Policy development in this area stems from multiple sources and is constrained and influenced by national frameworks and agreements.

The joint submission from government bodies outlined the national conventions, agreements, legislation, strategies and policies that influence Victoria's control of invasive animals.²³⁷

The division of policy-making responsibility in Victoria is another complex area.

The Department of Economic Development, Jobs, Transport and Resources is responsible for setting state-based policy for invasive species. Its roles also include funding strategic invasive species research, managing new outbreaks of invasive animals, overseeing animal welfare and enforcing the delivery of and compliance with pest animal legislation.²³⁸ It is also responsible for policy development for game hunting and game management.

The Department of Environment, Land, Water and Planning is responsible for:

- setting state-based policy for the sustainable, effective and efficient management of Crown land and facilitating the use of the public land estate
- state-wide wildlife, biodiversity and public land use policy (including informing invasive species policy)
- policy, investment, research and regulation to support healthy natural ecosystems, including the protection of threatened species.²³⁹

Other bodies may have influence over these policy decisions based on the advisory roles that they play.

For instance, the Victorian Environmental Assessment Council is responsible for conducting investigations into the management of the environment and natural resources of public land (at the request of the Government). This may include assessing the use of specific areas of land and recommending additional areas where hunting may be permitted.

²³⁷ Department of Primary Industries, *Background Paper: Summary of Relevant Invasive Plant and Animal Conventions, Agreements, Legislation, Strategies and Policies* (n.d.), p.7 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 4)

²³⁸ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.9

²³⁹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.9

Catchment management authorities are responsible for making recommendations to the Minister for Energy, Environment and Climate Change and the Secretary of the Department of Environment, Land, Water and Planning about actions to be taken on Crown land to prevent land degradation (which may include control of invasive animals).²⁴⁰

The Commissioner for Environmental Sustainability Victoria independently reviews the overall condition of Victoria's natural environment, including biodiversity, and considers the impact and management of pest plants and animals.²⁴¹

3.7.2 Current Victorian policy

The approach to invasive species control in Victoria is underpinned by a number of policies and frameworks that co-exist with each other. Three of the most significant policies for this inquiry are the *Invasive Plants and Animals Policy Framework*, *Protecting Victoria's Environment – Biodiversity 2037* and the *Sustainable Hunting Action Plan 2016-2020*.

Invasive Plants and Animals Policy Framework

This framework, released in 2010, outlines Victoria's overarching whole-of-government approach to managing existing and potential invasive species. The framework aims to:

- be aligned with and support relevant Victorian and national policies and strategies
- provide a risk management approach to address species at all stages of invasion
- incorporate both public and private land management, allowing for a nil-tenure approach
- provide a clear allocation of government investment
- identify priorities and directions
- outline the roles and responsibilities of stakeholders and the public.²⁴²

In achieving the objectives of the framework, the joint submission to this inquiry from government bodies outlined that the 'generalised invasion curve' (see Figure 3.5 and Section 2.2.3 of this report) is used 'to identify invasive species threat, assess their relative risk to the environment, agriculture or the community and select the most appropriate intervention.'²⁴³ The curve also gives an indicative measure of the economic returns associated with each stage of control.

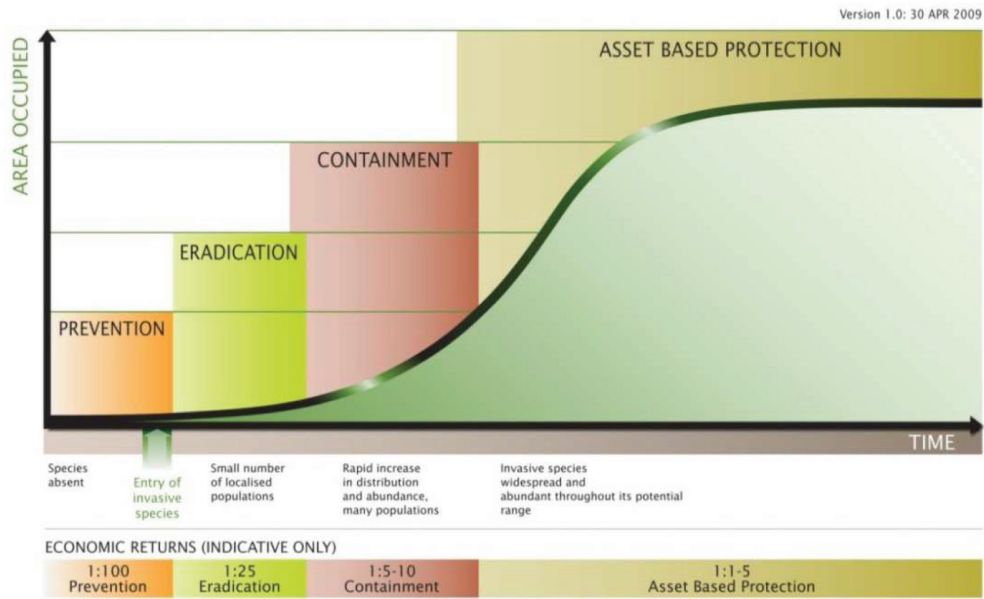
²⁴⁰ *Catchment and Land Protection Act 1994*, s.12

²⁴¹ *Commissioner for Environmental Sustainability Act 2003*; Commissioner for Environmental Sustainability Victoria, *Biodiversity in Victoria* <www.ces.vic.gov.au/soe/biodiversity>, viewed 7 April 2017

²⁴² Department of Primary Industries, *Invasive Plants and Animals Policy Framework* (2010), p.7 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 10)

²⁴³ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.10

Figure 3.5 The generalised invasion curve



Source: Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.11

In essence, the curve indicates that preventing the entry of any new invasive species is the most cost-effective method of invasive species management. Once an invasive species has entered a new area, efforts should be focussed on eradication of the small localised population. If the species is not eradicated and the population grows, efforts should be directed towards containment. Once a population has grown past the point where it can be eradicated or contained, efforts are best focussed on asset protection. Asset protection involves localised protection of environmental, economic or social assets. Examples of these assets include alpine peatlands in the Victorian High Country and the habitat of endangered native animals.

A 'Weeds and Vertebrate Pests' module of the framework was released in 2010, with further details about the Government's intended approach. It included 58 high-level actions that the Government intended to undertake.²⁴⁴

Protecting Victoria's Environment - Biodiversity 2037

The Victorian Government released its long-term plan *Protecting Victoria's Environment - Biodiversity 2037* in April 2017. The plan sets priorities, targets, actions and timeframes to achieve the following key goals:

- encourage more Victorians to value nature
- ensure that Victoria's natural environment is healthy.²⁴⁵

²⁴⁴ Department of Primary Industries, *Weeds and Vertebrate Pests*, Module 1 within the *Invasive Plants and Animals Policy Framework* (2010), pp.2-4 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 11)

²⁴⁵ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment - Biodiversity 2037* (2017), p.13

It also states that the government will ‘progressively review the regulatory framework to ensure that it supports achievement of the goals and targets of this Plan, is adaptable to changing circumstances and upholds accountability’.²⁴⁶ The Committee considers this to be an important part of the plan, given the complexity of the current regulatory environment.

See Chapter 10 of this report for a discussion of the *Protecting Victoria’s Environment – Biodiversity 2037* policy.

Hunting and game policy

The Government released its *Sustainable Hunting Action Plan 2016-2020* in December 2016. It aims to provide the following outcomes:

- responsible, safe and humane hunting
- full utilisation of game
- inclusive regional growth
- a secure future for hunting.²⁴⁷

It proposed promoting responsible hunting by providing better access to information, educating and training new hunters and improving compliance with hunting laws and regulations. It also proposed growing the benefits of hunting and improving hunting opportunities by promoting hunting, facilitating game meat processing and expanding access to land and species for recreational hunters. The plan aimed to ensure sustainable hunting through improved research, data collection, monitoring and evaluation.²⁴⁸

The Game Management Authority released its *Game Hunting in Victoria – A Manual for Responsible and Sustainable Hunting* in February 2017. This is intended to be a comprehensive game hunting manual covering topics including current laws, firearm safety, hunting methods, hunting equipment, ethics, survival skills, education and training.²⁴⁹

3.8 Who is dealing with it?

This chapter has discussed who has responsibility for setting policy for invasive species control, who is accountable for the control of certain species on different categories of land and the methods they are permitted to apply to achieve this control. On the ground, animal control work is undertaken by a number of different groups.

²⁴⁶ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.51

²⁴⁷ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.7

²⁴⁸ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.7

²⁴⁹ Game Management Authority, *Game Hunting in Victoria* (2017)

3.8.1 Landowners

Private landowners undertake pest control on their land at their own cost. Some landowners perform control works themselves using methods outlined in Section 3.5 of this chapter. Some landowners employ paid professional pest controllers to undertake work on their land or engage volunteer shooters to hunt on their property.

3.8.2 Paid professional pest controllers

Along with control work performed for private landowners, professional pest controllers are also engaged by government bodies to undertake pest control on Crown land. They can use a variety of methods, including shooting, poisoning and trapping.

Mr Cameron Skedd, President of the Vertebrate Pest Managers Association Australia, noted that his association has:

... about 60 member companies who are all professional pest managers working for government departments and private enterprise. We do works covering many animals, invasive species and native animals as well as the introduced species.²⁵⁰

Mr Skedd estimated that approximately 60 per cent of the work performed by association members is for government and 40 per cent is from private sector contracts.²⁵¹

3.8.3 Recreational hunters

Recreational hunters contribute to the control of invasive animals through game and pest hunting in areas where hunting is permitted (see Chapter 4 of this report). This can include on private property at the request of the landowner.

Volunteers from recreational hunting organisations such as the Australian Deer Association, Sporting Shooters Association of Australia and Field & Game Australia are also involved in hunting programs co-ordinated by government bodies to control invasive species on Crown land (see Section 3.8.5 and Chapter 6 of this report).

Recreational hunters also contribute to conservation efforts through maintenance and repair work in response to damage caused to the environment by invasive animals and through participating in revegetation programs (see Section 4.6.3 of this report).

²⁵⁰ Cameron Skedd, President, Vertebrate Pest Managers Association, *Public Hearing*, 5 September 2016, p.2

²⁵¹ Cameron Skedd, President, Vertebrate Pest Managers Association, *Public Hearing*, 5 September 2016, p.4

3.8.4 Community groups

Community and landcare groups contribute to the control of invasive animals on public and private land through a number of programs and initiatives. For example, the Basalt to Bay Landcare Network co-ordinates the St Helens Biolink Project to control foxes and feral cats in St Helens Flora Reserve (see Section 6.6.2 of this report).

3.8.5 Government programs

The joint submission to this inquiry from government bodies states that ‘The Victorian Government currently delivers strategic invasive animal control on over 1.5 million hectares of Crown land annually.’²⁵² *Protecting Victoria’s Environment – Biodiversity 2037* anticipates increasing this to 4 million hectares being controlled for pest herbivores and 1.5 million hectares for pest predators.²⁵³

Control work undertaken by government bodies includes trapping, baiting, warren ripping and implosion, fumigation and shooting programs. In many cases, this work is undertaken by paid professional pest controllers, who can assist with a variety of methods. In some cases, recreational hunters have also been used for shooting programs.

Programs conducted by government bodies often utilise multiple control methods. For instance, rabbit control work undertaken by Parks Victoria and appointed contractors in the Mallee national parks since 2003 has involved warren ripping, baiting, shooting, fumigation and warren implosion.²⁵⁴

Under the *Action Plan for Managing Wild Dogs in Victoria 2014-2019*, the Department of Environment, Land, Water and Planning and Parks Victoria undertake wild dog control work including trapping, baiting and shooting. This plan also facilitates co-operation with private landowners undertaking baiting programs.²⁵⁵

The Department of Economic Development, Jobs, Transport and Resources administers the wild dog and fox bounty system to encourage and promote greater shooting of these animals (see Sections 8.5.1 and 9.5.1 of this report).

The Department of Environment, Land, Water and Planning has implemented the ‘Good Neighbour Program’ which aims to improve the protection of private land by co-ordinating and prioritising government control work on public land near where private landowners are undertaking work.²⁵⁶

²⁵² Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.19

²⁵³ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.20

²⁵⁴ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.20

²⁵⁵ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.21

²⁵⁶ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.21

The government is also involved in the release and monitoring of any biological control methods, such as the release of the rabbit haemorrhagic disease virus (see Section 7.3.1 of this report).

Co-ordinated hunting programs and trials are being implemented in multiple locations to target deer and pest species. These programs involve both volunteer and professional shooters (see Chapter 6 of this report). These trials involve co-ordination and co-operation from multiple bodies, agencies and organisations. For instance, the Alpine National Park deer control trial is jointly funded by Parks Victoria and multiple catchment management authorities (see Section 6.5.2 of this report). It involves the use of recreational hunters who are members of the Sporting Shooters Association of Australia or the Australian Deer Association and also incorporates paid professional shooters engaged by the government.

Local councils are similarly involved in pest management works involving volunteer shooters. For instance, Moyne Shire Council co-ordinates hunters from Warrnambool Field & Game to undertake fox control work on Griffiths Island (see Section 6.6.3 of this report). Local councils also create roadside weed and pest animal plans and can apply to the Department of Environment, Land, Water and Planning for funding to undertake specific control work.

FINDING 11: The convoluted nature of the legislative and policy framework in Victoria means that different rules apply to what control methods can be used depending on who you are, the species causing problems and the classification of the land. Responsibility for invasive animals is spread across multiple parties and differs depending on the species and land type. This makes it very difficult to co-ordinate an overall strategic approach to invasive animals.

FINDING 12: The complicated division and over-lapping of powers, responsibilities and roles between various government bodies, non-government bodies and private landowners is unclear and makes accountability and transparency difficult.

FINDING 13: Invasive animals do not recognise or obey land boundaries and any management approach must acknowledge this. Therefore, programs must run across multiple land tenures. Co-operation and contribution from different landowners is essential for effective invasive species management.

FINDING 14: The Victorian Government's commitment in its *Protecting Victoria's Environment – Biodiversity 2037* plan to 'progressively review the regulatory framework to ensure that it supports achievement of the goals and targets of this Plan, is adaptable to changing circumstances and upholds accountability' is a big step in the right direction.

FINDING 15: It is important for land managers to be able to undertake the most effective approach to invasive animal control, which will often involve using multiple methods. While recreational hunters may have a role to play, professional pest controllers will remain an essential component, given their ability to employ a variety of control methods.

4 Recreational hunting in Victoria

4.1 Introduction

Recreational hunting has occurred in Victoria for over 150 years and it is becoming an increasingly popular activity in the state.²⁵⁷ Victoria is regarded as having some of the best hunting opportunities in Australia, due to the land and species available for hunting.²⁵⁸

Deer, duck, quail and introduced game birds are all classified as game and a game licence is required to hunt these species. In 2016, there were approximately 48,000 game licence holders.²⁵⁹ To hunt non-game species, such as pest animals (including European rabbits and hares, foxes and feral or wild goats, pigs, dogs and dingoes), a hunter only requires a firearm licence. There are approximately 152,816 firearm licence holders in Victoria who indicated 'hunting' as their primary reason to own a firearm.²⁶⁰ Hunting of other animals in Victoria, including native wildlife, is not permitted.

Recreational hunting contributes to Victoria's tourism economy via the purchasing of equipment, food, fuel and accommodation. Many recreational hunters also volunteer in conservation programs, such as wetland rehabilitation, revegetation work and disease monitoring. In addition, recreational hunting may contribute to invasive animal control. The value of Victoria's hunting opportunities was seen in submissions from hunters who regularly travel from interstate to access the opportunities provided in Victoria.²⁶¹

Hunting has been regulated in Victoria since the early 1860s.²⁶² Regulations apply to the ownership of a firearm and the safety requirements of hunting, as well as to which species can be hunted and the locations and times that hunting is permitted, to facilitate species preservation.

This chapter outlines the current management and oversight of recreational hunting in Victoria. It details the rules and regulations around hunting, including permitted hunting methods and licencing requirements. This chapter examines the prevalence of recreational hunting in Victoria and the economic and environmental impact of hunters, including the conservation work performed by recreational hunters. This chapter also discusses the issue of illegal hunting.

257 State Government Victoria, *Hunting and Game Management Action Plan* (2014), p.4; Field & Game Australia Inc and Australian Deer Association, *Issues and Priorities for Shooting and Hunting in Victoria – Briefing Paper for Members of the 58th Parliament of Victoria* (2014), p.2

258 Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.2

259 Game Management Authority, *Victorian Hunting Guide* (2016), p.4

260 Eileen Armato, Director, Public Support Services Department, Victoria Police, correspondence received 6 April 2017

261 David Waldock, *Submission 27*, p.1; Colin Curtis, *Submission 28*, p.1; Gerard Brereton, *Submission 117*, p.1

262 State Government Victoria, *Hunting and Game Management Action Plan* (2014), p.4

4.2 Hunting rules and regulations in Victoria

Hunting in Victoria is governed by a number of different acts and regulations. The *Wildlife Act 1975* and the Wildlife Regulations 2013 provide for the sustainable use, management and conservation of wildlife. The Wildlife (Game) Regulations 2012 regulate the management of game species and game hunting.²⁶³ The *Code of Practice for the Welfare of Animals in Hunting* was issued under the Prevention of Cruelty to Animals Act in 2005.²⁶⁴ It aims to prevent cruelty and encourage the considerate treatment of animals that are hunted or used for hunting, identifying best practice and minimum standards for certain hunting methods.

The *National Parks Act 1975*, the *Crown Land (Reserves) Act 1978*, the *Conservation, Forests and Lands Act 1987* and the *Land Act 1958* regulate land management in Victoria. The Wildlife (State Game Reserve) Regulations 2014 provide for the management of Victoria's state game reserves.

The *Firearms Act 1996*, the Firearms Regulations 2008 and the Control of Weapons Regulations 2011 outline Victoria's firearm laws.

This section outlines current hunting regulations, including where and when hunting is permitted and what species may be hunted. This section also explains the restrictions on the size of the harvest for individual hunters and permitted methods of hunting.

4.2.1 What you can hunt

In Victoria, hunting of the following species is permitted:

- game species, such as deer, duck and quail
- declared pest species, such as rabbits, foxes, wild goats, wild pigs and wild dogs.

Hunting pest species does not require a specific hunting licence. Hunting game animals requires a valid game licence for the specific species (see Section 4.3.2 of this chapter for game licence details). There are also differences in where and when you can hunt an animal, depending on its species and whether it is classified as game or a pest.

²⁶³ Wildlife (Game) Regulations 2012, Regulation 1

²⁶⁴ Department of Economic Development, Jobs, Transport and Resources, Agriculture Victoria, *Code of Practice for the Welfare of Animals in Hunting (revision no. 1)* <agriculture.vic.gov.au/agriculture/animal-health-and-welfare/animal-welfare/animal-welfare-legislation/victorian-codes-of-practice-for-animal-welfare/code-of-practice-for-the-welfare-of-animals-in-hunting-revision-no.-1>, viewed 16 January 2017

4.2.2 Where you can hunt

Victoria consists of approximately 22.8 million hectares of land.²⁶⁵ Approximately 37 per cent of that is public land, which includes Crown land and land owned by state government public authorities.²⁶⁶ Ms Nina Cullen from the Department of Environment, Land, Water and Planning estimated that approximately half of Victoria's Crown land is currently available to recreational shooting.²⁶⁷

Whether hunting is permitted on a piece of land depends on the land classification.²⁶⁸ Table 4.1 lists the different land classifications in Victoria and the default position for each type of land with respect to hunting game and pest animals. Exemptions are made to this default position by the government where it considers that special circumstances exist (such as needing to preserve or cull particular species).

Table 4.1 Default hunting permissions in Victoria

Location	Hunting game species permitted	Hunting pest species permitted
State forest, forest parks (Cobboboonee and Otway) and other unoccupied Crown land (such as Crown land that is not leased or licensed)	✓ During open season	✓
Leased and licensed Crown land (with permission of lease, licensee or manager)	✓ During open season	✓
State game reserves	✓ / ✗ ^(a) During open season	✗
Private land (with permission of the landowner/manager)	✓ During open season	✓
Sanctuaries	✗	✓
National parks, state parks, coastal parks, wilderness parks, regional parks	✗ ^(b)	✗
Melbourne water catchment areas	✗	✗
Flora and fauna reserves and nature conservation reserves	✗	✗
Alpine resorts	✗	✗

(a) All state game reserves are available for duck hunting during the open season. Six state game reserves permit hog deer hunting (Clydebank Morass, Dowd Morass, Ewings Morass, Heart Morass, Jack Smith Lake and Lake Coleman) and one allows the hunting of sambar deer (Ewings Morass).

(b) See discussion below on the exceptions for hunting in these areas.

Sources: adapted from Game Management Authority, *Game Hunting in Victoria* (2017), pp.113-5; Wildlife (State Game Reserves) Regulations 2014, Regulation 13

²⁶⁵ Victorian Environment Assessment Council, *Statewide Assessment of Public Land, Discussion Paper* (2016), p.16

²⁶⁶ Victorian Environment Assessment Council, *Statewide Assessment of Public Land, Discussion Paper* (2016), pp.7, 16

²⁶⁷ Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.9

²⁶⁸ The use of a firearm may also be prohibited under the *Firearms Act 1996* on some land where hunting would otherwise be permitted.

National, state, coastal, wilderness and regional parks

Generally, recreational hunting is not permitted in these parks. However, hunting has been permitted in certain limited areas since the 1980s. Currently, hunting specified deer species by stalking is permitted during certain times of the year in:

- Alpine National Park and Avon Wilderness Park
- Baw Baw National Park (only in the area east of Thomson Valley Road)
- Lake Eildon National Park (in certain areas in the south-east of the park)
- Mitchell River National Park (east of the Mitchell River and south of Hortons and Calvi Tracks)
- Tara Range Park.²⁶⁹

Game duck hunting and the use of gundogs is allowed in Cape Conran Coastal Park during the open season.²⁷⁰

In certain sections of Gippsland Lakes Coastal Park, game duck, stubble quail and hog deer may be hunted in season. In these areas gundogs are permitted for duck hunting.²⁷¹

In certain sections of Nooramunga Marine and Coastal Park, hog deer and game duck hunting is allowed.²⁷²

Hunting of foxes and rabbits as pest species and game duck hunting during the open season with the use of gundogs are permitted in Lake Albacutya Park.²⁷³

It is important to note that while hunting of particular species is allowed in certain parts of these parks, firearms must only be those calibres or gauges permitted for the species.²⁷⁴

4.2.3 When you can hunt — hunting seasons and bag limits

Pest species can be hunted (where permitted) all year round and there is no limit on the number of pest animals that may be hunted. However, open and close seasons apply to game species. These are used to regulate the harvest, maintain species population and reduce disturbance to both game and other wildlife.²⁷⁵ Bag limits also assist the management and conservation of game species.²⁷⁶

²⁶⁹ Game Management Authority, *Game Hunting in Victoria* (2017), pp.114-5

²⁷⁰ Game Management Authority, *Game Hunting in Victoria* (2017), p.114

²⁷¹ Game Management Authority, *Game Hunting in Victoria* (2017), p.115

²⁷² Game Management Authority, *Game Hunting in Victoria* (2017), p.115

²⁷³ Game Management Authority, *Game Hunting in Victoria* (2017), p.115.

Hunting is not permitted in part of the park at the Western Beach visitor facilities, including the boat ramp.

²⁷⁴ Wildlife (Game) Regulations 2012, Regulations 34-5; Game Management Authority, *Game Hunting in Victoria* (2017), p.124

²⁷⁵ Game Management Authority, *FAQs* <www.gma.vic.gov.au/faqs>, viewed 6 December 2016

²⁷⁶ Game Management Authority, *FAQs* <www.gma.vic.gov.au/faqs>, viewed 6 December 2016

The Wildlife (Game) Regulations 2012 prescribe the open and close seasons and bag limits for game hunting in Victoria. All recreational game hunting on public land must occur between 30 minutes before sunrise and 30 minutes after sunset.²⁷⁷

Hunting open seasons and bag limits have become less restrictive over time in relation to deer, with all deer species (except hog deer) available for hunting all year round with no bag limits. Bag limits and open seasons for game bird hunting fluctuate from year to year in response to habitat conditions and bird numbers.

Table 4.2 outlines the open seasons and bag limits for various game species in Victoria.

Table 4.2 Open season and bag limits

Species	Hunting open season	Bag limits
Hog deer	1 – 30 April	A maximum of one male and one female during an open season
Sambar deer (stalking only)	All year	No limit
Sambar deer (hound hunting)	1 April – 30 November ^(a)	No limit
Chital deer	All year	No limit
Fallow deer	All year	No limit
Red deer	All year	No limit
Rusa deer	All year	No limit
Stubble quail	First Saturday in April until 30 June	A maximum of twenty on any day during an open season
Indigenous game birds (waterfowl) ^(b)	Third Saturday in March until the second Monday in June	A maximum of ten ducks, which may include no more than two Australasian (Blue-winged) Shovelers, on any day during an open season ^(c)
Non-indigenous game birds ^(d)	All year	No limit

- (a) If Easter Sunday falls in April, hound hunting for sambar deer is not permitted for the period from Good Friday to the following Wednesday (inclusive).
- (b) Includes pacific black duck, chestnut teal, grey teal, hardhead, pink-eared duck, mountain duck and Australian wood duck. The blue-winged shoveler was not permitted to be hunted in the 2016 season due to its continued low numbers.
- (c) The bag limits prescribed in the Wildlife (Game) Regulations 2012, Schedule 4 were reduced in response to dry conditions since 2012 which has resulted in reduced bird numbers and waterfowl habitat. In 2016 eight game ducks on the opening Saturday of the season and four game ducks per day for the remainder of the season were allowed.
- (d) Includes pheasant, partridge European quail, Japanese quail and Californian quail.

Sources: adapted from Wildlife (Game) Regulations 2012, Schedules 2-4; Game Management Authority, *Game Hunting in Victoria* (2017), p.122

Balloted hog deer hunting

Hog deer are the only species of deer that are restricted by bag limits and a hunting season. This is due to the unique and highly sought-after opportunity the Victorian hog deer population offer hunters (the species is endangered in its native range) and its lower population numbers. The open season for hunting hog deer in Victoria occurs during April. There are also balloted hunting periods

²⁷⁷ Wildlife (Game) Regulations 2012, Regulation 47

outside of this open season in certain locations organised by the Blond Bay Hog Deer Advisory Group.²⁷⁸ The ballot is used to select hunters to hunt for free-ranging hog deer on Blond Bay State Game Reserve, on sections of the Boole Poole Peninsula and on Snake Island.²⁷⁹

4.2.4 Hunting methods

Stalking, which involves pursuing an animal on foot, is a commonly used hunting method. Spotlighting and hunting with dogs can also be used in certain circumstances and can result in a more efficient harvest. There are a variety of different firearms, equipment and techniques available to hunters. Regulations apply to which methods are permissible for hunting certain species.

Firearms

There are restrictions on the firearms permitted and the calibres for certain firearms used for hunting particular species. The approved hunting method for ducks is with a shotgun that does not exceed 12 gauge.²⁸⁰ The use and possession of toxic shots are prohibited in state game reserves.²⁸¹ The minimum calibre of firearms permissible for hunting deer differ according to species.²⁸²

Spotlights

A spotlight is defined as a source of artificial light, an infrared device, a night viewing device or a thermo-imaging device.²⁸³ Spotlights are generally not permitted to hunt game in Victoria.²⁸⁴ However, spotlights may be used by:

- people who are employees or contractors of the relevant government department who have written authorisation to use a spotlight to hunt or take game
- people acting in accordance with an Authority to Control Wildlife,²⁸⁵ or other authorisation issued under the Wildlife Act that permits them to destroy wildlife with the aid of a spotlight.²⁸⁶

278 Game Management Authority, *2016 Victorian Hog Deer Harvest Data Fact Sheet* (2016), p.1; Game Management Authority, *2017 Hog Deer Ballot Results* <www.gma.vic.gov.au/hunting/deer/deer-species/hog-deer-ballot>, viewed 16 January 2017

279 Game Management Authority, *2017 Hog Deer Ballot Results* <www.gma.vic.gov.au/hunting/deer/deer-species/hog-deer-ballot>, viewed 16 January 2017

280 Wildlife (Game) Regulations 2012, Regulation 31

281 Wildlife (Game) Regulations 2012, Regulations 32-3. Toxic shots are those that are not of a class or type described in Schedule 7 of the Regulations.

282 Wildlife (Game) Regulations 2012, Regulations 34-5

283 Wildlife (Game) Regulations 2012, Regulation 5

284 Wildlife (Game) Regulations 2012, Regulation 45

285 An 'Authority to Control Wildlife' may be issued by the Department of Environment, Land, Water and Planning to permit the disturbance and destruction of protected wildlife that have been shown to be causing problems.

286 Wildlife (Game) Regulations 2012, Regulation 45(2); Game Management Authority, *Game Hunting in Victoria* (2017), p.126

Private landowners and their agents are permitted to spotlight for pest animals and species declared unprotected (see Sections 3.5.3 and 9.3.3 of this report) on their land and 250 metres beyond the boundary of their property.²⁸⁷

The use of spotlighting is explored in Section 9.3.3 of this report.

Hunting dogs

Hunters may use certain breeds of trained dogs to assist them to flush, trail, point or retrieve game birds and deer. Any dog used for game hunting must instinctively hunt, be non-aggressive, be obedient and have the ability to ignore distractions.²⁸⁸

Hunters are responsible for the behaviour of their hunting dogs. The Wildlife (Game) Regulations 2012 outline the penalties for misuse and misbehaviour of hunting dogs. Dogs must not attack, bite or maim wildlife, including pest animals.²⁸⁹

The three categories of hunting dogs are gundogs, deer-hunting dogs and hounds. Only two gundogs, two deer-hunting dogs or a combination of one gundog and one deer-hunting dog may be used by any hunter or team of hunters at any one time.²⁹⁰ Each hound team may consist of no more than 10 hunters when actively hunting in the field (or 12 provided that two hunters are under 18 years of age).²⁹¹ A hound team may use a maximum of five scent-trailing hounds (or up to eight, provided that three are under 12 months of age and are in training).²⁹²

Hunting with gundogs involves the dogs remaining close to the hunter and pointing and flushing out game.²⁹³ Gundogs may be used to locate, point, flush or retrieve game birds.²⁹⁴ Gundogs may be used for locating, pointing or flushing deer (other than hog deer).²⁹⁵ There are currently 30 breeds of gundog approved for hunting.²⁹⁶

Deer-hunting dogs may be used for the purpose of locating or flushing deer (other than hog deer).²⁹⁷ There are currently eight breeds of deer-hunting dogs approved for hunting.²⁹⁸

²⁸⁷ Game Management Authority, *Game Hunting in Victoria* (2017), p.125; Wildlife (Game) Regulations 2012, Regulation 36(4)(a)

²⁸⁸ Game Management Authority, *Game Hunting in Victoria* (2017), p.53

²⁸⁹ Wildlife (Game) Regulations 2012, Regulation 41

²⁹⁰ Wildlife (Game) Regulations 2012, Regulations 39-40

²⁹¹ Wildlife (Game) Regulations 2012, Regulation 19(2)(b)

²⁹² Wildlife (Game) Regulations 2012, Regulation 19(2)(a)

²⁹³ Field & Game Australia Inc and Australian Deer Association, *Issues and Priorities for Shooting and Hunting in Victoria – Briefing Paper for Members of the 58th Parliament of Victoria* (2014), p.7

²⁹⁴ Wildlife (Game) Regulations 2012, Regulation 37(3)(a)

²⁹⁵ Wildlife (Game) Regulations 2012, Regulation 38(1)(b)

²⁹⁶ Wildlife (Game) Regulations 2012, Part 1, Schedule 5

²⁹⁷ Wildlife (Game) Regulations 2012, Regulation 38(1)(c)

²⁹⁸ Wildlife (Game) Regulations 2012, Part 3, Schedule 5

The use of scent-trailing hounds is often referred to as hound hunting. This is restricted to sambar deer. Hound hunting involves the dog following the scent of a sambar deer and ‘voicing’ their location to both the deer and hunter.²⁹⁹ Hound hunting was the most popular form of deer hunting in Victoria until the mid-1980s when stalking became more prevalent.³⁰⁰ Hunting with scent-trailing hounds is the most productive method of recreational deer hunting (see Section 9.3.4 of this report).³⁰¹

Beagles, bloodhounds and harriers are the three breeds of hounds that may be used for trailing sambar deer.³⁰² These hounds must be registered with the GMA.³⁰³ In Victoria, there are 3,254 registered hounds.³⁰⁴

To participate in hound hunting, a hunter must pass the hound-hunting test and obtain a game licence which authorises the use of hounds (see Section 4.3.2 of this chapter). Hound hunting is not permitted in national or state parks, or on private property without the permission of the landowner or manager.³⁰⁵ The use of hounds for hunting sambar deer is only permitted at specific times of year (see Table 4.2).

4.3 Licensing requirements

Hunting in Victoria requires various licences, registrations, permits and permissions. A current firearm licence is required to possess, use or carry a firearm in Victoria. All firearms must be registered. Firearm licences are issued and regulated by Victoria Police.

To hunt game in Victoria, a current game licence is also required. A range of game licence types are available at varying costs depending on the species and the intended method of hunting (see Section 4.3.2 of this chapter). Game licences are issued and regulated by the Game Management Authority.

A game licence is not required to hunt pest animals in Victoria.

4.3.1 Firearm licence

A firearm licence is required to possess or use a firearm. Victoria Police’s Licensing and Regulation Division is responsible for assessing applications for firearm licences, permits and authorities.

²⁹⁹ Field & Game Australia Inc and Australian Deer Association, *Issues and Priorities for Shooting and Hunting in Victoria – Briefing Paper for Members of the 58th Parliament of Victoria* (2014), p.8

³⁰⁰ Field & Game Australia Inc and Australian Deer Association, *Issues and Priorities for Shooting and Hunting in Victoria – Briefing Paper for Members of the 58th Parliament of Victoria* (2014), p.8

³⁰¹ Game Management Authority, *Estimates of Harvest for Deer in Victoria-Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016), p.13

³⁰² Wildlife (Game) Regulations 2012, Regulation 38(1)(a), Part 2, Schedule 5

³⁰³ Wildlife (Game) Regulations 2012, Regulation 23

³⁰⁴ Game Management Authority, *Game Licence Statistics, Summary Report – 2016* (2016), p.16

³⁰⁵ Wildlife (Game) Regulations 2012, Regulation 43

All licence applications must be made to the Chief Commissioner.³⁰⁶ To be eligible for a firearm licence, a person must be:

- a resident of Victoria (or work with firearms in Victoria)³⁰⁷
- a ‘fit and proper person’³⁰⁸
- between 12 and 18 years of age (junior licence) or 18 years and over (adult licence)³⁰⁹
- a ‘non-prohibited’ person (or have been deemed not to be ‘prohibited’ by a court)³¹⁰
- able to demonstrate and maintain a ‘genuine reason’ for needing a particular licence type.³¹¹

Victoria Police outline that you are not considered a ‘fit and proper person’ if you have:

- a history of irresponsible handling of firearms
- been deemed a ‘prohibited person’
- been found guilty of violent crimes
- not proven to be of good character
- a criminal history associated with firearms
- provided false or misleading information to the police in a firearms matter
- a record of physical or mental illness which medical evidence suggests debars you from owning or using firearms
- a record of drug or alcohol misuse which medical advice suggests debars you from owning or using a firearm
- failed to possess sufficient knowledge and competency in the carriage and use of firearms (for example, you have not completed or have failed the Victorian Firearms Safety Course).³¹²

³⁰⁶ *Firearms Act 1996*, s.31

³⁰⁷ *Firearms Act 1996*, s.17(1)(ab)

³⁰⁸ *Firearms Act 1996*, s.17(1)(c)

³⁰⁹ *Firearms Act 1996*, ss.17(1)(b), 18(1)

³¹⁰ *Firearms Act 1996*, s.17(1)(a)

³¹¹ *Firearms Act 1996*, s.10

³¹² Victoria Police, *Fit and Proper Persons* <www.police.vic.gov.au/content.asp?Document_ID=34426>, viewed 31 January 2017

Applicants are also required to successfully complete a relevant Victorian firearm safety course and test if:

- they are applying for any licence other than a collectors, heirlooms or licensed firearm dealer licence³¹³
- they have never held a Victorian firearm licence (even if they had a licence in another Australian state or territory)³¹⁴
- their Victorian firearm licence was cancelled³¹⁵
- their Victorian firearm licence expired more than 12 months ago.³¹⁶

A junior licence restricts the applicant to certain categories of firearm and is only permitted in order to receive instruction in the use of firearms or to engage in sport or target shooting competitions.³¹⁷ Junior licence holders must be under the immediate supervision of an adult with a full licence for the same category of firearm when carrying or using the firearm.³¹⁸

Recreational hunting, professional hunting and sport/target shooting are all considered 'genuine reasons' for holding a firearm licence.³¹⁹ The most popular recreational firearm licence in Victoria is a licence issued for the purpose of hunting.³²⁰ Hunting is a valid reason to apply for and obtain category A and B longarm licences.³²¹ Category C and D licences, which allow semi-automatic rifles, semi-automatic shotguns and pump action shotguns, are not available for the purposes of recreational hunting, but may be obtained by professional hunters (and category C may be obtained by primary producers to manage invasive animal species).³²²

4.3.2 Game licence

Hunters are required to obtain a game licence to hunt game species on public land. In contrast, those controlling problem deer on private property are not required to possess a game licence.

³¹³ Victoria Police, *Victorian Firearm Safety Course* <www.police.vic.gov.au/content.asp?Document_ID=34440>, viewed 3 January 2017

³¹⁴ *Firearms Act 1996*, s.17(c)(iii); Victoria Police, *Victorian Firearm Safety Course* <www.police.vic.gov.au/content.asp?Document_ID=34440>, viewed 3 January 2017

³¹⁵ *Firearms Act 1996*, s.49A(4); Victoria Police, *Victorian Firearm Safety Course* <www.police.vic.gov.au/content.asp?Document_ID=34440>, viewed 3 January 2017

³¹⁶ Victoria Police, *Victorian Firearm Safety Course* <www.police.vic.gov.au/content.asp?Document_ID=34440>, viewed 3 January 2017

³¹⁷ *Firearms Act 1996*, s.18(1)

³¹⁸ *Firearms Act 1996*, Schedule 2, Item 4

³¹⁹ *Firearms Act 1996*, s.10(1)

³²⁰ Victoria Police, *Hunters* <www.police.vic.gov.au/content.asp?Document_ID=34497>, viewed 1 December 2016

³²¹ *Firearms Act 1996*, s.10

³²² *Firearms Act 1996*, s.11; Victoria Police, *Firearm Licence Application Forms* <www.police.vic.gov.au/content.asp?Document_ID=34468>, viewed 6 January 2017

A game licence may be issued for a single game category or may be issued for multiple categories. Full licences currently cost between \$55.70 and \$83.60 per year, with concession licences costing half as much.³²³ Hunters aged 12 to 17 years of age can obtain a junior game licence free of charge. The revenue from game licence fees totalled \$2.50 million in 2015-16.³²⁴

Waterfowl identification test

To hunt game birds, including ducks, hunters must pass the waterfowl identification test.³²⁵ This test involves a series of multiple-choice questions based on video footage of waterfowl in flight. This requirement is intended to ensure that only hunters that are able to demonstrate adequate identification skills are able to hunt ducks.

Hound-hunting test

To hunt sambar deer with the aid of hounds, hunters must pass the hound-hunting test.³²⁶ This requirement is designed to ensure hunters using hounds are aware of the legal, ethical and safety requirements when hunting. This test involves multiple-choice questions on licensing requirements, when you can hunt, legal hunting methods, safe firearm handling practices, ethical responsibilities and other information relevant to hound hunting.

4.3.3 Provisional game licences

In addition to standard game licences, there are three other licence types available.

Juniors (12 to 17 year olds) can obtain a game licence. Junior hunters can also obtain a provisional licence to hunt ducks and a provisional licence to hunt sambar deer with hounds under the direct supervision of an adult who holds a valid licence and has passed the relevant test.³²⁷

Game-bird-farm hunting licences are valid for seven days and are free of charge. These licences are intended to provide access to game bird farms for corporate events and clients looking for a game-hunting experience in a controlled environment under expert instruction.³²⁸

³²³ Game Management Authority, *Game Licence Application Form 2016-17* <www.gma.vic.gov.au/__data/assets/pdf_file/0008/317249/Application-for-a-Game-Licence-General-v16-1.pdf>, viewed 25 January 2017

³²⁴ Committee calculations based on Game Management Authority, *Game Licence Statistics, Summary Report – 2016* (2016), p.6

³²⁵ Wildlife (Game Regulations) 2012, Regulation 14

³²⁶ Wildlife (Game Regulations) 2012, Regulations 15-16

³²⁷ Game Management Authority, *Game Hunting in Victoria* (2017), p.106; A junior may only obtain each provisional licence once. Following this, they are required to sit the relevant test to continue participating in game bird hunting or hound hunting.

³²⁸ Game Management Authority, *Game Hunting in Victoria* (2017), p.107

A non-resident of Australia game licence allows international visitors (who reside outside Australia) access to Victoria's hunting opportunities without the requirement to pass the waterfowl identification test or hound-hunting test. As with provisional game licences for juniors, this licence requires that the holder (for example, a tourist) be under the direct supervision of an adult who holds a valid game licence specific to the species being hunted and has passed the required tests. This licence is valid for a maximum of 14 days and costs the same as a one-year game licence.³²⁹ International visitors must also apply for a temporary visitor permit to enable them to possess, carry or use a firearm in Victoria.³³⁰ All firearm licence applications attract a minimum 28-day waiting period.³³¹

4.4 Management and regulation of game hunting

The Victorian Game Management Authority (GMA) was established in 2014 under the *Game Management Authority Act 2014*. It is an independent statutory authority responsible for the regulation of game hunting, governed by a board and accountable to the Minister for Agriculture.

The GMA's main functions are to:

- ensure hunters comply with relevant regulations, codes and legislation
- issue game licences
- promote, monitor, investigate and enforce compliance with game hunting laws
- develop plans and procedures to maintain sustainable hunting, ensure the humane treatment of animals, minimise any negative impacts on non-game wildlife and conserve wildlife habitats
- work with public land managers to improve the management of public land where hunting is permitted
- monitor, conduct research and analyse the environmental, social and economic impacts of game hunting and game management
- make recommendations in relation to game hunting and game management, the control of pest animals, land management and hunting seasons and bag limits.³³²

The GMA's organisational structure consists of a nine-member board and 18 employees.³³³

The GMA conducts telephone surveys of game licence holders to collect data relating to harvest levels, hunter effort and success, periods of increased harvest pressure and areas where hunting pressure is heightened. Aerial and on-ground

³²⁹ Game Management Authority, *Game Hunting in Victoria* (2017), p.107

³³⁰ *Firearms Act 1996*, s.186

³³¹ *Firearms Act 1996*, s.33

³³² *Game Management Authority Act 2014*, s.6

³³³ Game Management Authority, *Annual Report 2015-16* (2016), pp.9, 13, 26

surveys and in-field inspections are used to monitor waterfowl numbers. Checking stations are set up in hog deer regions to obtain biological information, such as the animal weight, age, sex and reproductive condition and the date, time and location of the hog deer taken.³³⁴

The GMA appoints authorised Game Officers to monitor, detect and enforce compliance with hunting rules, regulations and laws. Game Officers also assist hunters to understand hunting laws and provide advice and information. Game Officers in the field may approach hunters or stop any vehicle or boat and request to examine firearm and game licences and any game that may have been harvested or be in a hunter's possession. A Game Officer may also seize any game, wildlife or equipment that is suspected of having been used in the commission of an offence.

According to the GMA's *Compliance Policy*:

Authorised Game Officers are not permitted to use or carry firearms for protective purposes and must be accompanied by Victoria Police Officers when conducting enforcement activities in the presence of armed hunters.³³⁵

This policy limits the capacity of the GMA to enforce regulations as attendance at an incident by both the GMA and Victoria Police is not always possible. Assistant Commissioner Rick Nugent explained to the Committee that timing and resources can limit the incidents that police can attend:

If they are aware of an incident where they would like to have someone intercepted by us or for us to speak to someone who has a firearm, whether they are licensed or otherwise, we would certainly help them out when we are available. In local areas there is only a finite number of local police. They get called to anything and everything, so if they are not available, then someone further afield might attend. If it is at Corryong, for example, you might have to go to Tallangatta or further to then respond to help, but certainly we would absolutely be there to support them.³³⁶

The GMA, as the regulator of game hunting in Victoria, works closely with other bodies that have related responsibilities, including the Department of Environment, Land, Water and Planning, Parks Victoria, the Department of Economic Development, Jobs, Transport and Resources and Victoria Police. These bodies' responsibilities are discussed in Section 3.6 of this report.

The GMA receives an annual grant of \$4.8 million from the Department of Economic Development, Jobs, Transport and Resources. In 2015-16, the GMA reported a total income of \$5.0 million.³³⁷ In 2016-17, the Government committed \$5.3 million over four years to support safe, responsible and legal hunting through the *Sustainable Hunting Action Plan*.³³⁸ Mr Ken Slee asserted that the GMA 'does

³³⁴ Game Management Authority, *FAQs* <www.gma.vic.gov.au/faqs>, viewed 7 December 2016

³³⁵ Game Management Authority, *Compliance Policy* (2014), p.7

³³⁶ Assistant Commissioner Rick Nugent, Victoria Police, *Public Hearing*, 5 December 2016, p.8

³³⁷ Game Management Authority, *Annual Report 2015-16* (2016), p.44

³³⁸ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.2; Department of Treasury and Finance, *Budget Paper No. 3: 2016-17 Service Delivery* (2016), pp.37, 42, 48

not currently have the resources to properly manage recreational deer hunting in Victoria' which he believes will 'become more apparent as deer hunter numbers increase further'.³³⁹

As noted above, there are only 18 GMA employees, which includes one manager of game compliance and five Senior Game Officers.³⁴⁰ Mr Slee suggested that the role and resources of the GMA should be expanded:

I think the GMA ideally should be better funded. It should have the ability to undertake research or commission research into deer and their impact. They should not just be licensing and enforcement. They should have a much broader role, and they should be involved in encouraging recreational hunting, for one thing.³⁴¹

Other submissions received by the Committee advocated for an expansion of the GMA's roles and responsibilities to include the management of all recreational hunting for invasive species (not just game hunting), deer management and land management of state game reserves (Section 10.3.1 of this report outlines the need for a single point of responsibility in this area).³⁴²

4.5 Prevalence of recreational hunting in Victoria

Victoria offers a wide range of game-hunting opportunities and hunting has long been a widespread recreational activity in the state. Game hunting is becoming increasingly popular in Victoria. Deer hunting has particularly grown in popularity, with the number of deer-hunting licences tripling between 2000 and 2016.³⁴³

There are now approximately 48,000 licenced game hunters in Victoria.³⁴⁴ As at 30 June 2016, there were 32,306 licensed deer hunters, 25,646 licensed duck hunters and 28,545 licensed quail hunters.³⁴⁵ Figure 4.1 highlights the distribution of licence holders by licence type as at 30 June 2016.

These figures do not reflect people who hunt pest animals and therefore do not require a game licence. As at March 2017, there were 152,816 firearm licence holders who indicated 'hunting' as their primary reason to own a firearm.³⁴⁶

³³⁹ Ken Slee, *Submission 77*, p.3

³⁴⁰ Game Management Authority, *Annual Report 2015-16* (2016), p.13

³⁴¹ Ken Slee, *Public Hearing*, 6 October 2016, p.5

³⁴² Robert Michalski, *Submission 39*, p.1; Trevor Dennis, *Submission 45*, p.1; Tim Hajenko, *Submission 95*, p.1; Australian Deer Association, *Submission 168*, p.4

³⁴³ Game Management Authority, *Game Licence Statistics, Summary Report - 2016* (2016), pp.20-1

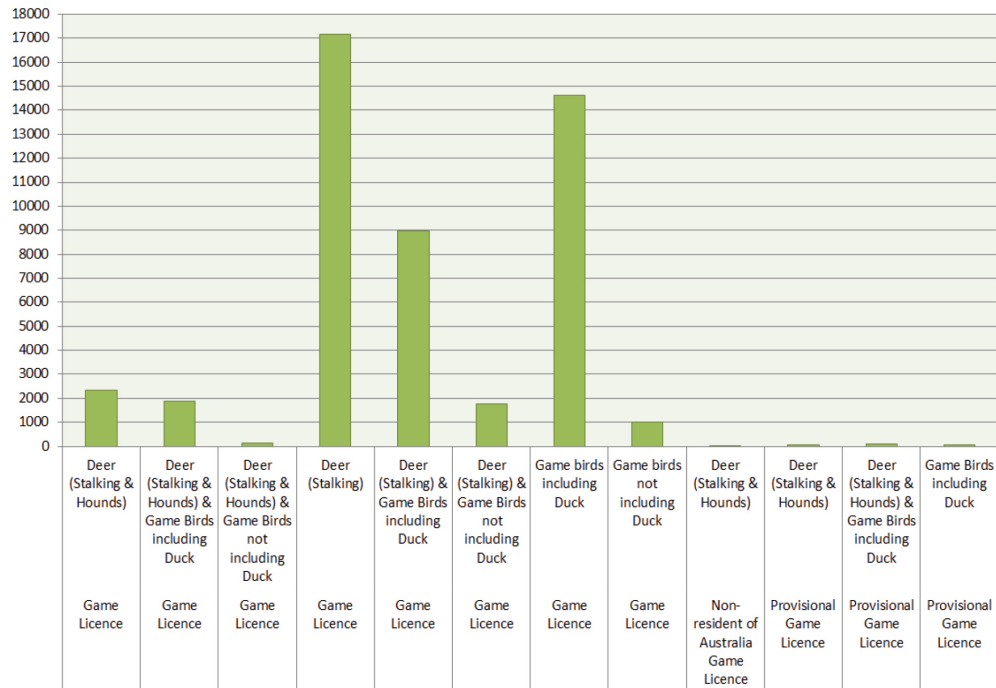
³⁴⁴ Game Management Authority, *Victorian Hunting Guide* (2016), p.4

³⁴⁵ Game Management Authority, *Game Licence Statistics, Summary Report - 2016* (2016), p.21. A number of these hunters are licensed to hunt more than one species.

³⁴⁶ Eileen Armato, Director, Public Support Services Department, Victoria Police, correspondence received 6 April 2017

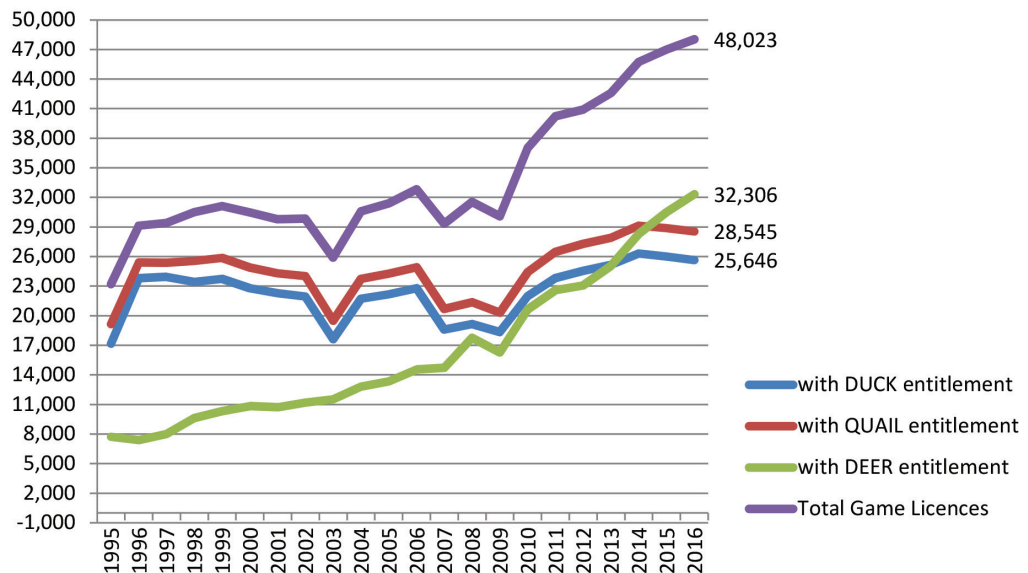
Game licence numbers have tended to increase over the last 20 years, as depicted in Figure 4.2. The reduction in licence numbers in some years may be attributed to the cancellation or reduction in the length of the duck season or due to the application of lower bag limits.³⁴⁷

Figure 4.1 Licence holders by licence type as at 30 June 2016



Source: Game Management Authority, *Game Licence Statistics, Summary Report – 2016* (2016), p.5

Figure 4.2 Game licences (figures as at 30 June each year)



Source: Game Management Authority, *Game Licence Statistics, Summary Report – 2016*, p.7

³⁴⁷ The duck season was cancelled in 1995, 2003, 2007 and 2008. There were restricted (either reduced season length, bag limit or species) duck seasons in 1998, 2000, 2001, 2002, 2004, 2005, 2006, 2009, 2010, 2015 and 2016.

4.6 Impact of recreational hunting

4.6.1 Size of the harvest

Since 2009, telephone surveys have been conducted to estimate the size of the deer, duck and quail harvests each year (see Table 4.3). Random samples of game licence holders were surveyed in relation to their hunting activities over the period being reviewed. This information was then used to estimate the total number of species harvested by game licence holders over the calendar year.³⁴⁸

There are a number of limitations to this methodology. It assumes that the samples of respondents surveyed are representative of the entire population of Victorian game licence holders. There may also be bias due to inaccurate recall and deliberate over- or under-reporting. The methodology also may not capture private landowners controlling game species on their private property as they are not required to obtain a game licence for this type of hunting.

Anecdotally, the harvest of deer on private land has risen substantially in recent years and may be significant. For instance, the Committee was told:

Out of 8 landowners out of a population of nearly 700 in the King Valley, between them they have shot 336 deer this season. There is one farmer there who has shot, in the last two months, 80 on his own.³⁴⁹

In the last three years I (or members of my family and private shooters approved by myself) have shot in excess of 500 deer.³⁵⁰

In our back paddock along the bush we have shot 15 grey deer in the last five weeks.³⁵¹

Furthermore, the survey does not incorporate the impact of unlicensed recreational hunters.

Table 4.3 shows that duck and quail harvests fluctuate from year to year.³⁵² However, an overall increase in deer harvests has been observed over time (see Figure 4.3).

³⁴⁸ Game Management Authority, *Estimates of Harvest for Deer in Victoria-Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016), p.6

³⁴⁹ James Findlay, *Public Hearing*, 20 October 2016, p.3

³⁵⁰ Harry Ryder, *Submission 206*, p.1

³⁵¹ Brendan Mahoney, *Public Hearing*, 20 October 2016, p.2

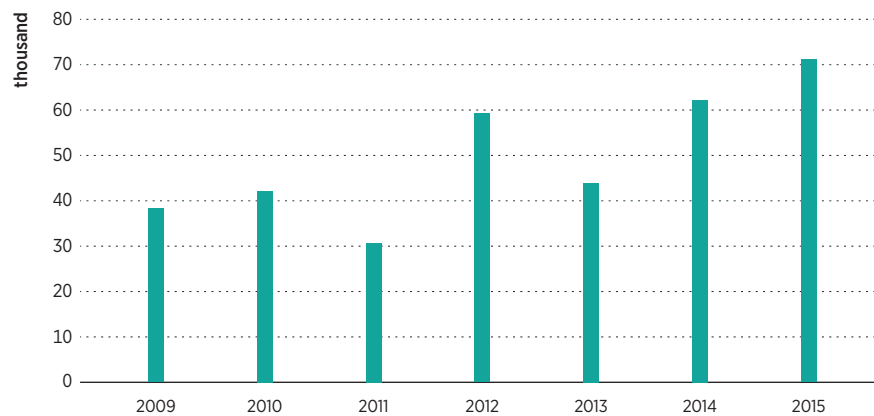
³⁵² This is correlated with restrictions being placed on duck hunting in certain years (such as reduced open seasons and bag limits).

Table 4.3 Estimates of deer, duck and quail harvests, 2009 to 2015

Year ^(a)	Deer	Duck	Quail
2009	38,284	222,302	189,155
2010	42,133	270,574	86,302
2011	30,753	600,739	678,431
2012	59,206	508,256	129,711
2013	43,985	422,294	184,123
2014	62,165	449,320	16,243
2015	71,142	286,729	101,244

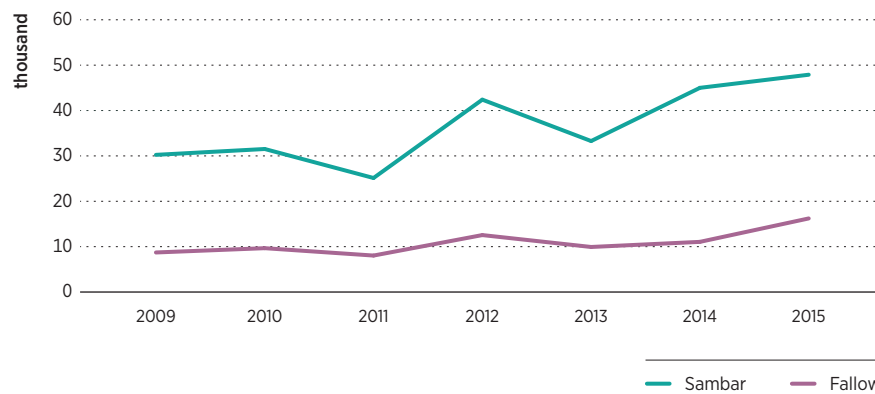
(a) From 2009-13 the figures were reported by financial year and from 2014 the figures were reported by calendar year. The GMA converted the previous figures to calendar year estimates by using the results of each 2-monthly survey from January-February 2009 to November-December 2013.

Sources: Game Management Authority, *Estimates of Harvest for Deer in Victoria-Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016); Game Management Authority, *Estimates of Harvest for Duck and Quail in Victoria-Results from Surveys of Victorian Game Licence Holders in 2015* (2016)

Figure 4.3 Estimated deer harvest, 2009 to 2015

Source: adapted from Game Management Authority, *Estimates of Harvest for Deer in Victoria-Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016), p.22

Sambar deer are the most commonly harvested deer, followed by fallow. Figure 4.4 shows the estimated harvest of each deer species over the surveyed period.

Figure 4.4 Estimated deer harvest according to deer species, 2009 to 2015

Source: adapted from Game Management Authority, *Estimates of Harvest for Deer in Victoria-Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016), p.22

The number of hog and red deer harvested, as reported to the GMA surveys, was minimal. Therefore, it is inferred the harvest of these species is small. Hog deer are the only species of deer that are restricted by bag limits and hunting season. Checking stations are set up which record the number of hog deer harvested. Estimates from other sources suggest that approximately 400 hog deer were harvested in 2014 and 2015.³⁵³

In 2014 and 2015, the greatest number of deer were killed in the Goulburn Broken Catchment Management Authority (CMA) region, followed by the East Gippsland CMA and the North East CMA regions (see Figure 4.5 below for the 2015 breakdown). The towns where the highest number of deer were harvested in 2015 include Mansfield, Myrtleford, Dargo, Bairnsdale and Licola.³⁵⁴

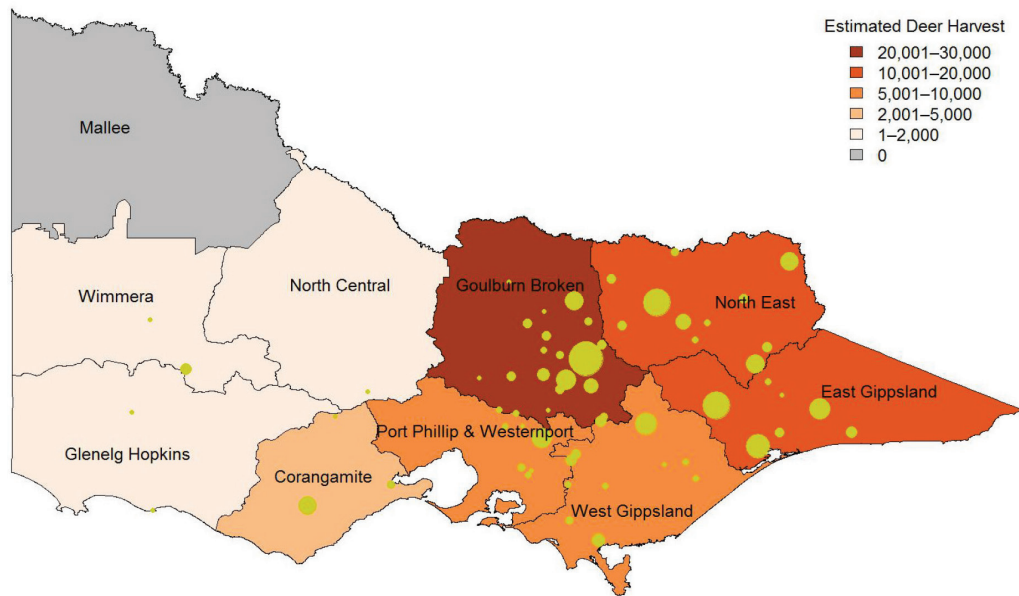
Records of the number of pest animals harvested by recreational hunters are not well documented. The Sporting Shooters Association of Australia (Victoria) provided the Committee with a summary of the number of animals killed by their members during their involvement in Parks Victoria pest management programs (see Table 4.4 below). Field & Game Australia reported that more than 90 per cent of their members actively hunt pest animals and since 2007 have removed over 30,000 feral and pest animals, including 10,990 foxes.³⁵⁵

³⁵³ Game Management Authority, *Estimates of Harvest for Deer in Victoria-Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016), p.22

³⁵⁴ Game Management Authority, *Estimates of Harvest for Deer in Victoria-Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016), p.21

³⁵⁵ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.3; Field & Game Australia, *Submission 207*, p.8

Figure 4.5 Estimated total deer harvest in 2015 by catchment management authority regions^(a)



(a) The yellow circles in the figure indicate the nearest town to harvest locations. Symbol size is proportional to reported harvest.

Source: Game Management Authority, *Estimates of Harvest for Deer in Victoria: Results from Surveys of Victorian Game Licence Holders in 2014 and 2015* (2016), p.21

Table 4.4 Animals destroyed by Sporting Shooters Association of Australia members during Parks Victoria pest management programs

Year	Feral cat	Feral pig	Rabbit	Hares	Feral goat	Fox	Deer
2003 - 2009	-	-	56	2	1,808	45	-
2009 - 2010	1	-	668	2	409	51	-
2010 - 2011	2	11	762	10	546	20	-
2011 - 2012	2	28	841	30	880	98	6
2012 - 2013	2	2	167	15	806	57	4
2013 - 2014	10	51	1,637	59	264	56	5
2014 - 2015	4	-	1,776	22	20	7	44
2015 - 2016	4	9	383	5	86	2	20
Totals	25	101	6,290	145	4,819	336	79

Source: Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.16

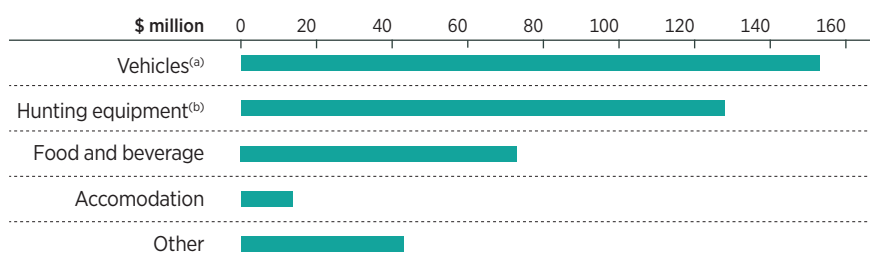
FINDING 16: The number of deer harvested by recreational hunters has increased over time with over 70,000 killed in 2015. The number of pest species harvested by recreational hunters is unknown.

4.6.2 Economic impact of hunting

Recreational hunting generates a range of benefits, including economic, social, business and employment.³⁵⁶ A study commissioned in 2013 by the then Victorian Department of Environment and Primary Industries estimated that hunting generates \$439.0 million in economic activity each year in Victoria.³⁵⁷ This is comprised of \$294.7 million on game hunting and \$144.4 million on pest hunting.³⁵⁸ The study estimated that approximately 40 per cent of expenditure took place in Melbourne and 60 per cent in regional areas.³⁵⁹

The key areas of expenditure by hunters are set out in Figure 4.6. The methodology used to obtain this figure involved surveying 1,000 hunters in relation to their on-trip and off-trip expenditure patterns.³⁶⁰ Game licence holders and hunting association members were recruited to participate in the survey via email and telephone.³⁶¹ This method of recruitment was noted in the study as a potential bias, as licence holders with available email and telephone details are younger than the overall licence holder population.³⁶²

Figure 4.6 On- and off-trip expenditure by recreational hunters



(a) Hunting equipment includes firearms, ammunition, hunting dog expenses and hunting clothing.

(b) Vehicles includes equipment/accessories, maintenance and fuel.

Source: Committee calculations based on Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.25

Field & Game Australia also suggested that the expenditure on pest hunting may be an underestimation, given that only game licenced hunters were included in the survey, as opposed to all firearm licence holders who are recreational

³⁵⁶ Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.1

³⁵⁷ Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.24; for alternate estimates of hunting expenditure, see Neal Finch, Peter Murray, Julia Hoy & Greg Baxter, 'Expenditure and Motivation of Australian Recreational Hunters' *Wildlife Research* 41 (2014), pp.76-83

³⁵⁸ Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.31

³⁵⁹ Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.26

³⁶⁰ Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.i

³⁶¹ Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.8

³⁶² Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), pp.4, 9

hunters.³⁶³ The study itself notes that all off-trip expenditure was allocated to game hunting rather than pest hunting, which may also undervalue the amount spent on pest hunting.³⁶⁴

Lawyers for Animals, in its submission to this inquiry, questioned the validity of the economic figures reported, claiming the survey method was ‘significantly flawed’.³⁶⁵ Another submitter to this inquiry, citing a report by the Australia Institute, suggested that, if hunting were not permitted, the same money would be spent within the Victorian economy anyway (albeit on different goods and services).³⁶⁶ The report argued that opportunity costs, such as duck hunting deterring other tourists from visiting those areas, were not factored into the \$439.0 million figure.³⁶⁷

Overall, the Committee notes that recreational hunting is a significant activity which contributes money to the regional economy. However, it is not clear how much of the contribution is dependent on hunting or what the overall net contribution of hunting is to areas where it takes place. Hunting tourism is discussed in Section 9.2.5 of this report.

FINDING 17: Recreational hunting is an activity undertaken by many Victorians. While a 2013 study found that hunting contributes \$439.0 million per year to the Victorian economy, concerns have been expressed about the methodology used to make that estimate and about the extent to which hunters’ expenditure would take place regardless of whether or not they were allowed to hunt.

4.6.3 Conservation contributions by recreational hunters

The Committee heard that recreational hunters contribute significantly to the repair and maintenance of the environment through conservation work in hunting areas. The GMA suggests that, ‘Hunting encourages people to connect with, and to conserve, the natural environment.’³⁶⁸ The Executive Officer of the Australian Deer Association described the organisation as a ‘membership-based deer hunting and conservation organisation.’³⁶⁹ The General Manager of Field & Game Australia told the Committee that the group has a history of ‘commitment to conservation and very active and practical conservation.’³⁷⁰

³⁶³ Field & Game Australia, *Submission 207*, p.8

³⁶⁴ Department of Environment and Primary Industries, *Estimating the Economic Impact of Hunting in Victoria in 2013* (2014), p.18

³⁶⁵ Lawyers for Animals, *Submission 208*, p.16

³⁶⁶ Mary Wilkins, *Submission 162*, p.2; Rod Campbell, Richard Denniss & David Baker (the Australia Institute), *Out for a Duck: An Analysis of the Economics of Duck Hunting in Victoria* (2012), p.7

³⁶⁷ Mary Wilkins, *Submission 162*, p.2; Rod Campbell, Richard Denniss & David Baker (the Australia Institute), *Out for a Duck: An Analysis of the Economics of Duck Hunting in Victoria* (2012), p.7

³⁶⁸ Game Management Authority, *Get Involved in Conservation* <www.gma.vic.gov.au/conservation-And-environment/get-involved>, viewed 4 January 2017

³⁶⁹ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.2

³⁷⁰ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.2

A survey of over 7,000 Australian recreational hunters (mostly members of hunting clubs) found that 65 per cent of respondents cited conservation as one of their motivations for hunting. More than half of the respondents indicated that they also took part in weed control, tree planting or fire management activities.³⁷¹

Mr David McNabb from Field & Game Australia also highlighted some of the conservation work that hunters undertake on a volunteer basis. He explained that a prime motivation for hunters to perform this work is the access to that environment for their chosen pursuits:

Field & Game's conservation projects are run, staffed and implemented by an overwhelming majority of volunteer personnel, and these volunteers are motivated by the value they place on the continuation of their hunting culture and traditions and/or the ability to utilise these project wetlands for research, education or other recreation.³⁷²

Field & Game Australia invested \$2 million of private funds into their Heart Morass project, which involved their members, along with the Wetlands Environmental Taskforce, restoring a parcel of land near Sale, Gippsland.³⁷³ Mr McNabb discussed this project with the Committee:

Conservation, restoration and maintaining the habitat are key for Field & Game, with long-term projects such as the Heart Morass, near Sale in Gippsland, demonstrating the ability of private partnerships to deliver conservation and biodiversity outcomes. The Heart Morass is a prime example of how invasive animal control by volunteers can be effective in improving biodiversity. Field & Game and our subsidiary the WET [Wetlands Environmental Taskforce] Trust have restored over 1300 hectares of degraded grazing land after about 100 years of agriculture, and in the last 10 years we have turned it back into a thriving and diverse wetland.³⁷⁴

A similar conservation undertaking was initiated by the Australian Deer Association, which worked extensively to restore Clydebank Morass, a state game reserve in Gippsland. Mr Barry Howlett, the Executive Officer of the Australian Deer Association, explained:

Clydebank is a great example. That is a state game reserve. It was purchased by probably the Bolte government as a duck swamp. It is basically degraded former farmland, fairly saline, really low-lying. It sat there for 50 years or so as degraded former farmland with a bit of water in it. We recognised that it is really good habitat for hog deer, which are quite scarce, and public land opportunities for hog deer are quite rare. So we have spent the last 11 winters completely revegetating that reserve, planting out trees — our members, our money — ... We did it because habitat is a really important thing to us, and what we have found is this huge improvement in biodiversity. The water has improved because of the trees around it. The wildlife has improved. There are kangaroos, there are birds, there are insects.³⁷⁵

³⁷¹ Neal Finch, Peter Murray, Julia Hoy & Greg Baxter, 'Expenditure and Motivation of Australian Recreational Hunters' *Wildlife Research* 41 (2014), pp.80, 82

³⁷² David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.5

³⁷³ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.7

³⁷⁴ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.4

³⁷⁵ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, pp.8-9

The Committee notes that many recreational hunters and hunting organisations are heavily involved in assisting in the conservation of public land.

4.7 Community concerns with hunting

Concerns about irresponsible and illegal hunters were raised by a number of submitters and witnesses during this inquiry. Illegal hunting includes trespassing on private property, hunting in areas where hunting is not permitted, hunting without the required licence, spotlighting on public land and shooting on private land without permission.

Some witnesses, however, appeared reticent to raise their concerns about inappropriate and illegal hunters. A number of hunters acknowledged some of the problems with illegal and irresponsible hunters, but saw them as a minority. However, with no available data on the incidence of illegal and irresponsible hunting, it is difficult to understand the prevalence of the problem.

The GMA records its enforcement actions regarding non-compliance with hunting regulations (see Table 4.5). These figures indicate that very small numbers of recreational hunters have been found by the GMA to have not complied with the rules. These actions do not include responses to any illegal hunting that is within the jurisdiction of the police or hunting by people without a game licence.

Table 4.5 Summary of the Game Management Authority's enforcement outputs for 2014-15 and 2015-16

Activity	2014-15	2015-16
Total game licences issued	47,007^(a)	48,023^(b)
Official (written) warnings issued	7	27
Infringement notices issued	61	17
Banning notices issued	7	1
Exclusion orders (issued by the Magistrates Court)	1	0
Game licences suspended	1	4
Game licences cancelled	1	4
Authorisations/permits suspended	0	0
Authorisations/permits cancelled	0	1
Court proceedings taken	21	26

(a) As at 30 June 2015

(b) As at 30 June 2016

Sources: Game Management Authority, *Annual Report 2015-16* (2016), p.18; Game Management Authority, *Game Licence Statistics, Summary Report - 2016* (2016), p.21

The GMA, in partnership with government agencies, hunting organisations and industry, developed the *RESPECT: Hunt Responsibly* program, which promotes a set of hunting standards and encourages hunters to act responsibly

and report those breaking the rules.³⁷⁶ The GMA created an online form in 2016 that facilitates the confidential reporting of illegal hunting activity.³⁷⁷ The GMA smartphone application facilitates reporting of illegal hunting with a direct hotline to their Customer Service Centre. The Sporting Shooters Association of Australia (Victoria) and Field & Game Australia set codes of conduct and ethical standards that must be adhered to by their members.³⁷⁸

The Committee received direct evidence from a number of landowners who had observed illegal hunting on their land.³⁷⁹ Mr Ben Teek, a cattle farmer from Mitta Valley, discussed the issues and destruction caused by recreational hunters on his land:

Personally I have had issues with people camping at the back of our property and leaving beer cans. We do not drive in the paddocks in winter with four-wheel drives because it is too wet, but they will get stuck and then come through, creating a mess. There are also rogue hound hunters. We have wild dog issues, so we do not have dogs to work cattle, and the hounds that they use can sometimes run through the paddocks and cause mayhem with the cattle. That has been a bit of an issue too.³⁸⁰

While Mr James Findlay, a sheep farmer from Cheshunt, acknowledged that problem hunters are a minority, he talked about the stress they cause landowners:

Dealing with these issues and the few problem hunters creates a lot of stress on landowners. It creates a lot of stress on a family. On a Saturday morning I want to be sitting there on my veranda enjoying a cup of coffee, not having to worry, 'Are those hounds coming into my place today?'; or psyching myself up to go and have a chat. I am not going to have a confrontation, but I want them to know, 'I live here. This is my home. You are 200 metres from my place. Do you know I am there?'. They might say, 'Oh, sorry, mate'. I will tell them, 'We are just having a chat. I just want you to know I live there. This is my place as well'. Those sorts of things bugger up your weekend a bit, and certainly it is stressful. We do not need that. I am just one person amongst a group in my valley who feel the same way.³⁸¹

In her submission to the Committee, Ms Louise Crisp from Gippsland highlighted the problems illegal hunters were causing in her area:

East Gippsland farmers now encounter hunters with loaded guns camping on their doorstep wherever there is public road access, trespassing on farmland, hunters running hounds through forest lease areas while graziers are trying to round up cattle, farmers having prize bulls shot.³⁸²

³⁷⁶ Game Management Authority, *Annual Report 2015-16* (2016), p.17

³⁷⁷ Game Management Authority, *Annual Report 2015-16* (2016), p.17; Game Management Authority, *Report Illegal Hunting Online* <www.gma.vic.gov.au/enforcement/report-illegal-hunting2>, viewed 23 January 2017

³⁷⁸ Sporting Shooters Association of Australia (Victoria), *Hunter Ethics* <ssaavic.com.au/hunting-pest-control/hunter-ethics>, viewed 30 January 2017; Field & Game Australia, *Code of Conduct and Ethics* <www.fieldandgame.com.au/page/code-of-conduct-ethics>, viewed 30 January 2017

³⁷⁹ Luke Mitchell, *Submission 165*, p.2; Mansfield Shire Council, *Submission 183*, p.5; Animals Australia, *Submission 213*, p.5; Ben Teek, *Public Hearing*, 19 October 2016, p.3; James Findlay, *Public Hearing*, 20 October 2016, p.3; Lachlan Campbell, Regional Landcare Facilitator – Agriculture – Kiewa, North East Catchment Management Authority, *Public Hearing*, 19 October 2016, p.11

³⁸⁰ Ben Teek, *Public Hearing*, 19 October 2016, p.3

³⁸¹ James Findlay, *Public Hearing*, 20 October 2016, p.3

³⁸² Louise Crisp, *Submission 185*, p.2

Submissions received by the Committee raised concerns around illegal hunters in relation to street signs being shot at, farm animals killed, spotlighting at night and damage to private property.³⁸³ Mr Bob Gough raised concerns about illegal hunters supplying an illegal venison trade.³⁸⁴ Mansfield Shire Council's submission to the inquiry reported that a number of residents were concerned about illegal hunting with one resident feeling so intimidated by illegal hunters on her property that 'she fears to go out or enact barriers for fear of reprisal.'³⁸⁵ Others discussed encounters with people illegally hunting on areas of public land where hunting is not permitted.³⁸⁶

Mr Neil McCarthy, the Chief Executive Officer of the North East Catchment Management Authority, outlined the concerns raised in relation to illegal hunting in his region and discussed how they have approached the issue:

At those forums the community do want to have a long conversation with VicPol about how it should be managed and how the community should respond. A good example is at Whitfield. We had longstanding members talk about the fact that in the middle of the night someone would shoot from the side of a road and they are there petrified, worrying if it is going to come through their house. VicPol would walk through and explain how to report it et cetera, and hence why the Rural Watch type-concept.

...

But that will still leave a minority dilemma in the sense of that individual who might be doing something that is probably closer to being illegal out there, which is what the community are concerned about. You can narrow that, so VicPol being very proactive, but it is a big challenge. Most of these sites where the real problems are are very remote.

...

What was expressed at Whitfield was there were people who have lived in their community for a long time really concerned for their own personal safety, and these are people who are actually probably involved in managing the pest animals on their property using firearms et cetera and know how to behave in the right way. They are concerned, but yes, there is a plethora of things that the forums have come out with from the hunter behavioural-type stuff right through to the Rural Watch-type programs.³⁸⁷

Senior Sergeant Doug Incoll presented at the Hume regional deer forum in November 2016 on the issues encountered in north-east Victoria relating to deer hunting. He indicated that there are 78 people of interest in relation to deer hunting in the Wangaratta area and highlighted illegal spotlighting as an emerging issue. He also explained that the Wangaratta Divisional Intelligence

³⁸³ Cathy Roberts, *Submission 20*, p.1; Luke Mitchell, *Submission 165*, p.2

³⁸⁴ Bob Gough, *Submission 67*, p.9

³⁸⁵ Mansfield Shire Council, *Submission 183*, p.5

³⁸⁶ Roger Bilney, Gippsland Environment Group, and Environment East Gippsland, *Public Hearing*, 6 October 2016, p.8; Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.6; Michael Watson, Watson's Mountain Country Trail Rides, *Public Hearing*, 20 October 2016, pp.3-4

³⁸⁷ Neil McCarthy, Chief Executive Officer, North East Catchment Management Authority, *Public Hearing*, 19 October 2016, pp.10-11

Unit had initiated an ‘illegal shooters’ intelligence cell in 2016 to collate information from the public and police relating to illegal activity associated with firearms (which may not be exclusively hunting-related).³⁸⁸

In contrast, Assistant Commissioner Rick Nugent from Victoria Police told the Committee that illegal hunting was not an issue of concern:

I have been in the role in eastern region now for about 18 months, and I am aware of the majority of our community safety issues, from road trauma to family violence to burglaries and so on. The issue around illegal hunting or community safety issues around hunting are not really on my radar.

...

I do not hear a lot of it. When I was first informed about the committee, I cast the net out through our operational areas to get an understanding of any problems that exist, evidence of the problems or data around the problems. To be honest, not a lot came back. We do certainly have challenges with unlicensed firearm users, unregistered firearms and from time to time people driving with loaded firearms in cars, but it is not a significant issue. Certainly from time to time we hear about street signs being shot or firearms being discharged in popular places, and that is addressed by the local police.³⁸⁹

This absence of data may be explained by evidence the Committee received suggesting that some private landowners no longer phoned the police to report trespassers and illegal hunting that occurred on their property. At a public hearing, Mr Robert Rosicka provided one possible reason for this, stating that ‘From speaking to the few farmers that I have spoken to, they do not even ring the police because they know that 3, 4, 5, 6 hours later a car might come out.’³⁹⁰ Illegal hunting is recognised as an area which is difficult to manage and oversee due to the remoteness of regional properties and the resources available.³⁹¹

Nonetheless, the North East Catchment Management Authority informed the Committee, based on its community consultation, that ‘Victoria Police are regularly called on to rectify breaches of rules in the recreational shooting of deer.’³⁹²

The Committee notes initiatives that are aimed at reducing illegal and irresponsible hunting and raising awareness around safe hunting. For instance, the Upper Murray community has implemented a Rural Watch program, which encourages people to report illegal and irresponsible hunting within the community and to emergency services.³⁹³ The Upper Murray community

³⁸⁸ Senior Sergeant Doug Incoll, *Firearms & Hunting in East Region D4 Presentation*, 31 November 2016

³⁸⁹ Assistant Commissioner Rick Nugent, Victoria Police, *Public Hearing*, 5 December 2016, pp.2-3

³⁹⁰ Robert Rosicka, *Public Hearing*, 20 October 2016, p.6

³⁹¹ Nillumbik Shire Council, *Submission 196*, pp.5, 7; Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.13; Neil McCarthy, Chief Executive Officer and Lachlan Campbell, Regional Landcare Facilitator – Agriculture – Kiewa, North East Catchment Management Authority, *Public Hearing*, 19 October 2016, pp.10-12

³⁹² North East Catchment Management Authority, *Submission 138*, p.3

³⁹³ Landcare Australia, *Landcare in Focus*, 23 February 2017, p.41; Neil McCarthy, Chief Executive Officer, North East Catchment Management Authority, *Public Hearing*, 19 October 2016, pp.3, 11

has also embraced the use of hunting awareness signs that are provided at a cost by Landcare groups. These, along with awareness initiatives (for instance landowners turning outside lights on when shots are heard to alert hunters to houses and properties) are believed to have made a difference in the Upper Murray area.³⁹⁴

The Committee notes the apparent differences in evidence received from multiple sources as part of this inquiry. The Committee heard evidence that there were problems associated with illegal and irresponsible hunting on private property. The Committee received contradictory evidence from Victoria Police in relation to the incidence of illegal hunting. The Committee notes that there may be benefits to increasing awareness and education around reporting incidents of illegal behaviour – for instance, promoting the use of the GMA smartphone application and programs like the Upper Murray’s Rural Watch initiative.

If recreational hunting is to be expanded in Victoria (see Chapter 9 of this report), it will be particularly important to ensure that this does not lead to an increase in problems from illegal hunting.

FINDING 18: There are legitimate community concerns with irresponsible and illegal hunting activity, including damage caused to private property, stress for landowners from having to confront illegal hunters, concerns about safety and disruptions to farming activities. However, the incidence of this behaviour is unknown.

RECOMMENDATION 2: That Victoria Police and the Game Management Authority work collaboratively to better monitor and educate the community on reporting mechanisms for illegal hunting activity.

³⁹⁴ Clare Kiely, Department of Environment, Land, Water and Planning, correspondence received 26 March 2017

Part B

Approaches to invasive animal control

5

Assessing animal control methods

5.1 Introduction

This inquiry's terms of reference require the Committee to:

- assess the co-ordinated use of recreational hunters and community hunting organisations
- consider the application of these sorts of co-ordinated programs for other invasive animal species
- compare this approach to other forms of pest control in national parks.

This second part of the report considers the evidence about different control methods for invasive animals in Victoria.

This chapter discusses how we should assess control methods in order to compare the appropriateness of different techniques.

The Committee notes that for some species there are limited control methods available. For instance, the primary control method for deer is shooting. The assessment of control methods for deer will therefore involve an assessment on how shooting is best applied and carried out.

The Committee heard from multiple submitters and witnesses that there is a lack of data about the effectiveness and cost of different methods, especially in the Victorian context. The Australian Deer Association, for example, believed that one of the factors inhibiting deer control in Victoria is a lack of 'knowledge of how to best employ the human resource and physical resources such as specialised equipment.'³⁹⁵ Although one of the aims of Parks Victoria's current trials is to gather such data, these trials have not yet been completed. The Committee's ability to compare different control methods is therefore constrained by the lack of data.

The Committee was also told that the effectiveness of a control method depends on the circumstances, including the species and environment. The most appropriate control method is situation-dependent and often a combination of methods is the most effective way to control an animal population. As one former land manager informed the Committee:

From long experience, I am aware that it is rarely possible to control an invasive species by taking a single control measure but that control almost always requires an integrated suite of control measures.³⁹⁶

³⁹⁵ Australian Deer Association, *Submission 168*, pp.1, 6

³⁹⁶ Peter Lynch, *Submission 116*, p.1

According to the evidence received by the Committee, assessing control methods requires certain criteria to determine their effectiveness. However, this is not always easy to determine. The Committee notes the importance of assessing effectiveness by measuring changes in the impacts of invasive animals rather than the number of animals killed. For a number of reasons explored in this chapter, culling large numbers of animals does not necessarily reduce the impacts of those animals beyond the immediate term. It does not always follow that, because a large number of animals have been killed, a method has been effective.

In addition to effectiveness, other considerations are also important in assessing control methods. For example, the support for a method may vary depending on the purpose of the control work. For instance, whether control is for the purposes of farmers, the natural environment, animal welfare, hunters or for a combination of these.

This chapter explores these issues.

Chapter 6 looks at shooting as means of invasive animal control, including the use of recreational hunters as part of co-ordinated programs, unsupervised recreational hunters and paid professional shooters. Chapter 7 explores various other control methods that were discussed as part of this inquiry, including poisoning, biological control, live capture, warren and harbour destruction, fencing, deterrents and fertility control.

Chapter 8 considers which animals recreational hunting is best suited to and what role recreational hunting should play in invasive animal control.

Part C of this report considers potential changes to invasive animal control in Victoria given the findings in Part B.

5.2 Data limitations

The Committee was made aware on a number of occasions about the lack of robust, objective data about different animal control methods. For example, Dr Dave Forsyth (formerly of the Arthur Rylah Institute) noted that ‘... we do not really have the information yet on the various control methods, how effective they are in Victoria and how much they cost in Victoria.’³⁹⁷

A lack of information about the effectiveness of recreational hunting in particular was noted by many stakeholders, including the Vertebrate Pest Managers Association Australia and the Australian Deer Association.³⁹⁸ In terms of recreational hunting, a 2016 review article concluded:

³⁹⁷ Dave Forsyth, *Public Hearing*, 10 October 2016, p.4

³⁹⁸ Vertebrate Pest Managers Association Australia, *Submission 169*, p.3; Australian Deer Association, *Submission 168*, p.5

... there is little direct evidence to support or disprove the argument that recreational hunting, as currently practised, provides a useful pest animal control tool on public lands in Australia. A few experimental studies and anecdotal reports indicate that well-directed hunting activity can make useful contributions to strategic pest management programs when it is combined with other control actions. However, the pest management value of haphazard recreational hunting on public land beyond dedicated conservation reserves remains unknown and, in the absence of clear objectives and formal monitoring and evaluation programs, unknowable.³⁹⁹

In New South Wales, a trial of co-ordinated recreational hunting as a means of pest control in national parks and reserves has recently been concluded (referred to as the 'supplementary pest control trial'). This trial focussed on co-ordinated recreational hunting used in combination with other techniques, rather than as a control method by itself. The Natural Resources Commission, which evaluated the trial, noted that its evaluation was limited by an insufficient timeline to determine whether or not the program has brought about permanent changes and by a lack of consistent baseline data.⁴⁰⁰

The projects currently being conducted by Parks Victoria in the High Country (see Section 6.5.2 of this report) are intended to improve our knowledge of the costs and benefits of different techniques.⁴⁰¹ Dr Forsyth indicated:

... the Parks Victoria trial that is being conducted on the Bogong High Plains is a case in point where that information is starting to be collected. In a few more years we will be in a strong position to actually say, 'This is how much it costs to reduce deer by this amount using recreational hunters'. I think that they are using some contract hunters up there now as well. That type of information can be gathered.⁴⁰²

A robust evaluation program is planned for this trial, which includes monitoring the environmental condition before and after the trials, measuring changes in deer abundance and tracking the costs of a variety of control methods (see Section 6.5.2). This may improve our understanding of what animal control methods are most effective in the Victorian context.

Given the lack of data about the effectiveness of different control methods in Victoria, the Committee cannot undertake a quantified cost-benefit analysis as part of this inquiry. The Committee notes that, even if more data about the control methods were available, quantifying costs and benefits for invasive animal control is inherently difficult as they are not tangible. Many of the important costs and benefits are not naturally quantifiable, such as the impact of invasive species on native species or the relative humaneness of different methods of animal control.

³⁹⁹ Andrew J. Bengsen & Jessica Sparkes, 'Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.304

⁴⁰⁰ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), p.11

⁴⁰¹ Ben Fahey, State Leader of Invasive Species, Parks Victoria, *Public Hearing*, 10 October 2016, p.4

⁴⁰² Dave Forsyth, *Public Hearing*, 10 October 2016, p.4

This report therefore takes a qualitative approach to comparing different control techniques. Its primary aim is to identify the circumstances in which recreational hunting may be appropriate. The Committee notes that the findings of this inquiry should be reviewed once the trials in the Victorian Alps are completed and analysed.

FINDING 19: Programs aimed at controlling invasive animals have not previously incorporated sufficient monitoring or evaluation mechanisms. Therefore, there is currently a lack of data about the relative costs and benefits of different control techniques in Victoria. The Committee cannot undertake a quantified cost-benefit analysis of different control techniques without accurate data.

RECOMMENDATION 3: That the Government evaluate the effectiveness of existing control programs to manage invasive species.

5.3 No ‘one size fits all’

It is also important to note that there is no ‘one size fits all’ method of animal control. The most appropriate method varies depending on the species, the environment, how far advanced the spread of a species is and the broader context in which a technique is used. Many submitters and witnesses also noted that animal control programs can be more effective if they use multiple methods (either simultaneously or in a sequence), rather than relying on just one method.⁴⁰³ This is further discussed in Section 8.10 of this report.

One factor driving the need to use a range of methods is that different species respond in varying ways to different methods. The behaviour and biology of species can influence how effective a control method is. For example:

- whether a species lives in large groups or is solitary can affect the appropriateness of techniques that require finding individual animals (such as shooting) as opposed to methods which rely on the animal finding baits or traps
- the rate at which a species can reproduce impacts on what proportion of a species needs to be killed in a year to reduce the population (see further discussion in Section 5.4.1 of this chapter) and therefore how efficient a method needs to be to have an impact
- a species’ preferred environment influences how easy it is to find animals – for example, methods that are effective on a species that lives in open plains may not work on a species that prefers densely forested environments.

⁴⁰³ See, for example, Bob Gough, *Submission 67*, p.18; Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.2; David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.13

The appropriateness of a method can also be influenced by factors related to the particular environment where control is taking place, such as:

- how accessible the area is
- how close the area is to people's homes
- the presence or absence of other animals (including wild and farm animals) that may be negatively impacted by a control method
- the density of the invasive animal population
- the type of vegetation (which impacts on a species' visibility).

Even within one area, multiple methods may be required. For example, a method which is effective and appropriate in some parts of a park may be inappropriate in areas that are close to private land or high-value environmental assets.

The most effective method may also change as a control program progresses. Methods that are efficient when an animal population is dense may become less efficient as the population is reduced. An alternative method may then become more efficient or effective than the initial approach. The evaluation of the New South Wales supplementary pest control trial found that sequencing different methods in particular orders is can be important to ensure programs are as effective as possible (see Section 6.7.1 of this report).⁴⁰⁴

Similarly, the best method or methods may vary between species that are well established and those that are still expanding their territory. As discussed in Sections 2.2.3 and 3.7.2 of this report, the government has adopted the 'generalised invasive curve' in invasive animal management. With this approach, the goals of invasive animal control change depending on how advanced a species' invasion is and this may require differences in the method of animal control used. For example, more thorough techniques may be required for species where the aim is eradication rather than control. Similarly, if a species has not extended to all of its potential habitat, it may be important to eliminate all animals in outlying pockets or along the edge of the populated zone to prevent the animal expanding into new areas.⁴⁰⁵ This may require additional (or different) techniques to actions in the main population zone which are only aimed at keeping the population in check.

Ms Kate McArthur from the Department of Environment, Land, Water and Planning also noted the importance of applying control methods in the most appropriate way:

Over that course of the 10 years ... where we have refined, tried, tested, learnt and developed sort of a series of principles about how to do these things, we have really learnt what works best to achieve the outcome that you are trying to achieve in a given situation. It is really true that there is no one-size-fits-all because things vary so much depending on where you are working and what your objectives are, and that is particularly true for the peri-urban and the urban environment, where other factors

⁴⁰⁴ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), p.7

⁴⁰⁵ Invasive Species Council, *Submission 192*, p.8

come into play that limit not only what you can use but how you can use it for other factors that do not include biodiversity outcomes, for instance, safety, such as the use of firearms and things.

It is true that over time, while I cannot give an answer about what definitively works, we do have a very good understanding of how [to apply techniques] ... things like strategic and targeted, and a really clear understanding of what you are trying to achieve.⁴⁰⁶

As a result of these varying factors, the Committee is not able to declare any one control method to be ‘the best’ or the most effective. Each method has advantages and disadvantages which are explored in Chapters 6, 7 and 8 of this report.

FINDING 20: Land managers need to have the flexibility to employ different control methods (or combinations of methods) depending on the circumstances.

Nonetheless, certain methods are more appropriate (as part of a mix or by themselves) for particular species in Victoria than other methods. The Committee’s findings on which species and circumstances are best suited to recreational hunting are discussed in Chapter 8 of this report.

5.4 Measuring the effectiveness of invasive animal control programs

In order to assess control programs, it is important to establish clear criteria about what an effective program would look like. The Committee received evidence from a number of submitters and witnesses indicating that counting the number of animals killed is a poor measure of a program’s effectiveness. Instead, best practice is to focus on the problem that the program is trying to solve (such as environmental degradation, reduced numbers of a native species or livestock losses):

It is important that effective management is viewed through the prism of addressing impacts rather than of numbers of animals taken. Reducing numbers is a means to achieving a more fundamental objective. In some areas, a reduction of one or two deer may achieve significant biodiversity outcomes, whereas in other areas, it may be necessary to take a large number of deer to achieve the desired end.⁴⁰⁷

One of the key principles of invasive species or problem species management is trying to focus on managing the actual impacts. A particular landholder, for example, may be very strongly impacted by the presence of sambar deer, but it could only be a few sambar deer that are causing those serious impacts — for example, jumping into a newly sown paddock of clover or grass, just nipping the heads off the planted seedlings and trampling the paddock as well — or it could be quite a large number of deer doing that. You can actually spend a lot of time trying to figure out if it is just a few deer or a lot of deer, but what we argue is that it is best to actually focus on managing those impacts.⁴⁰⁸

406 Kate McArthur, Senior Policy Officer, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.7

407 Australian Deer Association, *Submission 168*, p.6 (with sources)

408 Dave Forsyth, *Public Hearing*, 10 October 2016, p.3

As these quotes indicate, different numbers of animals will need to be culled depending on the circumstances. Without knowing what that required number is, it is impossible to determine from the number of kills whether a program has been useful or not.

There are two other reasons that the number of kills may not provide useful information about the effectiveness of a program:

- for many invasive species, culling may make no long-term impact on the total population of the species unless it is above a certain threshold (see Section 5.4.1 of this chapter)
- in some cases, reducing the number of one species may increase the number of another, offsetting the benefits of killing the target species (see Section 5.4.2).

5.4.1 How many animals need to be culled to control the population?

The social organisation and speed with which a species can reproduce have a large impact on a species' ability to recover from culling. For some species, this means that culling may have no long-term impact unless very large proportions of the population are culled.

For many invasive animal species, only a small proportion of the young born each year will grow to adulthood. The Invasive Species Council explained, 'Of feral pigs studied in Kosciuszko National Park, about 15% survived one year. Just 1-10% of rabbits usually survive their first year and only 20% of foxes may do so.'⁴⁰⁹ The majority of young are killed by starvation, predators or disease. These are referred to as the 'doomed surplus'.⁴¹⁰

If fewer animals than the doomed surplus are killed each year, animal control techniques may have no impact on the overall population beyond the immediate term. This is because the killed animals may be ones that would have died naturally (as part of the doomed surplus) or their death may enable another animal (which would otherwise have died) to live due to reduced competition for resources.⁴¹¹

In some species, there may also be mechanisms that assist the species to replace killed members when culls occur. In foxes, for example, dominant animals reduce the fertility of others. If social groups are disrupted through control techniques, the next year may see a higher rate of pregnancy than would normally occur.⁴¹² Female deer can also have increased birth rates when more resources are

⁴⁰⁹ Invasive Species Council, *Recreational Hunting NSW: Claims v Facts* (fact sheet) (2012), p.1 (with sources)

⁴¹⁰ Invasive Species Council, *Recreational Hunting NSW: Claims v Facts* (fact sheet) (2012), p.1

⁴¹¹ Invasive Species Council, *Recreational Hunting NSW: Claims v Facts* (fact sheet) (2012), p.1; Carol Booth, Invasive Species Council, 'Hunting & Feral Animal Control: Conservation or Con?' in Melina Tensen & Bidda Jones (eds), *Proceedings of the 2010 RSPCA Australia Scientific Seminar: Convergence or Conflict: Animal Welfare in Wildlife Management and Conservation* (2010), p.26; Animals Australia, *Submission 213*, p.6

⁴¹² Victorian Institute of Animal Science Vertebrate Pest Research Department, *Evaluation of the 2002/03 Victorian Fox Bounty Trial* (2003), p.12

available, which may occur after culling removes competition.⁴¹³ Pigs can have more litters or larger litters when experiencing stronger pressure from hunting than pigs experiencing milder hunting pressure.⁴¹⁴

Given these factors, estimates have been made of the minimum proportions of various species in a particular area that need to be killed each year to reduce the population (see Table 5.1).

Table 5.1 Minimum proportion of animal populations that need to be culled each year to reduce the population beyond the immediate term

Species	Minimum proportion
Rabbit	87 per cent
Pig	approximately 70 per cent/51 per cent ^(a)
Fox	65 per cent
Cat	57 per cent
Hog deer	53/52 per cent ^(a)
Sambar deer	40 per cent
Dingo, wild dog	38 per cent
Goat	35/34 per cent ^(a)
Fallow deer	34 per cent

(a) First figure from Invasive Species Council; second figure from Bengsen & Sparkes

Sources: Invasive Species Council, *Recreational Hunting NSW: Claims v Facts* (fact sheet) (2012), p.1 (with sources); Andrew J. Bengsen & Jessica Sparkes, 'Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.301 (with sources)

If control techniques in an area remove less than the thresholds in Table 5.1, they may not have any impact on the overall number of animals beyond the immediate term. The Committee notes that these thresholds are quite high in a number of cases, often requiring control programs to be thorough, consistent and long-term in order to be effective.

A trial of low-level cat trapping in Tasmania found that cat numbers actually increased in areas where culling took place. This is thought to have been caused by an influx of cats from other areas facilitated by the removal of dominant cats through the cull.⁴¹⁵

In general, even if more animals in an area are culled than the threshold, control efforts may be unsuccessful in the longer term if the area is open to recolonisation from neighbouring populations.

⁴¹³ Lawyers for Animals, *Submission 208*, p.7

⁴¹⁴ Laura B. Hanson, Michael S. Mitchell, James B. Grand, D. Buck Jolley, Bill D. Sparklin & Stephen S. Ditchkoff, 'Effect of Experimental Manipulation on Survival and Recruitment of Feral Pigs' *Wildlife Research* 36 (2009), pp.188-9; Sabrina Servanty, Jean-Michel Gaillard, Francesca Ronchi, Stefano Focardi, Éric Baubet & Olivier Gimenez, 'Influence of Harvesting Pressure on Demographic Tactics: Implications for Wildlife Management' *Journal of Applied Ecology* 48 (2011), p.838

⁴¹⁵ Billie T. Lazenby, Nicholas J. Mooney & Christopher R. Dickman, 'Effects of Low-Level Culling of Feral Cats in Open Populations: A Case Study from the Forests of Southern Tasmania' *Wildlife Research* 41(5) (2014), pp.416-7; People for the Ethical Treatment of Animals Australia, *Submission 124*, p.3

Measuring the number of animals killed fails to take account of the capacity for an animal population to recover from culling through increased survival rates of the remaining animals, additional births or recolonisation from other areas.

5.4.2 Secondary impacts

The environment is a complex system and reducing the number of one species can have multiple secondary impacts. In some cases, it may facilitate another invasive species becoming more prevalent or may lead to greater predation on native species.⁴¹⁶ For example, concerns were raised with the Committee that:

The impact of control of one species on other pests needs to be considered. An example is the control of foxes will reduce the pressure they put on rabbit populations so the unintended impact can be expected to be increased rabbit numbers.⁴¹⁷

Exterminate too many wild dogs/dingos and the various macropod species populations will increase at an unhindered and prodigious rate. Current experience is that kangaroo numbers are more than the environment can support and are eating themselves into an ecological desert as well as causing issues for farmers aka when they graze his grass/crops meant for his stock aka sheep and cattle – on his farm land.⁴¹⁸

... the removal of a large number of deer from the regions could mean the removal of a food source for wild dogs, which as a result will turn to other sources of food. That might be other native animals; it might be domestic animals.⁴¹⁹

These secondary impacts may offset some of the benefits of particular control techniques which target only one species. However, such secondary effects may not be present where an integrated program is undertaken.

If the only measurement of a program is the number of the target species killed, it will not be possible to see these secondary effects. In contrast, measuring the impacts of invasive animals on the environment or agriculture may highlight any negative secondary effects.

5.4.3 Better-practice evaluation

A key to effectively evaluating animal control programs is for the program to have clearly articulated goals or objectives. These may relate to healthier native vegetation, increased numbers of native animals, reduced damage to waterways, decreased impacts on agriculture or a range of other matters. They may be focussed on particular high-value assets or on larger scales.

⁴¹⁶ See Glen Saunders & Lynette McLeod, *Improving Fox Management Strategies in Australia*, report for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), pp.63-6 for a discussion of the fox and its relationship to other animals.

⁴¹⁷ Kara Kara Conservation Management Network, *Submission 160*, p.1

⁴¹⁸ Dennis Keith, *Submission 11*, Attachment 1, p.3

⁴¹⁹ Paul Hamlett, Snake Island Cattlemens Association, *Public Hearing*, 7 October 2016, p.4

These objectives should influence the choice of animal control methods and should form the basis for monitoring and evaluating a program's success.

Best practice in evaluating animal control programs is to directly measure the outcomes identified in the objective, such as the condition of environmental assets, the number of native animals or the damage to agricultural assets. Different methods may be required depending on the objectives. For example, a 'land condition index' is used in South Australia to monitor Operation Bounceback (see Section 6.7.2 of this report). The land condition index involves a series of criteria relating to the type and condition of vegetation, which can be used to score land and which can provide an objective assessment of land over time.⁴²⁰ Alternatively, remote cameras or faecal pellets might be used to identify changes in the population of a threatened native species that a program is trying to help.

Measuring outcomes like these (rather than the number of kills) recognises the problems set out in Sections 5.4.1 and 5.4.2 of this chapter. Changes in outcomes will indicate whether a control activity is sufficient to reduce the impact of an invasive animal. They can also pick up some secondary impacts. However, this approach may be problematic in some cases. For example, where a program is trying to limit the impact of invasive animals on a threatened species, the abundance of the threatened species in the area may be low and recovery may be slow, making detection of that species difficult.⁴²¹

An alternative approach is to measure changes in the abundance of invasive animals at a site. This approach has been adopted in New South Wales⁴²² and New Zealand. Dr Clare Veltman from the New Zealand Department of Conservation explained:

We concentrate on measuring something called the relative abundance of deer. We use their faecal pellets, which we measure in small plots on transects located randomly in the forests where we work. We take that data on an annual basis, and we look at how it changes over time — so relative to the last time we measured faecal pellets on these lines, what is it today? That is how we track rises and falls in the abundance of the animals. We do not count them directly, because to do so would break the budget. Using faecal pellets is a highly repeatable method. We do know that it is related to the actual abundance of deer, because that step has been worked through.⁴²³

420 Robert T. Lange, Brendan G. Lay & Rodger W. Tynan, 'Evaluation of Extensive Arid Rangelands: the Land Condition Index (LCI)' *Transactions of the Royal Society of South Australia* 118(2) (1994), p.128; Government of South Australia, *Bounceback: Celebrating 20 Years* (2012), p.8

421 New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), Appendix 9, p.9

422 New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), Appendix 9, pp.9-10

423 Clare Veltman, Principal Science Advisor, New Zealand Department of Conservation, *Public Hearing*, 10 October 2016, p.2

Faecal pellet counts can be relatively labour-intensive.⁴²⁴ Other methods of tracking changes in an animal population include remote cameras, counting the number of animals encountered by hunters, spotlighting, aerial surveys and 'distance sampling'.⁴²⁵

Tracking changes in population abundance is not as robust as measuring changes in invasive animal impacts. Generally a reduction in invasive animal abundance will lead to a reduction in the amount of damage caused, but not always. In addition, this method does not account for possible secondary impacts, such as increasing numbers of other species. However, changes in the relative abundance of a species over the long term do indicate whether or not a control technique is actually reducing the population, which cannot be determined by simply counting the numbers of animals killed.

Whether outcomes or invasive animal abundance are measured, it is important to measure results over the long term. As discussed in Section 5.4.1 of this chapter, many species are able to compensate for culling, so that short-term impacts do not necessarily lead to long-term results. It is also important to have baseline data – that is, data about the situation prior to the control activity – to properly understand the impact of culling activities.

Evaluations will also be more robust if control areas are established – that is, areas that are similar to the ones where animal management programs are taking place except that the programs are not occurring. Comparing the control areas to the program areas helps the evaluation to distinguish the effects of the program from other things that may be occurring.

Further discussion about monitoring and evaluating Victoria's invasive animal programs can be found in Section 10.3.2 of this report.

The Committee notes that these factors have been incorporated into the evaluation framework for the trials in the Alpine National Park (see Section 6.5.2). However, a number of other programs in Victoria have much less robust monitoring in place.

FINDING 21: Counting the number of invasive animals killed is not a reliable way to assess the effectiveness of an animal control program. It fails to account for the differing numbers of animals that may be causing a problem in different situations, the fact that many species can recover from large culls quickly and possible secondary impacts from species that benefit from the removal of the target species. More effective ways to assess control programs include monitoring changes in the impact of invasive animals (such as the condition of the environment, native species numbers or livestock losses) or changes in the relative abundance of an invasive species.

⁴²⁴ Matt Amos, Greg Baxter, Neal Finch, Allan Lisle & Peter Murray, 'I Just Want to Count Them! Considerations when Choosing a Deer Population Monitoring Method' *Wildlife Biology* 20 (2014), p.367

⁴²⁵ Dave Forsyth, *Public Hearing*, 10 October 2016, p.5; New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), pp.21-3; Matt Amos, Greg Baxter, Neal Finch, Allan Lisle & Peter Murray, 'I Just Want to Count Them! Considerations when Choosing a Deer Population Monitoring Method' *Wildlife Biology* 20 (2014), pp.362-70

5.5 Different purposes for undertaking animal control

When assessing control techniques, the effectiveness of a technique is one clear consideration but it is not the only one. A range of other factors can also be taken into account, such as the impact of a method on agriculture, on the environment, the humaneness of a method and the recreational opportunities provided.

Which of these factors are considered, and how they are weighted, varies depending on the purpose of the work. In the course of this inquiry, four purposes for animal control were regularly encountered:

- farming purposes
- natural environment purposes
- animal welfare purposes
- recreational hunting purposes.

This section draws out each of these purposes in general terms. These are not mutually exclusive and all relate back to the reasons for undertaking the control work and the desired outcomes.

Particular individuals and organisations often approached the inquiry seeking to achieve more than one of these. The Committee does not mean to suggest that any of the submitters or witnesses quoted below adhered to only pursuing one purpose.

In particular, the Committee notes that many hunters were also concerned about animal welfare and the natural environment. Similarly, environmental groups often supported shooting where it has the potential to reduce the impacts of invasive animals.

The Committee received overwhelming evidence that invasive animals are a serious threat and require urgent attention. Submitters and witnesses shared a common desire to reduce the problem. Differences in opinion often related to priorities and details rather than overall goals.

5.5.1 Effects on farming

A number of farmers provided the Committee with details about the negative impacts invasive animals have on farm productivity. As Mr Gerry Leach from the Victorian Farmers Federation (VFF) told the Committee:

We are concerned that the cost-benefit analysis model seemingly focuses on biodiversity outcomes rather than the full range of statutory considerations under legislation, including those under the Catchment and Land Protection Act. VFF members are concerned with the impacts of pest animals on production and their livelihood. The impact of different invasive species includes but is not limited to direct stock loss from attack, such as foxes and wild dogs; potential stock loss from

disease from invasive species, such as wild pigs, goats and deer; reduction of fodder from invasive species, such as rabbit and deer but not limited to them; and direct environmental impact and land degradation from species such as rabbits.⁴²⁶

The Committee was also told about farmers' productivity being impacted by invasive animals damaging fencing, consuming crops and by the amount of time farmers are required to spend on animal control (see Section 2.6 of this report).

In addition to primarily focussing on the impacts of invasive animals on agriculture, control work for farming purposes may also place importance on reducing the time commitment required by farmers to control invasive animals. If a method is adopted that requires farmers' time, a system which enables some financial compensation for that time (such as bounties or allowing the use of carcasses) may be preferred.

5.5.2 Protecting the environment

The primary concern of some submitters and witnesses was the natural ecosystem. With this approach in mind, invasive animal control may be primarily aimed at protecting certain species from predation, preventing competition for food resources or protecting certain habitats (see Section 2.5 of this report for a discussion of the impact of invasive animals on the natural environment). For example, the Committee was told by some submitters:

Government has a Duty of Care to the environment and therefore must place the well-being of the environment and biodiversity ahead of any other consideration, including agriculture and recreational pursuits.⁴²⁷

We do not accept that 'socio-political' considerations should override sound, proven management techniques. We also do not accept that 'socio-political' considerations can be used as an excuse for acceptance of continued environmental degradation of fragile and threatened ecosystems. It is our position that the paramount consideration must be the protection of native plants and animals ...⁴²⁸

Approaching invasive animal control with the primary purpose of protecting the environment may give preference to methods that protect specific areas of high environmental value. More importance may be placed on limiting the impacts of a control method on species other than the target species when aiming to achieve this purpose.

⁴²⁶ Gerry Leach, Chair, Land Management Committee, Victorian Farmers Federation, *Public Hearing*, 10 October 2016, p.2

⁴²⁷ Friends of the Gippsland Lakes Parks and Reserves, *Submission 166*, p.1

⁴²⁸ Bushwalking Victoria, *Submission 131*, p.2

5.5.3 Animal welfare

Most animal welfare groups accepted the need to control and in certain circumstances eliminate invasive species to reduce the damage they cause. Control work aimed at achieving animal welfare purposes gives strong consideration to the suffering caused by the different methods of control. The RSPCA, for example, explained:

The RSPCA believes that any measures taken to manage wild animals must recognise that whether an animal is native, introduced or viewed as a ‘pest’ does not affect its capacity to experience pain, suffering or distress.⁴²⁹

... the RSPCA believes any methods that are used must be justified, effective and humane: so, justified—there must be evidence of attributable impact to the target species and that control methods will be effective; effective—monitoring must be done not just on the numbers but on the impact; and humane—to minimise suffering the most humane techniques should be used that will cause the least amount of pain and suffering to the target animal with the least harm or risk to non-target animals, people and the environment. The technique must also be effective in the situation where it will be used. It is important to remember that the humaneness of a technique is highly dependent on whether or not it is correctly employed. In selecting a technique, it is therefore important to consider whether sufficient resources are available to fully implement that technique.⁴³⁰

This approach was also adopted by the Invasive Species Council.⁴³¹

The RSPCA advocated the use of the humaneness assessment model.⁴³² This tool assesses different methods of animal control based on two factors:

- the impact of the method on the animal’s welfare prior to death
- the intensity and duration of suffering caused by the mode of death.⁴³³

These two factors are combined to give each method of animal control an overall score, enabling comparisons. Scores were determined for a variety of pest animals in Australia by a ‘Humaneness Assessment Panel’ that included researchers, a park ranger and veterinarians.⁴³⁴

Figure 5.1 provides the results for deer. The most humane methods appear in the bottom left of the matrix, with methods becoming less humane the closer they are to the top right corner. For example, this figure concludes that a ground shot to the head is considered to be the most humane method to kill a deer.

⁴²⁹ RSPCA Victoria, *Submission 53*, p.1

⁴³⁰ Mhairi Roberts, Animal Welfare Policy Manager, RSPCA Victoria, *Public Hearing*, 5 September 2016, p.2

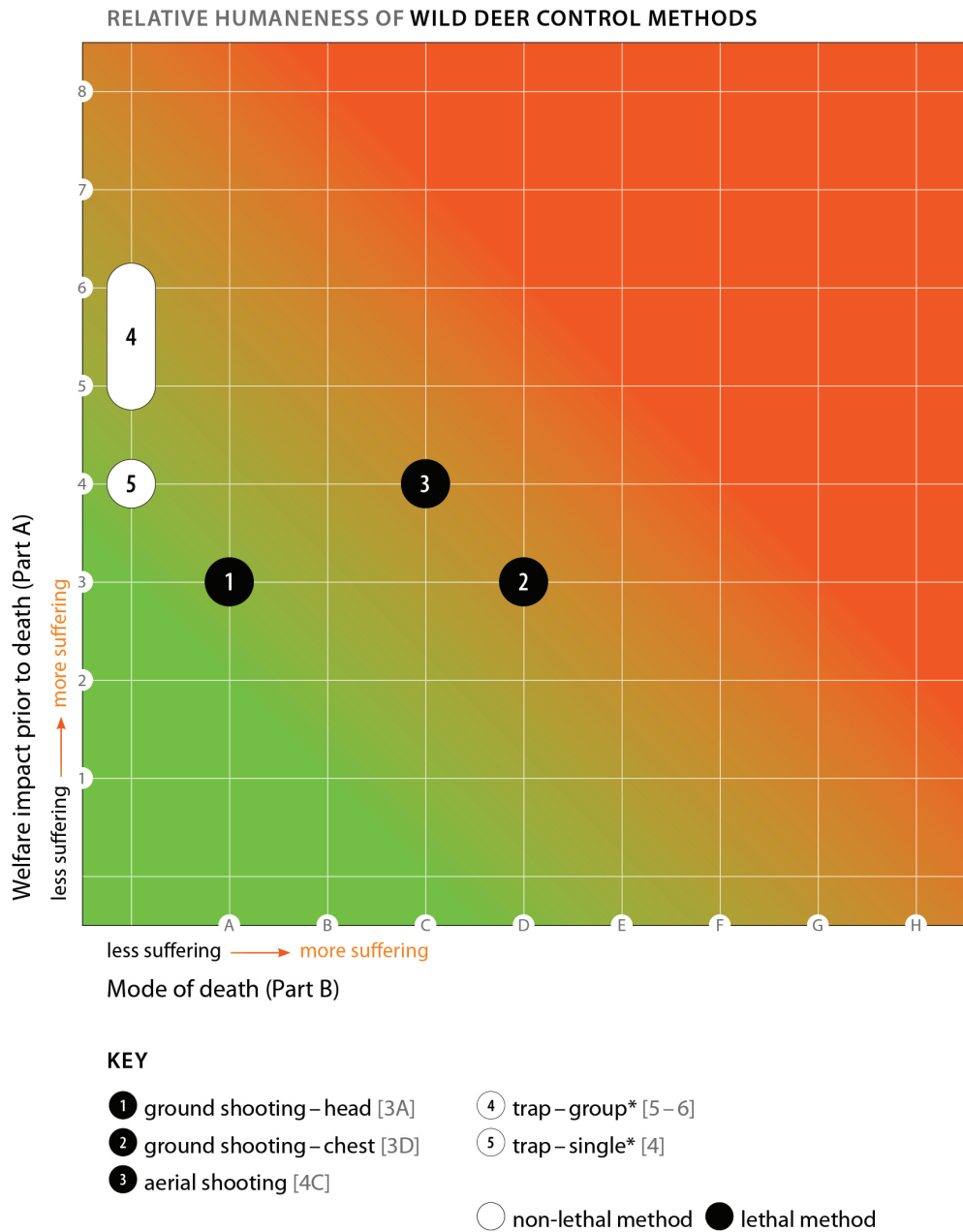
⁴³¹ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.3

⁴³² Mhairi Roberts, Animal Welfare Policy Manager, RSPCA Victoria, *Public Hearing*, 5 September 2016, p.2

⁴³³ Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humaneness of Pest Animal Control Methods* (2nd edition, 2011)

⁴³⁴ Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humaneness of Pest Animal Control Methods* (2nd edition, 2011), p.5

Figure 5.1 Humaneness assessment of deer control methods



*Note: the humaneness of trapping is highly dependent on how the subsequent stages (i.e. holding in the yards, drafting, shooting or transport) are conducted. The cumulative effects of these stages will compound welfare impact.

Source: Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humaneness of Pest Animal Control Methods* (2nd edition, 2011) Commonwealth Department of Agriculture, Fisheries and Forestry, p.117

5.5.4 Hunting for sport and recreation

For recreational hunters, the recreational benefits of hunting and personal benefits (such as meat and trophies) are important considerations:

Taking to the bush with thousands of dollars of equipment is a form of recreation that satisfies the hunter and supports local economies. When successful most will bring home organic meat. Those that aren't they will still have stories and feel satisfied with their escape back to nature. Hunters don't just talk about the bush they walk in it, sleep in it and having a longing in their souls to be part of it.⁴³⁵

Every year during Autumn I spend 10 days hunting Sambar deer in the Alpine National Park. I travel all the way from Southern Tasmania which requires a trip across Bass Strait on the 'Spirit of Tasmania'. I have made this journey every year since 2009 and without doubt it is my favourite time of the year ... I incur huge costs to travel to your State to hunt, however this does not deter me as the experience I receive whilst undertaking my pastime in your forests far out ways the money spent to reach it ... Growing your own vegetables and hunting game animals for meat is seen as a popular alternative to purchasing your food on a plastic tray and being far removed from its origins. Recreational hunting allows people to achieve this lifestyle.⁴³⁶

From this point of view, hunting may be a preferred method of animal control even if it is not the most effective.

Recreational hunters may be reluctant to kill as many animals as possible (many hunters feel a strong dislike of wasting meat which may make some hunters reluctant to shoot more animals than they can eat – see Section 6.8.3 of this report). Reducing animal numbers is a key goal of performing control work for other purposes. One component of this inquiry has been to identify how to harness recreational hunters' interests in undertaking shooting for sport and recreation and use this interest to achieve control outcomes for other purposes.

FINDING 22: In addition to effectiveness, it is important to identify and agree on the purpose of performing the control work when determining the method of control to apply in a particular circumstance. An assessment of control methods may consider the impact on agriculture, the impact on the environment, the humaneness and the recreational and lifestyle opportunities of hunting.

⁴³⁵ Stephen Stepic, *Submission 66*, p.1

⁴³⁶ Gerard Brereton, *Submission 117*, p.1

6 Professional and recreational shooting

6.1 Introduction

As discussed in Chapter 4, recreational or community hunting is a popular pastime. Like any other sporting activity, hunting is a sport that an individual may choose to participate in and enjoy for personal reasons.

As well as this individual benefit, hunting is seen as an activity that may, under certain circumstances, provide a community benefit in the context of invasive species by reducing the number of these animals.

Parks Victoria and other government bodies have commenced trials of what has been described as ‘co-ordinated’ recreational or community hunting. This involves individual hunters who are members of community hunting organisations (such as the Australian Deer Association, Sporting Shooters Association of Australia or Field & Game Australia) volunteering to participate in hunts co-ordinated and supervised by government bodies or other organisations. These hunts target invasive species that are destroying native flora and fauna and precious ecosystems. Trials are underway in numerous locations, discussed further in this chapter.

These trials form the basis for this inquiry’s terms of reference, which asked the Committee to consider the benefits of government bodies’ use of community hunting organisations and individuals in the control of invasive animals on Crown land.

Unlike other forms of recreational hunting, these trials are co-ordinated, supervised and regulated. They are conducted as part of specific operations at specific locations and times. They are, in some cases, conducted on public land where recreational hunting is otherwise prohibited.

While recreational hunters that are not part of a co-ordinated program may be invited onto private land to shoot invasive animals, legislation strictly limits their ability to shoot invasive animals on public land, often prohibiting it entirely and only allowing it in specific areas and (for some species) at specific times (see Chapter 3 of this report). The legislation, the nature of individual recreational hunting and safety concerns in the community mean this ‘unsupervised recreational hunting’ is not effective in controlling invasive animals.

Early results from the co-ordinated hunting programs, while incomplete and difficult to draw conclusions from, suggest that the programs may be achieving benefits in terms of controlling invasive species. However, submitters and witnesses generally agreed that co-ordinated recreational hunting by itself is

not sufficient to manage invasive animals. While it may be part of the solution, it should not displace other means, such as paid professional pest controllers and other methods discussed in Chapter 7 of this report.

The use of recreational hunters has been a cause of some concern for a number of submitters and witnesses to this inquiry. In particular, concerns have been raised about the risk of people being accidentally shot, reductions in the amenity of parks for other users and the possibility of animals being killed inhumanely by inexperienced or irresponsible hunters.

The overwhelming majority of the evidence received supported shooting as a means of animal control. Due to the scale of the pest problem, there was support for the expanded use of recreational hunters in pest control (an increase in both opportunities for unsupervised recreational hunters and volunteer hunters involved in co-ordinated programs).

In considering this expansion, the challenges of balancing hunting with other tourism pursuits were recognised:

... I have seen, for example, carcasses on the back of four-wheel drives in the main street of Mansfield with blood dripping onto the road. So is it a reality of life? Hunting is absolutely a reality of life. Is it a right for people to do and a suitable? Absolutely. Is it appropriate to have a carcass in the main street in Mansfield? That is what causes some challenges for some in the community.⁴³⁷

These community perceptions about hunting are an important factor to be managed in any use of shooting as a means of animal control.

This chapter compares three different forms of shooting that take place in Victoria in relation to animal control:

- paid professional shooting, which is undertaken by professional pest controllers along with a range of other techniques when hired by government bodies or private individuals
- co-ordinated recreational hunting programs, where volunteer hunters (often organised through community hunting organisations) are directed by government bodies or other organisations to hunt at particular times and places as part of managed, supervised programs
- unsupervised recreational hunting, in which individuals or groups travel to destinations of their own choice at times of their own choosing to hunt as a recreational activity.

The Committee heard evidence about differences relating to the effectiveness, safety and cost of shooting conducted in these various forms. These issues are explored in this chapter. Particular attention is paid to co-ordinated recreational (or community) hunting, as this is a primary focus in the terms of reference for this inquiry.

⁴³⁷ Alex Green, Chief Executive Officer, Mansfield Shire Council, *Public Hearing*, 20 October 2016, p.4

Overall, three questions are raised in relation to evaluating the effectiveness of shooting as a method of invasive animal control:

- What are the outcomes and results?
- How much did it cost?
- If the same funds were directed to other forms of shooting or alternative control methods, would they achieve the same or better outcomes?

Chapter 8 of this report considers the answers to these questions on a species-by-species basis and looks at the role that shooting might best play as part of Victoria's invasive animal control strategy.

6.2 Humaneness of shooting

The Committee notes the concerns raised during this inquiry in relation to the humaneness of shooting for invasive species control.

Dr Nancy McMurray (Friends of Gippsland Lakes Parks and Reserves) believed that recreational shooters wounded animals without killing them more often than professional shooters.⁴³⁸ She therefore argued that:

It has been found to be not humane. Many studies show that often the animals are not killed cleanly. They are maimed or just injured and suffer horribly, and the RSPCA conditions for humane culling by firearms does not endorse recreational hunting.⁴³⁹

A number of other submitters and witnesses also expressed concerns about the humaneness of shooting. The RSPCA explained to the Committee:

... the RSPCA believes that hunting has the potential to result in animals suffering significantly, including being:

- chased to the point of exhaustion;
- killed with methods that do not cause a quick and painless death
- injured and left to die a slow, painful death

Although some hunters may have the skills, knowledge and motivation to minimise the suffering of their prey, many do not and it is inevitable that some animals will endure pain and distress. With some hunting activities and practices the potential for significant suffering is extremely high, for example:

- where animals are injured but are not retrieved;
- where dogs are used and are not controlled properly;
- where hunters lack technical skill;
- where killing methods do not cause rapid death;
- or where dependent young are left abandoned.

⁴³⁸ Nancy McMurray, Friends of the Gippsland Lakes Parks and Reserves, *Public Hearing*, 6 October 2016, pp.12-13

⁴³⁹ Nancy McMurray, Friends of the Gippsland Lakes Parks and Reserves, *Public Hearing*, 6 October 2016, p.5

Current regulations and enforcement regimes do not prevent these things from occurring – they are an inevitable consequence of recreational hunting activities.⁴⁴⁰

To mitigate some of this suffering, Lawyers for Animals called for research into using darts with high doses of sedatives or analgesics to cause rapid and painless death.⁴⁴¹

6.3 Paid professional shooters

Paid professional shooters are used extensively in Victoria to control invasive animals on both public and private land.

Submitters and witnesses noted a number of advantages that paid professional shooters have over recreational hunters (whether shooting as part of a co-ordinated program or unsupervised). Mr Bob Gough, who has trained hunters and designed accreditation programs for recreational hunters to work with Parks Victoria, noted that shooting accuracy requires continual practice and that:

Professional shooters certainly do a lot of shooting, so they are good shots because it is their occupation. They would get over the nerves a lot better because they are more experienced. But experienced recreational hunters who are very experienced and knowledgeable would get over the nerves as well or they would not take the shot, and that is basically what we teach the recreational hunters.⁴⁴²

Mr Cameron Skedd, President of the Vertebrate Pest Managers Association Australia, similarly noted that:

[Professional pest managers] spend a lot of their time on the trigger, so they are pretty good shots. But again we recognise that some of the Sporting Shooters guys are excellent shots as well. But when you do it for a living and you are out there to control numbers, to get the numbers down, it is a job at the end of the day. You do not get overexcited when you see a massive, big male deer walk in front of you. He is just the target; you take him down humanely and professionally and move on.⁴⁴³

Mr Kirk Stone, the Director of Strathbogie Wildlife (an animal control company), provided an example of professional shooters' experience. He explained that the four principle staff in his company had culled in excess of 1,200 sambar deer and 40,000 other animals in the previous two years.⁴⁴⁴

Professional shooters are required to meet certain standards, which include techniques to destroy animals humanely:

⁴⁴⁰ RSPCA Victoria, response to questions on notice from *Public Hearing*, 5 September 2016, p.5; see also Lawyers for Animals, *Submission 208*, p.9

⁴⁴¹ Lawyers for Animals, *Submission 208*, p.10

⁴⁴² Bob Gough, *Public Hearing*, 19 October 2016, pp.9-10

⁴⁴³ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.8

⁴⁴⁴ Kirk Stone, *Submission 205*, p.2

There are codes of practice that the professionals abide by— *Ground Shooting of Feral Deer* is a code of practice. We have to follow all the protocols in the codes of practice as a bare minimum. We have to have competencies. There is a whole gamut of programs that we generally need to comply with before we can get any work with the government departments. We have to have done humane use of firearms to control vermin and pests courses. We have to have very tight, constrained insurance, lots of training, proficiencies and all the licences that we need as commercial contractors.

... Some of the tests that are gone through—the humane use of firearms to control animals test is pretty tough actually.⁴⁴⁵

The Vertebrate Pest Managers Association Australia identified a range of training courses available to professional shooters.⁴⁴⁶ Mr Stone stated that a professional shooting company may also have access to a range of expertise, including veterinarians, ecologists and experts in various shooting, safety and other technologies.⁴⁴⁷

Mr Stone also explained:

Shooting in the workplace while subject to workplace safety and animal welfare scrutiny is vastly different to the service provided by well intentioned volunteers. Professional programs are audited for animal welfare standards and population reduction effectiveness. Shooters are aware that their livelihood and reputation depend on their professionalism and effectiveness. Professional shooters are subject to workplace safety protocols, formal review, discipline, training and constant field assessment and accountability. This level of audit and transparency is not applied to volunteer organisations that essentially self-regulate.⁴⁴⁸

As noted by Mr Gough and Mr Skedd, some recreational hunters may be as competent as professional shooters. However, there is a wide range of skill levels with recreational hunters, and some do not have the same levels of proficiency (see Section 6.8.1 of this chapter).⁴⁴⁹

Professional shooters may also be more efficient than recreational shooters because they have access to additional equipment. This includes category C and D firearms, such as semi-automatic rifles, which recreational hunters are not permitted to have (see Section 4.3.1 of this report). Mr Skedd explained:

Our members, with the category D firearms, have been able to control 20 or 30 sambar deer in about a minute flat as they are running across an open reserve or when they are turning up now on the water catchment lands, which are open lands — dry dams and things like that. They are physically able to control a larger number of animals within a much smaller time frame with just a one or two-man team. I have had numbers quoted of around \$50 per deer for some of our members working on farmland in Victoria controlling sambar deer. It can be a very efficient method of control cost-wise. I have members in Tasmania who do a lot of this. They free-feed,

⁴⁴⁵ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.8

⁴⁴⁶ Vertebrate Pest Managers Association Australia, *Submission 169*, p.8

⁴⁴⁷ Kirk Stone, *Submission 205*, p.2

⁴⁴⁸ Kirk Stone, *Submission 205*, p.2

⁴⁴⁹ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.6

so they train the deer to come to feed stations. They can control during the night 50 animals a day, 200 days a year, and that is with one person. The time efficiencies — the man-hours efficiencies — for professionals and the tools that we have at our disposal, that are given to us, are very significant.⁴⁵⁰

There are two fellows I spoke to this week who have done similar things with their category D firearms ... They both, using these firearms to control sambar deer, routinely knock off 20 to 30 in a couple of minutes, if that.⁴⁵¹

Mr Barry Howlett from the Australian Deer Association further noted:

They have sound moderators, semiautomatic firearms, in some instances, and a lot of investment. We have started using thermal imaging gear on some of these programs and it is \$4000 for a monocular and then \$4000 for a scope. So your paid shooters are geared up with some really, really good equipment.⁴⁵²

Professional shooters are able to undertake aerial shooting in some cases using helicopters.⁴⁵³ With aerial shooting, professional shooters can access more remote areas that recreational hunters may not be able to access. Aerial shooting has been used successfully in a number of jurisdictions. Its potential for use in Victoria is discussed in Section 8.9.2 of this report.

The ability to use aerial shooting and other equipment may reduce the amount of animal suffering during culling exercises. The RSPCA stated:

Some of the methods used by professional pest animal controllers are more humane than those used by hunters. For example, in some situations aerial shooting has been assessed as being more humane than ground shooting since the distance from the shooter to the animal is much shorter and wounded animals can be followed up quickly. Also, shooting of deer at night with the aid of a spotlight causes less stress to the deer compared with recreational hunting where deer are only permitted to be shot during daylight hours.⁴⁵⁴

As with co-ordinated recreational hunting, professional shooters can be concentrated at a particular place and time where animal control is most needed.⁴⁵⁵ Professional shooters may also be more methodical in their approach within an area.⁴⁵⁶ These factors can provide advantages in terms of effective animal control.

450 Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.3

451 Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.5

452 Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.10

453 Vertebrate Pest Managers Association Australia, *Submission 169*, pp.4, 6, 9

454 RSPCA Victoria, response to questions on notice from *Public Hearing*, 5 September 2016, p.3

455 Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.6: Glenelg Shire Council, *Submission 35*, p.1

456 Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.5

Overall, these advantages enable professional shooters to kill more animals in a shorter period of time than recreational hunters. The RSPCA has stated that:

For example, in the Gum Lagoon Conservation Park in South Australia, 65 recreational hunters over 4 days were only able to kill 44 deer, while one professional marksman in a helicopter was able to kill 182 deer in 4 hours. In Tasmania, an investigation into wallaby shooting methods found that in two nights of shooting, a single professional marksman achieved the same level of population reduction as four recreational shooters were able to achieve in a year.⁴⁵⁷

The concentration of kills in a short period of time can minimise the extent to which the carcasses of shot animals attract other species. Professional shooters may also have equipment (such as 200-metre cables, winches and slide trails) to assist with removing deer carcasses.⁴⁵⁸ This may reduce problems with wild dogs or foxes feeding on the carcasses (see Section 6.8.4 on this matter).⁴⁵⁹

However, professional shooters come with a cost, especially if undertaking aerial shooting. While unsupervised recreational hunting may be less efficient, it has very little cost for the Government (see Section 6.9 of this chapter). Unsupervised recreational hunting may therefore be more cost-effective from the Government's perspective, despite the lower level of kills per hour.

The Committee was also informed that it may be difficult to organise professional shooters, especially at short notice:

The benefit of using volunteers is in the ready availability of a significant pool of volunteers, all trained to the same standard and managed by two organisations (ADA [Australian Deer Association] and SSAA [Sporting Shooters Association of Australia]) who partner on operations. For example, should PV [Parks Victoria] require 40 shooters for a program at short notice they can organise this within a few days by dealing with two organisations. Organising 40 contract shooters would mean dealing with perhaps 25-30 separate businesses, most of whom would not have worked together previously and would not share common procedures.⁴⁶⁰

The Committee notes that it may not be necessary to organise 40 professional shooters to achieve the equivalent outcomes as 40 recreational hunters, given the greater efficiency of professional shooters. However, the Committee also heard from other organisations about the willingness of recreational hunters to help, even at short notice.

⁴⁵⁷ RSPCA, *Is Recreational Hunting an Effective and Humane Form of Pest Animal Management in National Parks?* <kb.rspca.org.au/entry/540>, viewed 31 January 2017, cited by Victorian National Parks Association, *Submission 191*, p.2 and Euan Moore, *Submission 203*, pp.5-6; and RSPCA Victoria, response to questions on notice from *Public Hearing*, 5 September 2016

⁴⁵⁸ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.11

⁴⁵⁹ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.11

⁴⁶⁰ Bob Gough, *Submission 67*, p.19

Mr Richard Hodgens from Moyne Shire Council also compared professional and recreational shooters in relation to controlling foxes on Griffiths Island (see Section 6.6.3 of this report):

... I am aware that the Friends of Griffiths Island looked at employing the services of a professional shooter on the side to that. This would have been back in about 2011. They obtained a quotation for services and did a bit of a dummy run, where they did not actually shoot anything but went out to see whether or not it was practical. My understanding is that it failed due to the challenge of getting the shooter on nights when it would be suitable. If it was suitable, then the professional shooter would be out shooting on private property somewhere else. We are very fortunate that Warrnambool Field and Game, having a reasonably large membership, can book it in advance and go, 'Yes, we'll definitely be there on that night'.⁴⁶¹

6.4 Co-ordinated hunting programs

'Co-ordinated recreational hunting programs' involve the use of volunteers from recreational hunting organisations in programs directed by government bodies or other organisations. The volunteer hunters are recruited for a particular operation, at a specific location at certain times and are supervised by the co-ordinating body and other hunters.

There may be some differences in the effectiveness of unsupervised recreational hunting compared to co-ordinated recreational hunting. Co-ordinated hunting provides advantages by:

- concentrating hunters' efforts on key assets at the same time, providing for a larger harvest at that location
- being more easily integrated into broader control programs involving multiple methods
- having more processes in place to ensure the safety of participants and other park users (in some cases, parks may even be closed off to other park users while programs are in progress), enabling it to take place in parks that experience high visitation
- addressing community safety concerns in relation to recreational hunters
- enabling a selection or accreditation program for hunters so that only more skilled hunters take part, thereby reducing animal suffering.

The first collaboration between Parks Victoria and the Sporting Shooters Association of Australia (Victoria) occurred in November 2003, when 50 volunteer shooters were involved in a co-ordinated hunting effort to control goats in the Murray Sunset National Park.⁴⁶² The use of these programs has since expanded.

⁴⁶¹ Richard Hodgens, Environment Officer, Moyne Shire Council, *Public Hearing*, 29 November 2016, p.3; see also p.7

⁴⁶² Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.9

The Sporting Shooters Association's submission to this inquiry lists 34 programs it has been involved in since 2003.⁴⁶³ The Australian Deer Association outlines five Parks Victoria programs that it is involved in.⁴⁶⁴

Sections 6.5 and 6.6 of this chapter outline a selection of these programs in detail. The Committee has focussed on the programs where details of their operation and outcomes were available. The programs outlined are intended to provide examples of the use of co-ordinated recreational hunting. These case studies do not provide an exhaustive depiction of the co-ordinated recreational hunting programs that have previously been conducted or are currently being conducted in Victoria.

A key strength of co-ordinated hunting programs is the ability to undertake a targeted approach to invasive animal management by concentrating hunters in a particular area over a short period of time. This can be important in focussing hunting efforts so that it occurs at the intensity required to achieve animal management outcomes. The Sporting Shooters Association also highlighted that 'volunteer hunters become familiar with the areas used by deer', which improves the success of the hunt.⁴⁶⁵

Improvements in hunter and community relations are also cited as benefits of co-ordinated hunting programs. The Australian Deer Association highlighted the working relationship that had developed between volunteer hunters and local land managers, including neighbouring private landowners, during the Yellingbo deer management program.⁴⁶⁶

The Sporting Shooters Association signed a memorandum of understanding with Parks Victoria in 2012. The Association explained that 'The aim of the MoU [memorandum of understanding] is to accredit volunteer members to assist in approved PV [Parks Victoria] pest animal control programs on public land, under the direct management of PV'.⁴⁶⁷

The Australian Deer Association and Field & Game Australia have also signed similar agreements with Parks Victoria.

As part of these agreements, members of these organisations that want to participate in control programs are required to undertake additional training and accreditation. The Sporting Shooters Association's training involves:

The SSAA [Sporting Shooters Association of Australia] Victoria with the approval of PV [Parks Victoria] has established an accreditation course for volunteers participating in its CPM [Conservation and Pest Management] programs. All member volunteers are required to undertake and pass this course prior to being granted access to both the CPM program and involvement in projects in national and State parks within Victoria.

⁴⁶³ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.14

⁴⁶⁴ Australian Deer Association, *Submission 168*, p.11

⁴⁶⁵ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.8

⁴⁶⁶ Australian Deer Association, *Submission 168*, p.14

⁴⁶⁷ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.5

The accreditation course comprises four key theory topics and a practical component. The course has been designed to provide knowledge and skills to volunteers to ensure safe firearm handling and competence in navigation within forest and park environments, to ensure successful and safe outcomes for the program.⁴⁶⁸

According to Mr Bob Gough, who has designed and taught the Australian Deer Association's accreditation course:

These programs are known as the ADA [Australian Deer Association] Deer Management Program (DMP), and the SSAA [Sporting Shooters Association of Australia] Conservation and Pest Management (CPM) Program, and require volunteers to undertake a two day training course that requires high standards of marksmanship, navigation and field craft. This training is a prerequisite for program participation and is very challenging. Only around 33% of participants pass the course.⁴⁶⁹

In addition to training and accreditation, other safety measures have been incorporated into these co-ordinated recreational hunting programs. The Sporting Shooters Association outlined various plans and guides that are developed to enhance safety:

In addition to the accreditation course all projects are covered by an Operation Plan incorporating a Standard Operating Procedure (SOP) and Job Safety Analysis (JSA). They are jointly written by the SSAA [Sporting Shooters Association of Australia] Victoria and PV [Parks Victoria] to identify the risks involved in specific projects and the control measures required to be implemented prior to commencement.

As part of this process, volunteers are required to attend briefings at both the start and conclusion of projects. Briefings are used to identify hazards and risks which may present after the writing of the SOPs and JSAs, for example, fallen branches, prohibited areas and the like.

Part of an Operation Plan identifies the means by which the public accesses a park and the measures taken to limit that access during a project. Control measures include locked gates, signage and volunteer patrols of tracks and access points. The objective of these control measures is to ensure the safety of all people who have access to a particular park.

It is particularly important to note that in the time that the CPM [Conservation Pest Management] program has been operating, there have been no consequential injuries, accidents or incidents involving SSAA volunteers, PV personnel, land holders or members of the public.⁴⁷⁰

468 Sporting Shooters Association of Australia (Victoria), *Submission 150*, pp.7-8

469 Bob Gough, *Submission 67*, p.10

470 Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.8

Other safety measures that have been incorporated into these hunting programs include:

- the use of GPS devices and radios to track and monitor hunter locations
- supervision of volunteer shooters
- park closures with volunteers or staff manning entrances and signage explaining the operation.⁴⁷¹

The People for the Ethical Treatment of Animals were critical of the safety measures implemented by Parks Victoria, stating that they were:

... insufficient and hazardous, based on probability percentages rather than certainty and asking national park visitors to bear excessive responsibility for knowing about the dangers and adjusting their behaviour accordingly.⁴⁷²

However, the organisation did not provide any evidence of actual incidents or near misses in the trials conducted to date. In contrast, the Shooting Sports Council of Victoria, the Sporting Shooters Association and the North East Catchment Management Authority rated the safety of the programs highly:

The safety of these Sambar deer operations are sound provided the operations plan, incorporating the Job Safety Analysis (JSA) and the Standard Operating Procedure (SOP) are adhered to. Pre-hunt briefing and well defined block boundaries are also imperative, as is ongoing effective project overseeing.⁴⁷³

In relation to community safety, in the four years that we have been involved there have been no consequential injuries, accidents, incidents or what have you. So we really do not believe that there is an issue with community safety as such. We have some pretty stringent approaches. We have standing operating procedures. We have job safety analysis. We have meetings before and after. So it is very tightly controlled program, and it is subject to accreditation by our hunters before we engage them to go out and get involved in that program.⁴⁷⁴

The management of community safety in the regulated Parks Victoria Deer Trial is exemplary.⁴⁷⁵

The Committee notes the importance of safety as part of any program involving shooting, especially with recreational hunters. This appears to be factored into the planning of co-ordinated recreational hunting exercises.

FINDING 23: In spite of safety concerns with hunting, there was overwhelming support for the use of shooting (including co-ordinated volunteer hunting programs) in invasive species control.

471 Bob Gough, *Submission 67*, pp.14-15; Name withheld, *Submission 119*, pp.1-2; Field & Game Australia, *Submission 207*, p.4

472 People for the Ethical Treatment of Animals, *Submission 124*, p.4

473 Shooting Sports Council of Victoria, *Submission 202*, p.7

474 Jack Wegman, Chief Executive Officer, Sporting Shooters Association of Australia (Victoria), *Public Hearing*, 5 September 2016, p.2

475 North East Catchment Management Authority, *Submission 138*, p.3

6.5 Deer management trials and programs

A number of deer monitoring and control programs involving volunteer shooters have been undertaken in various locations across Victoria. Each program has different goals or assets that the program aims to protect. Program designs, permitted hunting methods and measurement processes also differ and are tailored to the requirements of each location and situation. This section outlines three of the deer control trials and programs that are currently being implemented by Parks Victoria.

6.5.1 Wilsons Promontory National Park deer control trial

Parks Victoria initiated the Wilsons Promontory National Park hog deer control trial following an increase in the number of hog deer sightings in the area. The Game Management Authority explained:

PV [Parks Victoria] had become concerned by the perceived increase in park Hog Deer numbers. The rise in the population was thought to be having negative impacts on vegetation and browsing competition with native macropods, mainly Swamp Wallaby (*Wallabia bicolor*), Eastern Grey Kangaroo (*Macropus giganteus*) and Common Wombat (*Vombatus ursinus*).⁴⁷⁶

Culling has now taken place on three occasions – in August 2015, May 2016 and August 2016. At the time of writing, operations were also planned for May and August 2017.⁴⁷⁷

The goal of the trial was specific asset protection, as opposed to management of the park as a whole. The three sites identified for the initial operation were:

- the campground and surrounds at Tidal River
- the airstrip at Darby River
- Cotters South at Darby River.⁴⁷⁸

The 12-month preparation stage of the trial involved Parks Victoria engaging with the Australian Deer Association and the Sporting Shooters Association of Australia (Victoria) to assist in planning and to utilise their volunteer hunters. The Game Management Authority provided the required permits (for hunters to carry firearms in the park, the destruction of hog deer outside the open season and for the use of spotlights for deer hunting). The GMA facilitated an on-site checking station (to analyse the health and remove biological material from every animal harvested). The GMA reported that consultation occurred with key stakeholders, local community groups and park neighbours. Pre- and post-trial population monitoring programs were implemented and shooting zones and time periods (morning, evening and night) were established.⁴⁷⁹

⁴⁷⁶ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program* (2015), p.4

⁴⁷⁷ Matthew Jackson, Chief Executive Officer, Parks Victoria, correspondence received 28 April 2017

⁴⁷⁸ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program* (2015), p.5

⁴⁷⁹ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program* (2015), pp.4-5

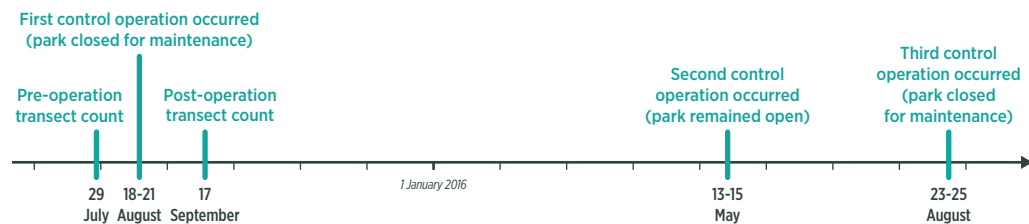
The control program involved:

- closure of parts or all of the park to other land users (two operations were timed to coincide with scheduled maintenance closures)
- site briefings and safety meetings with all volunteers and agency staff
- volunteer hunters from the Australian Deer Association and the Sporting Shooters Association of Australia (Victoria) using a variety of hunting methods (stalking, 'sit and wait' and spotlighting from a vehicle)
- Parks Victoria staff accompanying volunteers during the operations
- a pre- and post-operation transect count for the initial operation
- establishment of a checking station (to which all harvested deer were required to be taken), where harvest samples and measurements were taken and analysed
- hunters being able to butcher, remove and keep all meat from the harvest.⁴⁸⁰

Figure 6.1 shows the timeline of the control trials conducted at Wilsons Promontory.

The Committee is unaware of what evaluations occurred prior to and following the 2016 operations.

Figure 6.1 Wilsons Promontory National Park deer control trial timeline



Source: Environment, Natural Resources and Regional Development Committee, based on Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program (2015)*, p.5; Australian Deer Association, *Submission 168*, p.15

The Snake Island Cattlemens Association were critical of the Wilsons Promontory trial, in particular the August 2016 operation, which they stated was 'opportunistic and ill-considered'⁴⁸¹.

I do not think there was any publication of the trial that was going to happen on Wilsons Promontory that I was aware of, and certainly not of the second one, which occurred last August. I am not sure, because it is only about rumour because there is no information. And that is probably not the right way to do it.⁴⁸²

⁴⁸⁰ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program (2015)*, p.5; Australian Deer Association, *Submission 168*, p.15

⁴⁸¹ Snake Island Cattlemens Association, *Submission 167*, p.2

⁴⁸² Paul Hamlett, Member, Snake Island Cattlemens Association, *Public Hearing*, 7 October 2016, p.8

Parks Victoria are evaluating the success of the Wilsons Promontory trial. Mr Roger Fenwick from Parks Victoria explained that the Wilsons Promontory program 'was a trial of a model around the actual operation delivery in and around a place like Tidal River'.⁴⁸³

Mr Graeme Baxter, Parks Victoria's District Manager, explained:

The programs will also involve a monitoring program and further research with the Game Management Authority to ensure we can measure the effectiveness of the operation. We will also investigate the effectiveness of ground shooting as a method for controlling the deer population, and to reduce their impact on the environment. This trial control program is a positive step towards improving vegetation regrowth and reduction in grazing and browsing pressure.⁴⁸⁴

However, relatively little information about effectiveness appears to have been recorded as part of the trials. The 2015 operation removed 42 deer,⁴⁸⁵ and the August 2016 operation removed 44 deer.⁴⁸⁶ No deer were removed during the May 2016 operation due to unsuitable weather conditions.⁴⁸⁷ A post-operation transect count took place at the three sites four weeks after the first operation. This found reduced deer abundance at two of the three sites.⁴⁸⁸ However, the Game Management Authority noted the limitations of these findings, stating that further data are required to be confident about trends.⁴⁸⁹ As discussed in Section 5.4.1 of this report, reduced population four weeks after a harvest does not necessarily mean that there will be any long-term benefits.

While the number of hog deer at Wilsons Promontory is unknown, the Committee is not convinced that operations removing 42 to 44 deer are likely to have long-term impacts on deer problems, given that 52-3 per cent of a hog deer population needs to be removed to reduce numbers in the long term (see Section 5.4.1 of this report).

As discussed in Section 5.4 of this report, counting the number of animals removed by control operations is a poor way to measure the effectiveness of a program. Change in the impact of the animals is a more robust measure. The joint submission to this inquiry from government bodies stated that 'Anecdotal evidence indicates a reduction in impacts on wetlands and a decrease in the number of game trails in the area.'⁴⁹⁰ However, Mr Bill Hansen from Friends of the Prom stated that 'we did not notice any difference in plant damage after last year's [2015] cull.'⁴⁹¹

⁴⁸³ Roger Fenwick, Regional Director, Eastern Victoria, Parks Victoria, *Public Hearing*, 10 October 2016, p.5

⁴⁸⁴ Parks Victoria, *Protecting the Health of Wilsons Prom* <parkweb.vic.gov.au/about-us/news/protecting-the-health-of-wilsons-prom>, viewed 16 March 2017

⁴⁸⁵ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program* (2015), p.6

⁴⁸⁶ Parks Victoria, *Successful Hog Deer Operations at Wilsons Prom* <parkweb.vic.gov.au/about-us/news/successful-hog-deer-operation-at-wilsons-promontory-national-park>, viewed 6 March 2017

⁴⁸⁷ Matthew Jackson, Chief Executive Officer, Parks Victoria, correspondence received 28 April 2017

⁴⁸⁸ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program* (2015), p.6

⁴⁸⁹ Game Management Authority, *Wilsons Promontory National Park Hog Deer Control Program* (2015), p.9

⁴⁹⁰ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.22

⁴⁹¹ Bill Hansen, Secretary, Friends of the Prom, *Public Hearing*, 7 October 2016, p.4

Some submitters were sceptical about the potential of the program:

It is too early to accurately measure any biodiversity outcomes from the Wilsons Promontory trial. It is unlikely that significant biodiversity gains will be realised unless a control program integrating other herbivores such as eastern grey kangaroos and common wombats is conducted.⁴⁹²

Targeted control programs such as those at Wilsons Promontory and within the Mitchell River National park are possibly producing localised, short term biodiversity benefits, but, in the absence of landscape level programs are by their very nature severely limited.⁴⁹³

Landscape level control, as highlighted above by the East Gippsland Rainforest Conservation Management Network, involves targeting species across all land tenures and areas, as opposed to targeting small, distinct areas. The importance of a landscape level, cross-tenure approach is discussed in Section 10.2.3 of this report.

In the absence of structured habitat monitoring it is difficult for the Committee to conclude whether removal of this small number of deer has achieved the desired ecological outcomes of the program. While removing 42 to 44 deer from a particular area will not provide long-term population density impacts, it may be sufficient to mitigate the impacts of deer on discrete areas or assets.

The Snake Island Cattlemens Association was also critical of the 'subjective observational assessments' of increases in hog deer numbers in Wilsons Promontory that led to the initial culls.⁴⁹⁴ The Game Management Authority acknowledged the need for scientific measurement at Wilsons Promontory:

In recent years, PV [Parks Victoria] has noticed an increase in visible Hog Deer sightings at the WPNP [Wilson's Promontory National Park], specifically around populous places. It is accepted that further scientific monitoring needs to occur to get a robust measure of the scale of the increase in abundance or density of the deer at WPNP.⁴⁹⁵

The Game Management Authority made the following conclusion in relation to the monitoring of the outcomes in evaluating the success of the Wilsons Promontory trial:

... more data from similar control programs will be required to draw any strong and significant conclusions about the effectiveness of the control.

Effective population reduction must be regular and designed to achieve the necessary animal densities to achieve the desired ecological outcomes. This requires habitat monitoring.⁴⁹⁶

⁴⁹² Australian Deer Association, *Submission 168*, p.15

⁴⁹³ East Gippsland Rainforest Conservation Management Network, *Submission 170*, p.4

⁴⁹⁴ Snake Island Cattlemens Association, *Submission 167*, p.2

⁴⁹⁵ Game Management Authority, *Wilson's Promontory National Park Hog Deer Control Program (2015)*, p.4

⁴⁹⁶ Game Management Authority, *Wilson's Promontory National Park Hog Deer Control Program (2015)*, p.10

Parks Victoria's Wilsons Promontory Conservation Action Plan (2017) outlined that the intention is to measure the effectiveness of deer management activities by monitoring the number of deer (as indicated by activity or some other surrogate) and the 'number of key sites with multiple age classes of canopy species (banksias, sheoaks and eucalypts).'⁴⁹⁷

FINDING 24: The Committee supports improvements in monitoring the effectiveness of the Wilsons Promontory National Park trial and believes the focus of assessment should be on measuring the impacts on the assets the trial aims to protect, as indicated in the Wilsons Promontory Conservation Action Plan.

6.5.2 Alpine National Park deer control trial

Following a significant expansion and increase in the impacts of deer in the Alpine National Park, a six-year deer control trial commenced in 2014. This trial aims to establish whether ground shooting can reduce the impacts of deer on the alpine peatlands and to identify the most efficient and effective control techniques.⁴⁹⁸

The trial is jointly funded by Parks Victoria and the Australian Government's National Landcare Programme (via the North East, West Gippsland and East Gippsland Catchment Management Authorities).⁴⁹⁹

The trial program involves two sites:

- Bogong High Plains, near Falls Creek
- Howitt-Wellington Plains, north of Heyfield.

At each site, four treatment areas have been identified – two where shooting programs involving recreational and professional hunters co-ordinated by Parks Victoria are occurring and two where only existing unsupervised recreational hunting is occurring.⁵⁰⁰

Methods being trialled

The following ground-shooting methods are being trialled, assessed and evaluated via catch-per-unit-effort data collected by volunteer and professional shooters:

- stalking
- stalking with gundogs

⁴⁹⁷ Parks Victoria, *Conservation Action Plan for Parks and Reserves Managed by Parks Victoria: Wilsons Promontory* (2017), p.69

⁴⁹⁸ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.23

⁴⁹⁹ Parks Victoria, *Deer Control Trial for a Healthier Alpine National Park* <parkweb.vic.gov.au/about-us/news/deer-control-trial-for-a-healthier-alpine-national-park>, viewed 7 March 2017; North East Catchment Management Authority, *Submission 138*, p.1

⁵⁰⁰ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.23

- hound hunting (with some or all of the existing regulations removed or relaxed)
- glassing (which involves finding game from afar with binoculars or spotting scopes)
- deer drives (which involves a group of hunters moving through the bush in an organised manner to locate game and drive the game towards shooters)
- night hunting using spotlights, night vision and/or thermal imaging equipment
- attractants (to lure deer into specific areas)
- deer stands (elevated platforms that facilitate sit and wait hunting)
- quad bikes (to improve access to some areas).⁵⁰¹

Qualified and authorised volunteer shooters from the Australian Deer Association and the Sporting Shooters Association of Australia (Victoria) are involved in operations conducted two to three days each month. These shooters are able to use category B firearms (that is, muzzle-loading firearms and centre-fire rifles), without noise suppressors.⁵⁰²

Professional shooters are also involved in some operations. They are able to use category D firearms (that is, semi-automatic rifles and shotguns and pump action shotguns), with noise suppressors and thermal and infrared devices.⁵⁰³

The park is not closed to other land users during shooting operations. Operations are being conducted away from areas of high visitation and during periods of low visitation.⁵⁰⁴ Entry points are signposted, advising of the activity occurring. Tour groups are formally advised of the activities.⁵⁰⁵

Pre-operation briefings and post-operation debriefings are conducted to facilitate the sharing of information, outcomes and knowledge gained. This information is used to guide future operations.⁵⁰⁶ Mr Bob Gough highlighted access issues, including the number of tracks and the amount of thick vegetation, that limit the effectiveness of the Alpine National Park program, but highlighted that the Parks Victoria debrief is useful in overcoming these barriers.⁵⁰⁷

All operations are overseen by Parks Victoria staff. Shooters (both volunteers and professionals) are issued with Parks Victoria radios and GPS units.⁵⁰⁸

⁵⁰¹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.23; Daniel Brown, Karen Herbert & Elaine Thomas (Parks Victoria), *Alpine National Park Deer Control Trial Project Design* (2015), pp.18-19

⁵⁰² Bob Gough, *Submission 67*, p.15

⁵⁰³ Bob Gough, *Submission 67*, p.14

⁵⁰⁴ Parks Victoria, *Deer Control Trial for a Healthier Alpine National Park* <parkweb.vic.gov.au/about-us/news/deer-control-trial-for-a-healthier-alpine-national-park>, viewed 6 March 2017

⁵⁰⁵ Bob Gough, *Submission 67*, p.14

⁵⁰⁶ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.23

⁵⁰⁷ Bob Gough, *Submission 67*, p.15

⁵⁰⁸ Bob Gough, *Submission 67*, p.14

Standard operating procedures have been created, in consultation with volunteers, and adopted for the trial.⁵⁰⁹

Evaluation

The trial program involves the collection of baseline monitoring prior to the commencement of the control program (a pre-control assessment of the alpine peatland conditions related to deer-specific impacts), followed by three years of control techniques and three years of post-control monitoring.⁵¹⁰ Costs associated with the different control methods are also being tracked.⁵¹¹

The trial will monitor changes in the levels of deer abundance, density and habitat use and the occurrence and severity of deer impacts on the alpine and sub-alpine peatlands in the Alpine National Park.⁵¹²

Parks Victoria have published a detailed description of the monitoring process for the Alpine National Park trial, including the methodology and protocols that are being implemented.⁵¹³ Remote cameras and faecal pellet counts will be used to measure deer abundance and habitat use. Deer impacts will be monitored using the following surveys:

- peatland impact surveys, which consists of three transects in each treatment area, where vegetation condition assessments will occur and the following will be measured and observed:
 - weed species
 - pellets (from deer and horse)
 - pugging (deep pock marks in wet soil created by hooves)
 - wallows
 - trails
- targeted wallow and pool surveys, which involve assessing and photographing the size and condition of wallows (including the amount and quality of water in them).⁵¹⁴

The trial will compare and evaluate the results obtained from the sites where targeted deer control occurred with the sites where only existing unsupervised recreational hunting occurred.⁵¹⁵

⁵⁰⁹ Bob Gough, *Submission 67*, p.15

⁵¹⁰ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.23

⁵¹¹ Roger Fenwick, Regional Director, Eastern Victoria, Parks Victoria, *Public Hearing*, 10 October 2016, pp.4-5

⁵¹² Parks Victoria, *Monitoring Changes in the Levels of Deer Abundance and Impacts in the Alpine National Park 2015-2020 Project Brief* (2016), p.1

⁵¹³ Parks Victoria, *Protocols for Monitoring Changes in the Levels of Deer Abundance and Deer Impacts in the Alpine National Park* (n.d)

⁵¹⁴ Parks Victoria, *Protocols for Monitoring Changes in the Levels of Deer Abundance and Deer Impacts in the Alpine National Park* (n.d); Daniel Brown, Elaine Thomas, Karen Herbert and Keith Primrose, 'Evaluating the Effects of Feral Deer Management on Endangered Alpine Peatlands: The Alpine National Park Deer Control Trial' *Plant Protection Quarterly* 31(2) (2016), pp.65-6

⁵¹⁵ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.23

The joint submission to this inquiry from government bodies discussed what had occurred to September 2016 as part of the program:

Pre-control monitoring has been completed at six of the eight treatment areas within the Bogong High Plains and Howitt Wellington Plains. This includes a total of 48 alpine peatlands which have been monitored so far. The project is ongoing at this stage, and is following an adaptive management approach based on the ongoing evaluation of incoming results.⁵¹⁶

The North East Catchment Management Authority identified some of the current learnings from the trial in its submission to the inquiry, which included:

- volunteers showing high levels of commitment
- high-level outcomes are being delivered by professional hunters
- night operations appear most promising, especially utilising thermal imaging equipment
- deer leave the high plains after heavy snow and do not return until December/January
- deer management is difficult and must be flexible and adaptive
- deer movement corridors have been identified.⁵¹⁷

At this stage, minimal results or outcomes of the trial have been released. In September 2016, it was reported that 42 deer had been removed from the Bogong High Plains area.⁵¹⁸

The Committee notes the comprehensive design structure of the Alpine National Park trial in monitoring the impacts of deer on particular assets and comparing different hunting methods, including control areas where co-ordinated hunting is not occurring. If executed well, this will make an important contribution to research in this field. However, given that the trial is currently underway, the Committee is unable to make any judgment based on the trial's outcomes. The Committee notes that findings from this trial should be considered in future assessments of the effectiveness of co-ordinated hunting programs.

FINDING 25: The Alpine National Park deer management trial design is comprehensive and addresses a number of key issues. The comparative evaluation of co-ordinated volunteer hunting, unsupervised recreational hunting and paid professional shooters should strengthen our ability to determine which deer control activities are most effective. The results should be important in future government policy and will help the public to understand government decisions about invasive animal control.

RECOMMENDATION 4: That the Government make publicly available the results of the Alpine National Park deer management trial once completed and use these findings to inform future invasive species management program designs.

⁵¹⁶ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

⁵¹⁷ North East Catchment Management Authority, *Submission 138*, pp.4-5

⁵¹⁸ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.23

6.5.3 Yarra Ranges deer control program

Since 2014, ongoing deer management programs have been conducted by Parks Victoria, in collaboration with the Australian Deer Association and the Sporting Shooters Association of Australia (Victoria), in the Yarra Ranges.

The three sites where operations are conducted are:

- Dandenong Ranges National Park
- Yellingbo Nature Conservation Reserve
- Warramate Hills Nature Conservation Reserve.⁵¹⁹

The goal of the program is to reduce the impacts of deer on waterways in the area and protect the habitat for the threatened helmeted honeyeater and leadbeater possum.⁵²⁰

The program runs every week between April and November (except during school holidays). It requires commitment by Parks Victoria staff on planning and operations. In 2015-16, volunteer shooters dedicated approximately 1,525 hours to this project.⁵²¹

The areas where shooting occurs are closed for the duration of each operation, with staff and volunteers stationed at entry points. Only accredited and authorised shooters are permitted to volunteer and they are required to attend a safety briefing. Other safety measures incorporated in the program include a Parks Victoria Operational Controller who runs all operations, GPS tracking devices, establishment of 'shoot zones' and a strong communication focus with adjoining landowners and local community organisations.⁵²²

The Friends of the Helmeted Honeyeater commented on the successful implementation of safety mechanisms in the programs conducted at the Yellingbo Nature Conservation Reserve:

FOHH [Friends of the Helmeted Honeyeater] believe PV [Parks Victoria]-directed deer control activities have been well managed at Yellingbo Nature Conservation Reserve (YNCR). Risks to community safety have been mitigated by safety planning and communications that have ensured all stakeholders have received timely advice on control areas, scheduled shoots and any changes to schedule. Parks Victoria also suspend shooting operations during school holiday periods. FOHH run a number of field-based programs throughout the year, engaging volunteers in supplementary feeding, nursery and revegetation activities. To date this involves approximately 810 people per annum (690 planting day attendees, 90 supplementary feeders, 30 nursery volunteers). Despite these volunteer numbers and daily volunteer

⁵¹⁹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

⁵²⁰ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

⁵²¹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

⁵²² Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

attendance, no significant interruption to activities has been experienced due to culling activities. FOHH has been able to continue delivering our field-based programs at various sites across YNCR concurrent with active deer culling in other sites within the Reserve.⁵²³

However, the group also raised a number of safety concerns that need to be addressed by the program:

Some of our members residing local to YNCR [Yellingbo Nature Conservation Reserve] have expressed a perception of an increase in uncoordinated private land shooting since commencement of the deer cull trial. Any increase in these activities has potential implications for community safety. Formal channels are not currently in place for information sharing between property owners conducting deer shooting. As a result, potential risk scenarios could include deer stalking occurring concurrently on adjacent private property unbeknown to both parties, poorly considered shooting arcs threatening nearby houses, thoroughfares, or volunteers sites within YNCR. In addition, other groups and individuals may be in YNCR unknown to adjacent property owners. For example, monitoring associated with the lowland Leadbeater's Possum present at YNCR may be conducted at nighttime. Unregistered members of the public are also regularly recorded accessing YNCR by FOHH [Friends of the Helmeted Honeyeater] and PV [Parks Victoria], especially during school holiday periods.⁵²⁴

The Australian Deer Association outlined that carcass removal and hunting methodology processes and systems have been refined over time for this program.⁵²⁵ Some submissions highlighted certain operational limitations of the program:

The operational requirement to have Parks Victoria staff present during all operations limits the days and times available to conduct programs, particularly in light of budgetary constraints. It is feasible for Parks Victoria to hand over operational control of shoots to trained and competent volunteer co-ordinators.⁵²⁶

Effectiveness of the deer cull trial is also limited by other factors such as dimensions of the Reserve (some sections of YNCR [Yellingbo Nature Conservation Reserve] are too narrow to permit safe shooting without private land engagement), and the locations of Helmeted Honeyeater colony sites (no shooting zones). These act to limit the spatial extent of YNCR deer shooting can be conducted within and once again highlights the necessity for private land engagement.⁵²⁷

The success of this program is measured by spotlight counts. A reduction in deer population density has been observed at both Yellingbo Nature Conservation Reserve and Warramate Hills Nature Conservation Reserve. Populations remain stable at the Dandenong Ranges National Park (Sherbrooke).⁵²⁸ Furthermore, the

⁵²³ Friends of the Helmeted Honeyeater, *Submission 158*, pp.2-3

⁵²⁴ Friends of the Helmeted Honeyeater, *Submission 158*, p.2

⁵²⁵ Australian Deer Association, *Submission 168*, p.14

⁵²⁶ Australian Deer Association, *Submission 168*, p.14

⁵²⁷ Friends of the Helmeted Honeyeater, *Submission 158*, pp.3-4

⁵²⁸ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

joint submission from government bodies stated ‘Anecdotal evidence from local staff indicates a reduction in impacts on waterways and vegetation communities in the area.’⁵²⁹

In relation to control programs in the Dandenong Ranges National Park, the Shooting Sports Council of Victoria stated that ‘These programs have removed in the vicinity of 100 Sambar deer in two locations close to Melbourne. It is probable that these can be judged as successful in controlling the Sambar (on a locational basis only).’⁵³⁰

The Sporting Shooters Association of Australia (Victoria) listed the following biodiversity outcomes from the Dandenong Ranges National Park deer control program:

- improvement in the habitat for lyrebirds
- reduced erosion from game trails.⁵³¹

The following observations were made by the Friends of the Helmeted Honeyeater in relation to the outcomes of the program:

Incidental observations by FOHH [Friends of the Helmeted Honeyeater] volunteers and staff suggest reduction in deer impacts on native vegetation (browsing, antler rubbing) to be variable across the shooting zone and adjacent areas [in Yellingbo Nature Conservation Reserve]. Incidental observations recorded by FOHH members aligns with observational data collected by Parks Victoria during shooting operations. Decreased numbers of deer have been reported observed within the shooting zone, especially on tracks. Unpublished data provided by Parks Victoria indicates 0.38 deer seen per spotlighting Km in 2015/16, down from 1.2 in 2014/15.

Plantings undertaken in 2014 as part of the previous State Government 2 Million Trees Program have provided one means of monitoring impacts as most works were within shooting zones amongst remnant vegetation. Unprotected seedlings planted within the vicinity of Helmeted Honeyeater colony sites within or adjacent the shooting zone appear to exhibit less browsing activity than those planted in sites outside the shooting zone. Other factors may be influencing these apparent results however, such as deer avoidance due to increased levels of human traffic in colony sites (supplementary feeding and monitoring activities).⁵³²

The group outlined that the establishment of reliable monitoring was required to properly assess any biodiversity outcomes of the program:

Many forms of plant protection such as tree guards are clearly not sufficient under YNCR [Yellingbo Nature Conservation Reserve] conditions to ensure successful reestablishment of Helmeted Honeyeater habitat. In this context, deer culling is highly likely to reduce levels of browsing and antler rubbing pressure on revegetation and regenerating habitat. That said, rigorous impact data is lacking to demonstrate

⁵²⁹ Department of Environment, Land, Water and Planning, Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

⁵³⁰ Shooting Sports Council of Victoria, *Submission 202*, p.6

⁵³¹ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.15

⁵³² Friends of the Helmeted Honeyeater, *Submission 158*, pp.1-2 (with sources)

a *causal* connection between the culling program and reduced deer impacts. No rigorous monitoring framework has been funded or implemented to assess biodiversity outcomes of deer culling at YNCR. To date most data collected has been incidental observations or inferences drawn from trials.⁵³³

The Friends of the Helmeted Honeyeater raised concerns that there had been an increase in the observations of deer on private land adjoining Yellingbo Nature Conservation Reserve and suggested:

Effective control of deer in YNCR [Yellingbo Nature Conservation Reserve] therefore requires reduction in recolonisation pressure via cooperation across adjacent buffering properties. Increased opportunities and resourcing is needed for public land managers and voluntary hunting organisations to cooperate with adjacent private landholders.⁵³⁴

Section 10.2.3 of this report further discusses the benefits of co-ordinating animal control activities across land tenures.

The Committee notes the high level of volunteer involvement in this program over an extended period of time and the satisfaction of certain stakeholders with the program design. However, the Committee also notes that concerns about this program were raised by Mr Cameron Skedd of the Vertebrate Pest Managers Association Australia:

Several of my members have had contracts pulled out from under their noses. Sherwood forest and Yellingbo are two of them. Unfortunately that work was given to the Sporting Shooters. So they have lost their income straight away from those two contracts. It is a lot of money for a small operator. Then we find out that the Sporting Shooters did not do it for free; there were some donations given ... We are concerned that the government and Parks Victoria, which have been giving us a lot of work over the years, are not giving us the work anymore, but the money is being diverted to the Sporting Shooters and the ADA [Australian Deer Association].⁵³⁵

Mr Skedd did not oppose the use of recreational hunters, but advocated for a program involving both paid professionals and volunteers:

We would like to work with them, the Sporting Shooters and the ADA [Australian Deer Association]. Having them directed by the professionals, or the government departments, advised by the professionals, who are doing this work, they can help us maybe clean up areas. We as professionals know that we can get a lot of the animal numbers reduced with the tools of the trade that we have.⁵³⁶

A mixture of professional and recreational shooters has also been identified as a potentially effective means to control deer by other stakeholders in this inquiry (see further discussion in Section 8.9.2 of this report).

⁵³³ Friends of the Helmeted Honeyeater, *Submission 158*, p.2

⁵³⁴ Friends of the Helmeted Honeyeater, *Submission 158*, p.3

⁵³⁵ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.3

⁵³⁶ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.3

Overall, the Committee notes that a number of programs appear to be achieving some positive outcomes, but the monitoring methodology is insufficient to properly determine whether the control efforts are having the desired effects. The Committee also recognises the concern that the control operations on public land may be negatively impacting adjoining private land.

FINDING 26: It is essential that private landowners and public land managers work collaboratively to ensure any control program on one land type complements work occurring on another.

RECOMMENDATION 5: That Parks Victoria engage, consult and work together with private landowners whose property adjoins public land where invasive species control programs are occurring to facilitate and ensure complementary control activities occur across land tenures.

6.6 Pest management trials and programs

In addition to deer control, co-ordinated recreational hunting has also been used in efforts to control a number of pest animals in Victoria. A selection of these programs are outlined below. Each of these appears to have had some success. However, the Committee notes that each has taken place in compact areas and that shooting has been only one of several control techniques. It is unclear how representative these examples are of this sort of program.

6.6.1 Werribee Park rabbit control program

Rabbit control is undertaken at Werribee Park, a 10-hectare piece of land west of Melbourne, to reduce the rabbit population to a manageable level to protect the historic formal gardens and surrounds.⁵³⁷

A baiting program occurred at Werribee Park between 2006 and 2012. This program was limited due to safety implications for park users. Since 2012, a ground-shooting program has been used in conjunction with other rabbit control methods (including the removal of warrens, harbour destruction, rabbit proof fencing, ferreting and trapping). The shooting program involves park closures during night shoots conducted by volunteers from the Sporting Shooters Association of Australia (Victoria).⁵³⁸

The joint submission to this inquiry from government bodies stated:

Overall, the integrated control strategy has proved highly successful in reducing the rabbit population to a level well below the period in which Pindone baiting was carried out alone. Rabbit densities are now very low, and as a result, the risk to heritage assets has been significantly reduced and the safety risk of the operation to

⁵³⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.27

⁵³⁸ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.27

the public has now been diminished. The program and partnership between Parks Victoria and the Sporting Shooters' Association of Australia at Werribee Park has been successful in significantly reducing rabbit numbers and asset destruction.⁵³⁹

The Sporting Shooters Association listed the following biodiversity outcomes from the Werribee Park rabbit control program:

- protection of heritage listed trees and plants
- protection for the State Rose Garden and orchard
- reduced need to baiting
- protection of possums, native rats and birds.⁵⁴⁰

6.6.2 St Helens Flora Reserve

The St Helens Biolink Project, commenced in 2011, aims to protect the southern brown bandicoot population in the 38-hectare St Helens Flora Reserve, on Victoria's south-west coast. The Basalt to Bay Landcare Network, using remote camera monitoring, established that the biggest threats to the bandicoots are foxes and feral cats and established and implemented mechanisms to control these.⁵⁴¹

The organisation's approach involved baiting and shooting foxes, as well as removal of cats by 'direct intervention'.⁵⁴² Warrnambool Field & Game, private landowners and forestry plantations, amongst others, have provided assistance to the Basalt to Bay Landcare Network in their efforts to achieve a continuous fox control and fauna monitoring program.⁵⁴³

The Basalt to Bay Landcare Network outlined the following results:

In the three years that fox control using baiting and with support of private hunters we have seen a slow but steady reduction in the frequency of fox incursions into the range of the cameras, which have been located in the same place all that time. We still see them, but they have reduced their visits from several times a week, to less than two per month. With lambing starting on the farm we did a spot audit of what happened to dead lambs. For the first time in four years the lambs that died stayed put – they weren't chewed or dragged as in previous years and we didn't find pieces of them around the edge of the reserve.

At the same time we have started to see the individual bandicoots during the day.⁵⁴⁴

⁵³⁹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.27

⁵⁴⁰ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.15

⁵⁴¹ Basalt to Bay Landcare Network, *Submission 188*, p.2; Lisette Mill, Landcare Network Facilitator, Basalt to Bay Landcare Network, *Public Hearing*, 29 November 2016, p.3

⁵⁴² Basalt to Bay Landcare Network, *Submission 188*, p.2

⁵⁴³ Warrnambool Field & Game, *Submission 129*, p.2; Basalt to Bay Landcare Network, *Submission 188*, p.2; Lisette Mill, Landcare Network Facilitator, Basalt to Bay Landcare Network, *Public Hearing*, 29 November 2016, p.3

⁵⁴⁴ Basalt to Bay Landcare Network, *Submission 188*, pp.2-3

6.6.3 Griffiths Island fox control program

Since 1999, Moyne Shire Council has utilised Warrnambool Field & Game to control foxes on Griffiths Island (a 37-hectare parcel of land) near Port Fairy.⁵⁴⁵ The primary aim of this effort is to protect the short-tailed shearwater birds living and breeding there at certain times of the year. This program, now conducted four times per year (prior to 2012 the program was conducted once each year), involves:

- closing the island to visitors (from approximately 6.00 – 11.00 a.m. for a morning shoot and from 6.00 p.m. for a night shoot), with signage and a representative located at the entrance to the island
- driving the foxes into a shooting zone using noise
- spotlight shooting at night
- public notices published in the newspaper, information provided at the visitor information centre and informing the local police
- frequent attendance by a District Firearms Officer to monitor safety.⁵⁴⁶

Since 2010, Moyne Shire Council has undertaken other control work on Griffiths Island in addition to the shooting operations, including removal of fox harbours, den fumigation and a baiting program.⁵⁴⁷

Moyne Shire Council highlighted that the shooting program is inexpensive and is 'strongly supported by the local community'. The Council stated that participating volunteers are 'extremely professional, courteous, considerate, sensible, practical and with a strong safety awareness'.⁵⁴⁸ In relation to the program, Mr Richard Hodgens from the council stated that the 'direct cost to council is approximately \$400 worth of meat from the local butcher [to provide a barbeque for volunteers] and a couple of hundred dollars worth of advertising across the year'.⁵⁴⁹

In relation to the impacts on the environment and other land users, Warrnambool Field & Game stated that 'The shoots have little or no impact to the integrity of the islands flora & fauna with only minor impact for short periods to tourist access while the shoots are being conducted'.⁵⁵⁰

In 2015, it was estimated that seven foxes were killed (six at night) as a result of the control program.⁵⁵¹ Mr Anthony Evans from Warrnambool Field & Game provided anecdotal evidence of a decline in the number of bird carcasses on Griffiths Island last year, stating 'There were carcasses there, but nowhere near

⁵⁴⁵ Moyne Shire Council, *Submission 61*, p.1; anecdotal evidence suggests Warrnambool Field & Game have performed fox control on the island as early as the 1970s.

⁵⁴⁶ Warrnambool Field & Game, *Submission 129*, pp.1-2; Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, pp.2-4

⁵⁴⁷ Richard Hodgens, Environment Officer, Moyne Shire Council, *Public Hearing*, 29 November 2016, p.3

⁵⁴⁸ Moyne Shire Council, *Submission 61*, p.1

⁵⁴⁹ Richard Hodgens, Environment Officer, Moyne Shire Council, *Public Hearing*, 29 November 2016, p.3

⁵⁵⁰ Warrnambool Field & Game, *Submission 129*, p.1

⁵⁵¹ Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, p.6

the likes of what other previous years have been.⁵⁵² Members of the Friends of Griffiths Island concurred that the numbers of carcasses have declined notably in recent years.⁵⁵³

FINDING 27: Co-ordinated recreational hunting programs have been successfully used for invasive species other than deer and complement the use of other control techniques to achieve landscape-level control.

6.7 Similar trials and their outcomes in other jurisdictions

6.7.1 New South Wales – Supplementary Pest Control Trial

The New South Wales National Parks and Wildlife Service commenced a three-year ‘supplementary pest control’ trial in 2014. The trial involves using volunteers from the Sporting Shooters Association of Australia (NSW) undertaking co-ordinated shoots in 12 national parks and reserves, targeting several pest animals including feral goats, pigs, foxes and rabbits. This program is intended to test whether using volunteer recreational shooters should be added to the existing pest control programs that are currently used in New South Wales.⁵⁵⁴

An interim evaluation of the trial conducted by the Natural Resources Commission found:

The trial has removed more than 2,800 target animals to date, raised awareness of pest animal management in National Parks and built significant goodwill between NPWS [National Parks and Wildlife Services] staff, program volunteers, park neighbours, community and Aboriginal groups. The positive engagement it has afforded NPWS is a testament to both NPWS staff and the selected volunteers and is a key factor in the success of the trial to date.

Ecological outcomes from the program are uncertain at this point due to monitoring design limitations, and the inability to distinguish between SPC [supplementary pest control] and non-SPC pest management within the reserves.

...

Finally, this report advocates ongoing adaptive management of the trial. Using the method in combination with the right tools and techniques will be crucial to the program’s success, along with the correct sequencing, timing, selection of volunteers, location selection, species targeting and coordination with other tenures.

As such, an ongoing priority of the pest control trial will be to identify the specific set of circumstances where it can be most useful to NPWS’ primary pest management program.⁵⁵⁵

⁵⁵² Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, p.7

⁵⁵³ Richard Hodgens, Environment Officer, Moyness Shire Council, correspondence received 10 April 2017

⁵⁵⁴ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Evaluation of Trial Design* (2014), p.4

⁵⁵⁵ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Evaluation of Trial Design* (2014), p.3

Though noting that there were limitations in the data available to evaluate the program, the Natural Resources Commission indicated that some people living on the vicinity of the trial locations reported reduced impacts from some species since the trial began.⁵⁵⁶ It also reported that there had been no human safety or animal welfare incidents to the time of the interim report.⁵⁵⁷

The costs associated with this trial are discussed in Section 6.9 of this chapter.

In his submission to this inquiry, Mr Mark Chaplin made the following comments about the effectiveness and costs of the New South Wales trial:

The NSW trial included the use of limited ground based hunters to undertake shooting of species (primarily goats, rabbits and pigs in Western NSW) in the presence of OEH [Office of the Environment and Heritage] Officers, and only under very specific conditions. This approach may be suitable for areas in the immediate proximity of alpine resorts or similar settings, but it would seem that the trial proved to be an unsustainable and extremely expensive operation for broader National Park animal control.

The interim report into the NSW National Park supplementary pest control trial (Feb 2016) recorded a cost of **\$1,274.15 per animal harvested**. In contrast, over **\$2 million** revenue and virtually free animal control was achieved by licensed hunters in NSW as recorded in the last *Public Benefit* assessment of the previous NSW Game Council. The latter NSW Game Council *Public Benefit* report covered game licensing of hunters on NSW State Forests. *The results are compelling at a time of scarce financial resources.*⁵⁵⁸

The Committee notes that, as the trial progressed, a number of ways were found to reduce the cost (see Section 6.9 of this chapter).

6.7.2 South Australia – Operation Bounceback

The South Australian Government commenced its landscape-scale conservation program, titled ‘Operation Bounceback’, in the Flinders Ranges in the early 1990s. Since then, the program has expanded to other public land, as well as some neighbouring private properties. The program consists of a number of control programs, each of which uses varying control methods.⁵⁵⁹

Several initiatives operating under ‘Operation Bounceback’ have been undertaken by the South Australian Government in conjunction with volunteers, landholders and local communities.⁵⁶⁰

556 New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Evaluation of Trial Design* (2014), p.25

557 New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Evaluation of Trial Design* (2014), p.13

558 Mark Chaplin, *Submission 104*, p.2 (with sources)

559 Invasive Species Council, *South Australia Excels at Pest Control* <invasives.org.au/blog/south-australia-excels-at-pest-control/>, viewed 10 March 2017

560 Government of South Australia, *Bounceback: Celebrating 20 years* (2014), p.3

For instance, an aerial and ground shooting program targeting goats, foxes and cats has operated in the Flinders Ranges National Parks since 1994. The program resulted in the numbers of the endangered yellow-footed rock wallaby in the area increasing from an estimated 50 in the 1990s to over 1,000 in 2012.⁵⁶¹

A ground and aerial culling program involving the Sporting Shooters Association of Australia in the south-eastern area of the State saw more than 2,800 deer killed over ten years which has more than halved the total size of the deer population.⁵⁶²

A large-scale rabbit-control trial involved warren ripping across 190 square kilometres of the Flinders Ranges National Park between 1992 and 2002.⁵⁶³ An additional 140,000 rabbit holes were destroyed by explosives in follow-up works over the next ten years. Spotlight counts between 1996 and 2006 indicated rabbit densities were ten times higher in untreated areas compared to treated areas. Vegetation monitoring also indicated positive growth and recovery. However, results from 2010-11 indicated a large increase in the number of rabbits in both treated and untreated areas.⁵⁶⁴ A review of the program in 2009 found that warren ripping alone could not maintain reduced rabbit densities. A poison baiting program to control rabbit populations was introduced following that review.⁵⁶⁵

A goat-control program commenced in 1992 involving mustering and removal by recreational hunting organisations, rangers and contractors. Aerial controls commenced in 2002 and private landowners were encouraged to manage feral goats on their land. Results indicated that 140,000 goats were removed from a 12,000 square kilometre area over 20 years.⁵⁶⁶ In his evidence to the Committee, Dr Clive Carlyle highlighted the achievements of the feral goat program:

... I do know that as far as feral goat control is concerned, in South Australia, particularly in the Flinders Ranges and Gammon Ranges national parks, there is a program called Bounceback, which is quite large. It was a well-thought-out program, and it included both public and private ownership of very large land areas. That has reduced feral goat populations quite dramatically in the target areas. That has been in part through having targeted and supervised recreational shooters coming to parks in a fairly intensive and focused way to shoot goats, so typically a park or proportion of the park would be closed for a week to the public. I am aware that that has been effective.⁵⁶⁷

⁵⁶¹ Invasive Species Council, *South Australia Excels at Pest Control* <invasives.org.au/blog/south-australia-excels-at-pest-control/>, viewed 10 March 2017

⁵⁶² Invasive Species Council, *South Australia Excels at Pest Control* <invasives.org.au/blog/south-australia-excels-at-pest-control/>, viewed 10 March 2017

⁵⁶³ The program aimed to take advantage of lower rabbit densities due to the spread of Rabbit Haemorrhagic Disease.

⁵⁶⁴ This was in part attributed to the lessened impact of Rabbit Haemorrhagic Disease.

⁵⁶⁵ Government of South Australia, *Bounceback: Celebrating 20 years* (2014), p.12

⁵⁶⁶ Government of South Australia, *Bounceback: Celebrating 20 years* (2014), p.11

⁵⁶⁷ Clive Carlyle, *Public Hearing*, 30 November 2016, p.4

The South Australian Government has implemented a habitat monitoring system to determine the long-term effects of its invasive animal control programs. Random sites are sampled using road and track networks to monitor whole-of-landscape condition. Photopoint data (which involves photographs taken from a fixed point at regular time intervals) are used to monitor and determine changes in vegetation and land condition over time. Land condition index scores are used to rank land condition and regeneration relative to surrounding areas. This method ensures ‘long-term trends can be differentiated from responses to naturally occurring boom and bust events.’⁵⁶⁸

The following results were reported in 2014 as part of the monitoring of Operation Bounceback:

Improved LCI [land condition index] scores in Flinders Ranges and Vulkathunha-Gammon Ranges NPs [National Parks], and other reserves reflect widespread recovery of palatable perennial species, including regeneration of the long-lived species: Bullock Bush, Plum Bush, Mulga, Long-leaved Emu Bush and Dead Finish; recruitment of shrub species including Elegant Wattle, Bitter Saltbush and Silver Tails; and large native grass germination events following good rains. Reduction in total grazing pressure has encouraged widespread regeneration of shrub and tree species. Recovery of these dry country vegetation communities will take many decades and is dependent on good rainfall events and continued grazing management.⁵⁶⁹

The Committee notes that co-ordinated programs that target smaller areas and are used in conjunction with other management methods have greater potential to be effective. Mr Ken Slee noted that these co-ordinated programs ‘have value in small, well-defined areas when the goals are clear and when other measures are also implemented to support the opportunities presented by the culling.’⁵⁷⁰ The role of co-ordinated or focussed recreational hunting is considered in Section 8.10.2 of this report.

FINDING 28: Co-ordinated recreational hunting programs are most appropriate in small, contained locations that experience high visitation, where the goal is asset protection. Their application to a larger scale across the state is likely to be less effective.

RECOMMENDATION 6: That the Government ensure all co-ordinated recreational hunting programs are appropriately supervised, involve wide consultation, are well advertised, are rigorously evaluated and are transparent to ensure the concerns and needs of communities are addressed.

⁵⁶⁸ Government of South Australia, *Bounceback: Celebrating 20 years* (2014), p.8

⁵⁶⁹ Government of South Australia, *Bounceback: Celebrating 20 years* (2014), p.8

⁵⁷⁰ Ken Slee, *Submission 77*, p.1

6.8 Unsupervised recreational hunters

In the programs and trials discussed in Sections 6.5 and 6.6 of this chapter, recreational hunters are co-ordinated and directed by Parks Victoria and other bodies. However, the majority of recreational hunting in Victoria is unsupervised. That is, the location and timing of the hunt is determined by private individuals or organisations and takes place without government direction or supervision (other than through broad regulation of hunting areas and seasons).

The Committee acknowledges that the motivations and purposes of unsupervised recreational hunters relate to sport, recreation and enjoyment, in conjunction with controlling invasive animals. This section looks at the advantages and disadvantages of unsupervised recreational hunting, especially as it compares to the co-ordinated programs set out in Sections 6.5 and 6.6.

6.8.1 Proficiency

For the programs co-ordinated by government and other bodies, recreational hunters are often required to meet certain standards before they are permitted to take part (see Section 6.4 of this chapter). However, people do not need to meet the same standards to take part in unsupervised shooting. While some hunters are required to take a waterfowl identification test or hound-hunting test (see Section 4.3.2 of this report), these tests do not assess shooting accuracy.

This was a concern for some people, as accurate shots are important for minimising animal suffering. As Mr Paul Hamlett from the Snake Island Cattlemens Association stated, ‘Hunter skill and humane killing of animals go hand in hand.’⁵⁷¹

The Committee was informed that some recreational hunters are as proficient as professional shooters and hold themselves to high standards in relation to humane killing. For example, the Committee was told:

... I am not sure that there is a big difference between a professional and a very competent recreational shooter, because I think you will find most of the professionals are probably competent recreational shooters as well.⁵⁷²

... given access to the same equipment, there is little difference in professionalism, effect or outcome between the use of contractors and organized and well led volunteer hunters.⁵⁷³

Further to legal obligations, hunters take pride in effecting a swift and humane death for their quarry with a ‘one shot kill’ being the desired conclusion of a hunt. Game hunters regularly practise their marksmanship and have a deep understanding of their quarry’s anatomy and the best shot placement to effect a humane death.⁵⁷⁴

⁵⁷¹ Paul Hamlett, Snake Island Cattlemens Association, *Public Hearing*, 7 October 2016, p.6; see also Mhairi Roberts, Animal Welfare Policy Manager, RSPCA Victoria, *Public Hearing*, 5 September 2016, p.3

⁵⁷² Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, p.4

⁵⁷³ Bob Gough, *Submission 67*, p.20

⁵⁷⁴ Australian Deer Association, *Submission 168*, p.9

However, it is clear that not all recreational shooters are this proficient. Recreational hunters range from beginners to the very experienced. Mr Bob Gough, who has designed accreditation programs for shooters, noted that not all recreational hunters practice enough. As a result, he indicated, only 33 per cent of recreational hunters seeking to be part of the Parks Victoria program pass the required accreditation test for that program.⁵⁷⁵ The RSPCA informed the Committee that:

... [recreational] hunters have highly variable skill levels and there is no shooting competency test required to acquire a hunting licence. In a survey of hunters carried out by the University of Queensland in 2012, 58% of 6,892 hunters said they had not done any accredited hunter training.⁵⁷⁶

The Committee heard from a number of people and organisations that supported shooting as the most appropriate method of control for some invasive animals, but considered that it should only be done by professional shooters or recreational shooters that had passed certain assessments.

On the other hand, the Committee was also told that recreational hunters may have key experience with a particular animal or environment that may make them more effective than some professional shooters:

Sambar deer are very elusive. They are mostly solitary, very, very hard to hunt and you do require a great deal of experience to hunt sambar deer. Just because you happen to be a professional shooter does not mean to say you will ever get to shoot a deer. You have to be experienced in actually hunting the deer.⁵⁷⁷

Generally; people who volunteer for these tasks have a keen interest and deep knowledge of not only the set tasks; but often of the geographical area that operations are conducted. Often exceeding that of Parks staff. They are local people with generations – in many cases; of local knowledge.⁵⁷⁸

The skills, experience and advantages of professional shooters are discussed further in Section 6.3 of this chapter.

6.8.2 Safety

Concerns were also raised about the safety of recreational hunting by a number of submitters and witnesses. For example, Bushwalking Victoria supported the co-ordinated use of recreational hunters only at times when parks are closed to other users. In relation to unsupervised shooting, though, the President of Bushwalking Victoria told the Committee:

⁵⁷⁵ Bob Gough, *Public Hearing*, 19 October 2016, p.9

⁵⁷⁶ RSPCA Victoria, response to questions on notice from *Public Hearing*, 5 September 2016, p.3

⁵⁷⁷ Graeme Stony, Executive Officer, Mountain Cattlemen's Association of Victoria, *Public Hearing*, 20 October 2016, p.3

⁵⁷⁸ Jurgen Hemmerling, *Submission 4*, p.1

I guess the nub of the issue is that if you have got recreational hunting happening in an area, it is not safe. I understand that there is no evidence of someone actually being shot, but I think there is evidence that if someone gets shot, they are likely to get hurt, so there is the proximity of people and firearms. And I am aware of evidence in the US where they actually had a hunting season and they said, 'There's too many people getting shot'. They are shooting at each other because they think they are deer, and they get pretty excited when they go away and it is opening weekend.

... the situation that we want to avoid is increased recreational shooting and ending up with someone getting shot, which is avoidable. So if there is recreational shooting happening in a park or an area, it should be closed to other users because of that risk.⁵⁷⁹

Mr Charles Ablitt, Vice President of Bushwalking Victoria, noted the increase in bush users in recent years:

The fact is that more and more people are getting out into the bush. That means there is going to be more of a confrontation if you allow recreational hunters to get out there and do not close the parks in those periods of time when there is a likelihood that somebody will be shot.⁵⁸⁰

The Snake Island Cattlemens Association noted research conducted by HFEx, which examined situations where people are shot by hunters because they are mistaken for game.⁵⁸¹ Incorrect target identification was the largest contributor to 64 per cent of the fatal deer hunting accidents examined in the study.⁵⁸² The study found that 'Contrary to what most people think, the hunters committing these accidents are often experienced and considered to be safe and competent. Crucially, they often believe they have, 100%, correctly identified their target.'⁵⁸³ The report by HFEx suggests that certain human cognitive biases play a role in these accidents. The report concludes that further research is needed to develop strategies to mitigate the risk.⁵⁸⁴

However, others argued that recreational hunting poses little risk to other park users. A number of submitters stated that recreational hunting in Victoria has an 'exceptional safety record'. Some noted that hunters typically fire very few shots and are widely dispersed within an area.⁵⁸⁵ Hunting typically occurs in places where there are few other users and, in national parks, is restricted to months when there are fewer other visitors.⁵⁸⁶

⁵⁷⁹ Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.13

⁵⁸⁰ Charles Ablitt, Vice President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.7

⁵⁸¹ HFEx, *White Paper: Mistaken-for-Game Hunting Accidents – A Human Factors Review*, report prepared by Kyle Wilson and Karl Bridges for Hunter Safety Lab (2015)

⁵⁸² HFEx, *White Paper: Mistaken-for-Game Hunting Accidents – A Human Factors Review*, report prepared by Kyle Wilson and Karl Bridges for Hunter Safety Lab (2015), p.6

⁵⁸³ HFEx, *White Paper: Mistaken-for-Game Hunting Accidents – A Human Factors Review*, report prepared by Kyle Wilson and Karl Bridges for Hunter Safety Lab (2015), p.2

⁵⁸⁴ HFEx, *White Paper: Mistaken-for-Game Hunting Accidents – A Human Factors Review*, report prepared by Kyle Wilson and Karl Bridges for Hunter Safety Lab (2015), p.24

⁵⁸⁵ Ken Slee, *Public Hearing*, 6 October 2016, p.5; Dennis Keith, *Public Hearing*, 19 October 2016, p.7; Bob Gough, *Submission 67*, p.9; Simon Parkinson, *Submission 123*, p.1; Australian Deer Association, *Submission 168*, p.13

⁵⁸⁶ Bob Gough, *Submission 67*, p.9; Name withheld, *Submission 119*, p.2; Simon Parkinson, *Submission 123*, p.1

The Committee was told that many recreational hunters are conscious of the risks and take steps to mitigate them:

Most Victorian Hunters undertake hunter education training to improve knowledge and skills. Hunting organizations use this opportunity to improve attitudes including ethics, understanding of environmental issues and consideration of other bush users. All the major hunting organisations and a number of private providers conduct hunter education, and most positions on these courses are booked out months in advance. For example, the ADA [Australian Deer Association] has conducted an internationally recognised two day residential hunter education course in Victoria for up to 100 students annually for over 30 years.⁵⁸⁷

Hound crew leaders take a lot of pride in managing the hunt. I suppose it is not a selection process, but they generally do not want dills that can put anybody at risk. Everybody has a UHF radio, and if any members of the public happen to come into that area everybody is made aware of that. So there is a lot of effort put into risk mitigation. The hound crew leader also coordinates the movement of hunters through the radio, so that two hunters cannot bump into each other from opposite sides of a deer and shoot each other. That is just a real-world example of how the risks are managed and how we interact with the public. Now that we are family men, we do take a lot of pride and we see the point of view of the family camped on a riverbank, and making a point of driving in and saying, 'Listen, there might be a hunt coming through this way. Don't be alarmed. We know you are there', and those sorts of efforts.⁵⁸⁸

Mr David McNabb from Field & Game Australia told the Committee:

Our belief from the statistics that are available is that hunting has an exceptional safety record. In the 10-year period to 2010, hunting or shooting-related incidents that resulted in tragic deaths were 1.4 per cent of all reported incidents, and of this about a third were from vehicle accidents related to hunting activities, and none of those involved were non-hunters. It appears you are twice as likely to suffer a fatality from hiking, mountaineering and other adventure-type recreational activities, from the statistics we were able to access.⁵⁸⁹

Mr McNabb was drawing on a report by the Victorian Institute of Forensic Medicine, which sought to identify deaths from hunting accidents in Australia between 2000 and 2010. The report identified eight deaths as a result of unintentional shooting during hunting in Victoria. Additional deaths occurred from accidents during hunting, such as vehicle accidents. As noted by Mr McNabb, all of the deceased were hunters, injured either by their own gun or by someone else in their hunting party.⁵⁹⁰

The Monash University Accident Research Centre was also able to examine the records of hospital emergency department presentations in Victoria. Between 2002-03 and 2014-15, there were 25 records of people presenting to an

⁵⁸⁷ Bob Gough, *Submission 67*, p.9

⁵⁸⁸ Russell Sharman, *Public Hearing*, 7 October 2016, p.6

⁵⁸⁹ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.5; see also Field & Game Australia, *Submission 207*, p.4

⁵⁹⁰ Lisa Crockett, *NCIS Database Search: Australian External Cause Deaths While Engaged in Hunting Activities Between 1 July 2000 - 1st August 2010*, report for the Game Council of New South Wales (2010)

emergency department in Victoria who were shot while hunting. People also came to emergency departments as a result of being injured by rifles, ricocheted bullets, falling out of vehicles, cutting themselves with hunting knives and other activities while hunting.⁵⁹¹

Based on this evidence, current unsupervised recreational hunting activities do not pose serious risks to the community and other parks users. However, if any changes are made to the scale of hunting in Victoria or the places where it is permitted (see Section 9.2 of this report), it will be important to ensure that these changes do not reduce the safety of hunters or other park users.

6.8.3 Effectiveness

The effectiveness of unsupervised hunting as a means of controlling animal numbers was debated by submitters and witnesses to this inquiry. Dr Nancy McMurray (Friends of Gippsland Lakes Parks and Reserves) noted that ‘The most effective invasive programs are intensive, and they take out large numbers of invasive animals over the shortest period of time.’⁵⁹² It was argued that unsupervised shooting did not fit that model for several reasons.

The Committee was told that many recreational hunters will only kill animals that they can use for either meat or trophies. The Australian Deer Association, for example, stated that a ‘shoot to waste’ approach ‘is often repugnant to their [recreational hunters’] personal values and ethics’.⁵⁹³ As a result, recreational hunters may pass up opportunities to shoot deer when the meat will be difficult to utilise:

You know, you have just walked up a hill out of Licola; there is a fair bit of sweat on your brow. You are not sure whether you are going to be able to stand upright or not. ‘Do I want to take that stag there or do I want to redo this whole stalk so that I can actually recover the stag effectively and take it out to utilise the meat?’. That is the hunter’s motivation, because in those cases they will take the meat out. That might not necessarily fit with a control program, where the objective is different.⁵⁹⁴

Most hunters do not like leaving dead animals in the bush. They do not shoot them just to shoot them; they are going out there for a reason. So if there is good access, they will tend to be fairly non-selective as to what they shoot. If they are walking two days into the Alpine National Park, it is 2000 or 3000 feet back up the ridge line to the vehicle. They are not going to go in there to try to shoot animals for meat, because it will be a gut-busting walk and carry to get that carcass out ... So when people go into isolated areas, they tend to focus very much on a trophy stag and nothing else, because it is just impossible to carry out meat from that situation.⁵⁹⁵

⁵⁹¹ Monash University Accident Research Centre, correspondence received 19 December 2016; note that these figures may include some of the people who died as a result of hunting injuries.

⁵⁹² Nancy McMurray, Friends of the Gippsland Lakes Parks and Reserves, *Public Hearing*, 6 October 2016, p.6

⁵⁹³ Australian Deer Association, *Submission 168*, p.13

⁵⁹⁴ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.11

⁵⁹⁵ Ken Slee, *Public Hearing*, 6 October 2016, p.6

Hunters who are seeking a trophy stag (that is, a male with large antlers) may also pass up opportunities to shoot females and may restrict themselves to shooting males because of this reluctance to ‘shoot to waste’. This can limit the effectiveness of recreational hunting. Male deer typically mate with multiple females. As a result, shooting male deer may have little or no impact on the number of deer born in the next season. As Mr Anthony Carroll explained:

One female could in a lifetime produce up to about 10 calves. This [shooting females] significantly cuts the birth rate and is an important and effective method of population control. Large stags are valued for their trophy appeal and add to the value, financial and otherwise, of the Victorian economy and healthy lifestyle but shooting one large stag has little effect on overall populations.⁵⁹⁶

The Committee notes that some of the recreational hunting groups have made efforts to change hunters’ attitudes and encourage hunters to target female deer (see Section 9.4.1).

It was also suggested that recreational hunters may be motivated to limit what they shoot to ensure that there will be animals to shoot in the next season. This may involve not shooting as many animals as possible or specifically leaving females and young. Mr Simon Cox of the Invasive Species Council asserted that:

... the goals of the hunter are different from the goals of feral animal control ... Not all hunters have these goals but in general most hunters would and organisations that represent hunters have these goals, which are to maintain the population of the target species.⁵⁹⁷

In its submission to the Committee, Animals Australia supported this view:

... recreational hunters may often have motivations contrary to the goals of invasive animal population control, and in fact have an incentive to maintain populations to ensure they have ongoing hunting opportunities (for example, by moving on from a heavily hunted region, or leaving the young or breeding females).⁵⁹⁸

Mr Ken Slee rejected this, saying that:

Hunters do not think about what might or might not be there next year. They go into the bush to hunt now ... the problem is not that people make a decision to pass up animals for breeders or for next year; the problem is that the deer are very elusive and it is impossible — it is not a shooting gallery.⁵⁹⁹

⁵⁹⁶ Anthony Carroll, *Submission 92*, p.1

⁵⁹⁷ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, pp.4-5

⁵⁹⁸ Animals Australia, *Submission 213*, p.6

⁵⁹⁹ Ken Slee, *Public Hearing*, 6 October 2016, p.7

However, it has been noted that the Australian Deer Association's 2014 code of conduct advises:

If the taking of hinds or does is legal, consideration should be given to the effect of removal of such animals from the herd. Conversely, the removal of too many stags or bucks from a population should be avoided.⁶⁰⁰

The Committee was told that these problems are reduced with hound hunting as opposed to stalking. Mr Luke De Boer explained that hound hunters generally shoot all of the deer that their hounds find, rather than being selective:

... stalking is not a high-cull-rate type of activity, and a lot of stalkers, such as myself — if I hike into a national park, I am looking for a trophy animal; I am not looking to shoot a lot of deer. Hound hunting, on the other hand, has by far a lot higher success rate in the culling of deer, in reducing numbers. Hound hunters generally are more, when they hunt, indiscriminate; they will shoot any deer that their dogs are trailing. Of course they are lured to areas for trophies, and they like getting trophy stags, but that is more of a bonus as such.⁶⁰¹

Hound hunting is discussed further in Section 9.3.4 of this report.

Some submitters and witnesses also argued that, from an animal control perspective, recreational hunters may not focus their efforts where they are most needed:

They are likely to go to places that are accessible to Melbourne. I mean, it is up to them where they go. It might be a very nice camping spot, or it might be a place they go to every year. This is the thing. If you really have a good feral animal control program, you go to where the problem is or what the purpose is. If you wanted to do containment, you would go to the edges of where the deer are, where the densities are very low. But hunters tend to go where the densities are highest because they can maximise their chance of finding a deer.⁶⁰²

Given these factors, a number of contributors to this inquiry suggested that, despite the large number of deer harvested each year by recreational hunting, it may not make any impact on the total number of deer in the bush. This is discussed further in Section 8.9.2 of this report.

Government incentives, such as bounties or allowing the use of meat or other animal products in certain circumstances, may influence where and what unsupervised hunting takes place. This may improve the efficiency of recreational hunting and mitigate some of the concerns noted above. These incentives are discussed further in Sections 9.3.5 and 9.5 of this report.

⁶⁰⁰ Australian Deer Association, *Code of Conduct* <www.austdeer.com.au/about-ada/code-of-conduct/>, viewed 13 February 2017; cited by Andrew J. Bengsen & Jessica Sparkes, 'Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.300

⁶⁰¹ Luke De Boer, *Public Hearing*, 7 October 2016, p.3, see also Russell Sharman and Luke De Boer, *Public Hearing*, 7 October 2016, p.9

⁶⁰² Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.7; see also Dave Forsyth, *Public Hearing*, 10 October 2016, p.4

6.8.4 Community concerns

The Committee was also informed that there are some community concerns with recreational hunting.

Making other forms of control less effective

In some cases, recreational hunting may change animals' behaviour. Animals may be dispersed, either temporarily or permanently, as a result of hunting. This can increase the area with invasive animal problems and make it more difficult for subsequent animal control programs to target the right areas. Hunting may also make some animals shyer and more cautious, making them more difficult to locate.

Such changes in animals' behaviour can reduce the effectiveness of other control methods such as trapping or paid professional shooting.⁶⁰³ Dr Carol Booth from the Invasive Species Council has stated that:

There are problems also with hunters undermining professional control efforts, by making feral animals more wary or by sabotaging or opposing control programs. A Parks Victoria Pest Animal Officer who traps pigs and dogs in the Eastern Alps in Victoria, found that pig hunters "do a lot more harm than good, chasing pigs into new areas and making them wary and hard to catch." The government's pig traps have been vandalised and stolen, and trapped pigs "let loose for future hunting". A pest control officer in NSW, Andrew Glover, told ABC radio that deer hunters made control more difficult: "Deer in most circumstances are very, very clever, and if they've seen somebody walking around and then takes a shot at them, then the next time they're far more elusive and you have to use other more expensive and time-consuming techniques". Pig hunting, particularly with dogs, can disperse pigs or make them more wary.⁶⁰⁴

Mr Kirk Stone, a professional shooter, similarly indicated:

Sambar deer are highly adaptive and using methods or personnel that result in deer being encountered but not culled quickly leads to the deer population adopting evasion techniques that prevent meaningful population and impact reduction.⁶⁰⁵

It was also suggested by multiple submitters that some recreational hunters deliberately transport invasive animals to new areas to provide future hunting opportunities. A study of the genetics of wild pigs in Western Australia indicated that wild pigs had been deliberately moved to new areas, with recreational hunters the most likely culprits.⁶⁰⁶ A survey found that government agency land

⁶⁰³ Nancy McMurray, Friends of the Gippsland Lakes Parks and Reserves, *Public Hearing*, 6 October 2016, pp.5-6; Friends of the Gippsland Lakes Parks and Reserves, *Submission 166*, p.2; Nancy McMurray, *Submission 164*, p.1; Roger Bilney, Gippsland Environment Group, and Environment East Gippsland, *Public Hearing*, 6 October 2016, 2016, p.13

⁶⁰⁴ Carol Booth (Invasive Species Council), 'Hunting & Feral Animal Control: Conservation or Con?' in Melina Tensen & Bidda Jones (eds), *Proceedings of the 2010 RSPCA Australia Scientific Seminar: Convergence or Conflict: Animal Welfare in Wildlife Management and Conservation* (2010), p.29 (with sources)

⁶⁰⁵ Kirk Stone, *Submission 205*, p.3

⁶⁰⁶ Peter B. S. Spencer & Jordan O. Hampton, 'Illegal Translocation and Genetic Structure of Feral Pigs in Western Australia' *The Journal of Wildlife Management* 69(1) (2005), pp.377-84

managers across Australia believed that nine per cent of wild deer are a result of humans transporting the animals in recent times, as opposed to releases by the acclimatisation societies in the nineteenth century and unaided migration by the deer.⁶⁰⁷

Hunting dogs

The Committee heard that the safety of hunting dogs has improved in recent years due to the introduction of technology (such as GPS collars). This has mitigated the risk that dogs would be lost in the bush and then become wild, preying on native animals or farm animals. It was also put to the Committee that hunting dogs may not be able to survive in areas with established wild dog populations.

The impact of hunting dogs on the amenity of public land for other users was also raised as a community concern.

Hunting dogs are discussed further in Section 9.3.4 of this report.

Carcasses left behind

Concerns were also expressed about recreational shooters leaving carcasses behind. These carcasses may serve as food for other invasive animals, such as wild dogs or foxes, potentially increasing the number and strength of these invasive species.⁶⁰⁸ Carcasses may also draw animals into close contact with each other, increasing the risk of diseases being transmitted within the wild animal population (and potentially to hunting dogs and hunters).⁶⁰⁹

The Committee received different views relating to whether or not wild dogs would be attracted to deer carcasses. Mr Barry Howlett from the Australian Deer Association noted work by Dr Dave Forsyth of the Arthur Rylah Institute:

He left sambar deer carcasses in areas known to be frequented by wild dogs and set up camera traps and went back at regular intervals, checked the information from the camera traps and measured the reduction in biomass of the deer based on dog predation, and he found that, while dogs visited most of the carcasses, they ate very little of them ... Wild dogs are hunters, they are not carrion eaters.⁶¹⁰

⁶⁰⁷ Andrew Moriarty, 'The Liberation, Distribution, Abundance and Management of Wild Deer in Australia' *Wildlife Research* 31 (2004), pp.293-4

⁶⁰⁸ Bob Gough, *Submission 67*, p.24; Field & Game Australia, *Submission 207*, p.10

⁶⁰⁹ Andrew J. Bengsen & Jessica Sparkes, 'Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.305

⁶¹⁰ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.7

The article by Dr Forsyth and others concluded:

Wild dogs and foxes fed on most sambar deer carcasses, but they seldom remained at carcasses for long and had a smaller effect on the loss of edible biomass than we expected. Feral cats seldom fed on sambar deer carcasses, a result consistent with the belief that this species is an obligate predator in Australia (i.e. prefers live prey).⁶¹¹

The article hypothesised that:

Although wild dog pups sometimes spent long periods at sambar deer carcasses, we were surprised that wild dogs did not spend more time feeding at sambar deer carcasses and did not contribute more to the removal of edible biomass from carcasses. There are several possible explanations for this. First, our study sites had been subject to wild dog control for many years and hence wild dog abundances were likely low, particularly close to farms ... relative to what they would be in the absence of control. Low frequencies of visits to carcasses by wild dogs, particularly adults, suggest that this species was at low density. Wild dogs form large packs in the absence of control and the presence of abundant food, with small packs considered a product of control. Second, the availability of more preferred alternative prey may have meant that wild dogs did not 'need' to eat sambar deer carcasses. The diet of wild dogs in south-eastern Australia is dominated by macropods and wombats. The low rate of visits involving feeding supports this hypothesis. Indeed, Fleming et al. considered wild dogs to be "specialist" hunters rather than "opportunistic generalists". Third, and related to the previous point, the spatially and temporally unpredictable distribution of carcasses in the landscape means that wild dogs (and foxes) may have been using these areas less than other parts of the landscape. However, our carcasses were always within 50 m of roads and tracks, which are thought to be important movement corridors for wild dogs and foxes in south-eastern Australian forests. Fourth, hunter-shot deer carcasses unrelated to our study (and therefore unknown to us) may have been present in the study area. Hunting was permitted throughout our study area for the duration of our study and hence wild dogs and foxes may have been utilising other hunter-shot deer carcasses. Fifth, sambar deer carcasses rapidly decomposed during the warmer spring season such that virtually all edible biomass had been removed after 11 weeks. Hence, the flesh of carcasses remained available to all carnivores for longer during winter than spring. If we had monitored carcasses in only one season rather than two seasons then our estimates of the utilisation of carcasses by wild dogs, foxes and feral cats would have been different.⁶¹²

However, Mr Cameron Skedd of the Vertebrate Pest Managers Association Australia drew the Committee's attention to another study which analysed the food source of wild dogs and foxes in Victoria based on analyses of the animals' scats. The study found that:

611 David M. Forsyth, Luke Woodford, Paul D. Moloney, Jordan O. Hampton, Andrew P. Woolnough & Mark Tucker, 'How Does a Carnivore Guild Utilise a Substantial but Unpredictable Anthropogenic Food Source? Scavenging on Hunter-Shot Ungulate Carcasses by Wild Dogs/ Dingoes, Red Foxes and Feral Cats in South-Eastern Australia Revealed by Camera Traps' *PLoS ONE* 9(6) (2014), p.7 (with sources)

612 David M. Forsyth, Luke Woodford, Paul D. Moloney, Jordan O. Hampton, Andrew P. Woolnough & Mark Tucker, 'How Does a Carnivore Guild Utilise a Substantial but Unpredictable Anthropogenic Food Source? Scavenging on Hunter-Shot Ungulate Carcasses by Wild Dogs/ Dingoes, Red Foxes and Feral Cats in South-Eastern Australia Revealed by Camera Traps' *PLoS ONE* 9(6) (2014), p.12 (with sources)

Sambar deer were a key mammalian food item in the diet of wild dogs, and to a lesser extent foxes, in several regions where this species is now common, which has not previously been documented. Wild dogs may have been hunting and killing sambar deer, particularly calves, but given the large size of sambar deer (110–240 kg) consumption of this food item by wild dogs and foxes could reflect scavenging. The greater use of sambar deer by wild dogs may be due to the greater jaw size and strength enabling wild dogs to better access carcasses. However, the use of this food resource by foxes may be underestimated if they are scavenging from opened carcasses and not ingesting hair.⁶¹³

Other control methods, including professional shooting, co-ordinated recreational shooting and poisoning, also result in carcasses being left behind. However, with these methods the target animals may be killed in a much shorter period of time than with unsupervised recreational shooting:

... in terms of ... the carcasses that are left on the ground [after aerial shooting], it really depends over what period. If you do it over a sustained burst, there would be an oversupply of food for feral animals, and that would not be enough time to encourage breeding. But if you are doing it every month over a year, it would be a problem. Normally the short pulses of killing large numbers of animals from the air, according to the vertebrate pest experts, is normally not a problem, because while it might feed some feral animals in the short term, because the bodies decompose, then that food is no longer available. So if they are producing young, they would starve.

... With the goats, for instance, in Murray-Sunset they do do aerial shooting of goats, and they accept that there will be many. They do not remove the carcasses because it would be too costly and would mean they could not do as much control. But it does not create an ongoing increase of the feral animal population.⁶¹⁴

In relation to hound hunting, the Committee was also informed that, because hound hunters work in crews, they are able to take more carcasses away than stalkers by working together to lift and carry the carcasses.⁶¹⁵

Alternatively, it was also suggested that the negative impact of carcasses left in the bush could be mitigated by using them to control other invasive species. Some submitters suggested using the carcasses to bait or trap species such as foxes, wild dogs and feral cats that may be attracted to the carcasses.⁶¹⁶

⁶¹³ Naomi E. Davis, David M. Forsyth, Barbara Triggs, Charlie Pascoe, Joe Benshemesh, Alan Robley, Jenny Lawrence, Euan G. Ritchie, Dale G. Nimmo & Lindy F. Lumsden, 'Interspecific and Geographic Variation in the Diets of Sympatric Carnivores: Dingoes/Wild Dogs and Red Foxes in South-Eastern Australia' *PLoS ONE* 10(3) (2015), p.19 (with sources)

⁶¹⁴ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.9

⁶¹⁵ Russell Sharman and Luke De Boer, *Public Hearing*, 7 October 2016, p.8

⁶¹⁶ Luke De Boer, *Submission 128*, p.2; Stuart Stagg, *Submission 186*, p.3

6.9 Costs associated with shooting

The terms of reference for this inquiry ask the Committee to consider, among other things, the financial costs of co-ordinated recreational hunting compared to other forms of pest control.

When using paid professional shooters, there are labour costs, contract management and other costs. The costs to government associated with unsupervised recreational hunting, however, are minimal. A number of submitters and witnesses considered that a major advantage of using recreational hunters in co-ordinated programs is the lack of labour costs to be paid to volunteers. However, as with all volunteering programs, there are a number of costs involved with the co-ordination of the programs:

Developing partnerships with accredited volunteer shooters does come at a cost, to both the volunteers through accreditation, training and operational expenses, and to Parks Victoria through planning, supervision and compliance costs.⁶¹⁷

The programs involve a considerable amount of administration from ADA [the Australian Deer Association], and in recognition of this fact the Victorian government recently delivered us a grant of \$75 000 per annum to cover some of these expenses. The programs also cost Parks Victoria's budget to the tune of some hundreds of thousands of dollars a year.⁶¹⁸

... we [the Australian Deer Association] have a grant of \$75 000 a year over four years to help with the administration of these deer management programs, which is based on all the permits, all the rostering, all the work we have to do to run them.⁶¹⁹

There are costs associated with the co-ordination, planning and execution of co-ordinated hunting programs, ranging from organising permits, accreditation, project management, equipment, training and supervision. Table 6.1 provides the known costs, to date, of the co-ordinated deer control programs outlined in Section 6.5 of this chapter. Costs differ between programs depending on a number of factors, including the number and scale of programs delivered, the level of resources required to manage programs in different areas (high visitation areas require more operational resources) and the level of monitoring.⁶²⁰

⁶¹⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, pp.ii, 28

⁶¹⁸ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.4

⁶¹⁹ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.7

⁶²⁰ Matthew Jackson, Chief Executive Officer, Parks Victoria, correspondence received 28 April 2017

Table 6.1 Costs associated with Parks Victoria's co-ordinated deer control programs

	2016-17	2015-16	2014-15
Wilson's Promontory National Park			
Staff labour	\$6,120	\$15,030	\$0
Contracted labour ^(a)	\$0	\$14,000	\$0
Alpine National Park			
Staff labour	\$37,000	\$39,000	\$8,000
Contractors (deer control)	\$80,000	\$20,000	\$0
Monitoring ^(b)	\$64,000	\$95,000	\$95,500
Yarra Ranges / Dandenong Ranges			
Staff labour	\$19,764	\$24,165	\$49,068
Operational costs	\$15,000	\$10,000	\$10,000

(a) For the purposes of camera monitoring.

(b) Includes costs associated with contractor monitoring protocols and contingency staff required for camera monitoring.

Source: Committee calculations based on Matthew Jackson, Chief Executive Officer, Parks Victoria, correspondence received 28 April 2017

The Vertebrate Pest Managers Association Australia commented on the 'true costs both direct and indirect' of co-ordinated volunteer hunting programs:

Hidden costs are usually; ranger chaperones and local police officers (at overtime rates), admin fees and any hidden fees charged by SSAA [Sporting Shooters Association of Australia], additional Parks Vic admin and coordination fees not to mention the extra staff supervision required to ensure volunteers meet safety and ethical standards.⁶²¹

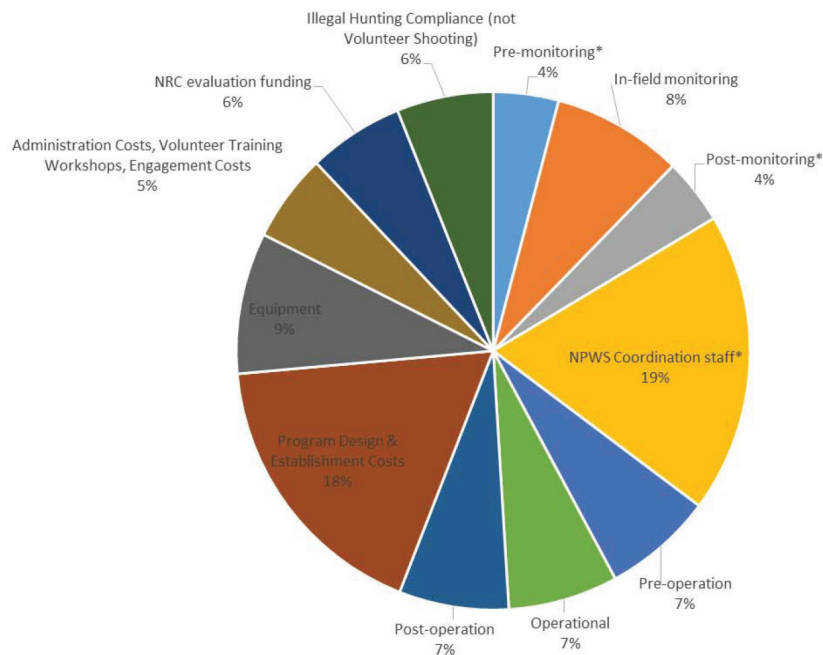
In some cases, Government grants are provided to recreational hunting organisations involved in co-ordinated hunting programs in recognition of their input. In 2016-17, this included \$75,000 to the Australian Deer Association and \$200,000 to the Sporting Shooters Association of Australia.⁶²² The New South Wales three-year supplementary pest control program (see Section 6.7.1 of this chapter), which involves co-ordinated volunteer recreational shooters in 12 parks and reserves, had a budget of \$11 million of government funding. An interim evaluation of the trial found that \$3.6 million had been spent by July 2015.⁶²³ Figure 6.2 breaks down this expenditure.

⁶²¹ Vertebrate Pest Managers Association Australia, *Submission 169*, p.2

⁶²² Matthew Jackson, Chief Executive Officer, Parks Victoria, correspondence received 28 April 2017

⁶²³ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Interim Evaluation* (2016), p.30

Figure 6.2 New South Wales supplementary pest control trial expenditure to July 2015



Source: New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Interim Evaluation* (2016), p.31

The evaluation found that significant improvements had been made in the first 18 months of the trial which saw costs halved to around \$9,400 per operation.⁶²⁴ This was achieved through improved planning, changes in staffing ratios, reduced use of access control staff and improved meal and accommodation arrangements.⁶²⁵ The Committee also notes that there may be large start-up costs associated with these programs, but expenditure may reduce over time. For instance, program design and establishment costs are initial expenditures that do not need to be repeated for subsequent operations and purchasing equipment and developing training materials will occur at the start of the program and can be re-used multiple times. As noted in the interim evaluation, establishment costs accounted for 18 per cent of the total trial costs to that point.⁶²⁶

However, the Committee notes the importance of oversight for these programs. In addition to focussing the recreational hunting effort at appropriate times and places, significant effort is put into ensuring safety as part of these programs (see Section 6.4 of this chapter). It was very clear from many members of the community which the Committee met with that these additional safety measures are essential to reassure the public that the programs are safe, particularly in

624 New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Interim Evaluation* (2016), p.30

625 New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Interim Evaluation* (2016), pp.31-2

626 New South Wales Natural Resources Commission, *Supplementary Pest Control Trial Interim Evaluation* (2016), p.33

high-use parks. While there may be potential efficiency gains in relation to the costs of overseeing co-ordinated recreational hunting programs, the Committee believes that the oversight of safety should not be reduced.

Other related costs of co-ordinated recreational hunting programs should also be considered. For instance, some programs require that parks be closed to other users while shooting occurs. This can result in loss of business to local tourism operators as well as potentially deterring some visitors. In relation to recreational hunting on Snake Island, the Committee was told:

The impact on the current (and future) licensed tour operators and user organizations' has **not** been considered. ie Currently approx. 5000 organized visitors days are at risk for a maximum 320 visitor days for recreational hunting.

Local and State tourism strategies are designed to attract Melburnians and international visitors to experience regional Victoria's natural beauty. Restricted access to Snake Island is counterproductive to this goal.⁶²⁷

In the end, Mr Bob Gough argued that there may be little difference in the costs between recreational hunters and professionals:

PV [Parks Victoria] volunteer management programs use volunteers in a very similar way to contractors, and the benefit is that contractors and volunteers can be used as required, and do not represent an ongoing personnel and equipment management liability for the host agency. Contractors and volunteer programs cost money in terms of PV staff time, and in equipment and resources, and a detailed financial comparison may show that there is little difference in program costs.⁶²⁸

However, some submitters and witnesses argued that paid professional shooters provide a greater level of effectiveness or efficiency. Noting the small numbers of deer removed by recreational hunters during the Wilsons Promontory exercises, it was argued that:

What was not reported was that 22 amateur shooters were involved (as well as numbers of parks Victoria staff, in addition to a year in the planning). It would have been much more efficient and effective to have had two professional or highly accredited shooters accompanied by a Parks Victoria staff member who was very familiar with the location of deer groups, the lie of the land and infrastructure, and to spot light hunt the deer. It is completely unsustainable and ineffective to involve that number of recreational shooters to cull 42 deer when there are now many tens of thousands of deer on public and private lands in Victoria.⁶²⁹

I understand 22 hunters took 3 days to cull about 70 animals, which seems very labour intensive to me and could probably have been achieved by a much smaller team of professionals directed by Parks staff.⁶³⁰

⁶²⁷ Snake Island Cattlemens Association, Presentation, *Public Hearing*, 7 October 2016, p.12

⁶²⁸ Bob Gough, *Submission 67*, p.19

⁶²⁹ Louise Crisp, *Submission 185*, p.2

⁶³⁰ Matt Pierce, *Submission 193*, p.1

Because professional shooters may be able to remove animals in less time than recreational hunters, parks may be required to close for shorter periods to produce the same results. In some cases, this may be a significant benefit to other park users and businesses dependent on park visitation. In contrast to recreational hunters, paid professional pest controllers are also able to use a variety of control methods and are not constrained to shooting only, which may further make programs involving professionals more efficient.

The use of paid professional pest controllers also provides a source of employment in regional areas.

The Committee recognises the significant amount of volunteer time provided to the Government through co-ordinated recreational hunting programs. For example, the Sporting Shooters Association estimated that its members have provided 23,750 volunteer hours, which the organisation estimated as worth \$1.2 million (based on a \$50 per hour rate).⁶³¹ However, the Committee notes that this work comes at a cost to the Government in respect of planning, supervising and assessing these programs.

Many of these costs would also apply to paid professional shooter operations and it is important to compare the costs of these two methods (as well as the results) in any assessment of co-ordinated recreational hunting. The Committee considers it important to track the costs associated with co-ordinated recreational hunting programs to enable accurate evaluations to occur. The Committee notes that costs of various methods are being tracked as part of the Alpine National Park trial.

A report for the Invasive Animals Cooperative Research Centre reviewed research on the efficacy of ground-based shooting as a form of invasive animal control and commented on the costs of these operations:

The two studies in our sample that combined cost estimates with population models to estimate the investment required to contain pest populations or damage to acceptable levels both reported substantial ongoing costs for sustained management. Several North American studies reported on programs that tried to avoid or reduce the costs of retaining staff or professional controllers for ongoing operations by using volunteer shooters or hunters. Some of these reported similar costs per animal to government shooting but lower costs per animal than other control tools such as trapping.

...

Other studies showed that there can still be substantial costs associated with managing volunteers or hunters, even when costs are partially offset by charging licence fees to hunters. The cumulative cost of these expenses could potentially outweigh the cost of professional control if differences in efficiency between professional and unpaid shooters mean that greater input is needed from unpaid

⁶³¹ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.10

shooters than would be needed from professionals in the long term. Careful construction of contracts and milestones for professional shooters can provide efficiency incentives that can help to minimise the duration of shooting operations.⁶³²

Research into the costs and benefits of various deer hunting methods has been conducted in the United States of America. One study examined the control of deer in Minnesota using co-ordinated recreational hunters, opportunistic conservation officers, park rangers and police officers. The study outlined the following costs (per deer killed) associated with each method:

The controlled hunt was the only method that generated revenue (fees charged to hunters) and cost \$117/deer killed to operate. Costs/deer killed using conservation officers and park rangers as sharpshooters were similar – \$108 and \$121, respectively. The highest cost (\$194/deer killed) occurred when police officers were used as sharpshooters.⁶³³

Co-ordinated recreational hunting produced the second lowest cost per deer at \$US117 per deer (partly because hunters were required to pay entry fees). Although costs associated with salaries for shooters were avoided with the recreational hunters, this was partly offset by lower efficiency rates. Recreational hunters removed on average 0.03 deer per hour. In comparison conservation officers, parks rangers and police officers removed on average 0.23, 0.47 and 0.49 deer per hour, respectively. These results need to be treated with some caution though, as the methods were used in different types of areas (for example, some were in large parks, others in small tracts of public land).⁶³⁴

Another study examining deer management in Nebraska using co-ordinated recreational hunters outlined the following costs associated with the co-ordination of the program:

Labor required to administer controlled hunts in FF [Fontenelle Forest] and NW [Neale Woods] during 2007–2008 included hunt manager (214 hr), FF staff (312 hr), sentries (157.5 hr), and volunteers (132.5 hr) for a total labor cost of \$12,238. Costs for materials (postage [\$97], copying [\$38], maps [\$20]) and event insurance (\$2,500) were partially offset by income from hunter administration fees (collected from 85 hunters X \$20 = \$1,700).⁶³⁵

Depredation hunts (which involve hunting animals causing agricultural damage that would otherwise not be permitted to be hunted) also occurred. Costs associated with depredation hunts were also outlined:

Labor required to administer depredation hunts in FF [Fontenelle Forest] during January–March 2008 included hunt manager (45 hr), FF staff (75.5 hr), and volunteers (46 hr) for a total labor cost of \$2,427. Cost of ammunition was \$70.⁶³⁶

⁶³² Andrew Bengsen, *A Systematic Review of Ground-Based Shooting for Pest Animal Control* (2016), produced for Invasive Animals Cooperative Research Centre, p.20 (with sources)

⁶³³ Michelle L. Doerr, Jay B. McAninch & Ernie P. Wiggers, 'Comparison of 4 Methods to Reduce White-Tailed Deer Abundance in an Urban Community' *Wildlife Society Bulletin* 29(4) (2001), p.1105

⁶³⁴ Michelle L. Doerr, Jay B. McAninch & Ernie P. Wiggers, 'Comparison of 4 Methods to Reduce White-Tailed Deer Abundance in an Urban Community' *Wildlife Society Bulletin* 29(4) (2001), pp.1109-11

⁶³⁵ Scott E. Hygnstrom, Gary W. Garabrandt & Kurt C. Vercauteren, 'Fifteen Years of Urban Deer Management: The Fontenelle Forest Experience' *Wildlife Society Bulletin* 35(3) (2011), p.130

⁶³⁶ Scott E. Hygnstrom, Gary W. Garabrandt & Kurt C. Vercauteren, 'Fifteen Years of Urban Deer Management: The Fontenelle Forest Experience' *Wildlife Society Bulletin* 35(3) (2011), p.131

The average cost per deer killed in the co-ordinated controlled hunts was \$US120 and in the depredation hunts was \$US70.⁶³⁷ The study concluded that these costs are ‘comparable to sharpshooting [highly trained and experienced marksmen], less than trap-and-shoot, and considerably less than trap-and-transport and trap-and-sterilize’.⁶³⁸

Given shooting is the predominant method currently used to control deer (see Section 8.9 of this report), it is difficult to compare costs of different forms of control for deer. While there are costs associated with both co-ordinated volunteer recreational hunting programs and paid professional shooters, they do not compare.

6.10 General findings on co-ordinated recreational hunting programs

In the terms of reference for this inquiry, the Committee was asked to consider and report on the benefits of co-ordinated recreational (community) hunting in the control of invasive animals, including factors such as the biodiversity outcomes, community safety and the limitations of the trials.

Based on the evidence considered in this chapter, the Committee makes a number of findings and recommendations. Further consideration of the role of recreational hunting can be found in Chapters 9 and 10 of this report.

FINDING 29: Evidence provided about some co-ordinated recreational hunting programs suggests that they may be achieving benefits in terms of controlling invasive animals. However, in most cases, the monitoring activities are inadequate to properly evaluate the programs. Different measures have been adopted for different programs, preventing a proper assessment of the relative effectiveness of different techniques.

FINDING 30: The current lack of data makes it impossible to accurately assess the effectiveness of co-ordinated recreational hunting or compare it to other methods of animal control.

FINDING 31: The Government intends to implement a more robust monitoring framework for the Alpine National Park deer management trial, which involves using multiple methods. The results of this trial should improve our knowledge of the effectiveness of co-ordinated recreational hunting and strengthen our ability to determine which deer control activities are most effective.

RECOMMENDATION 7: That the Government develop a monitoring framework that is designed to provide a better understanding of the relative effectiveness of different control methods (and combinations of methods) and can be used to assess whether or not funds for invasive animal control are providing the best value for money.

⁶³⁷ Scott E. Hygnstrom, Gary W. Garabrandt & Kurt C. Vercauteren, ‘Fifteen Years of Urban Deer Management: The Fontenelle Forest Experience’ *Wildlife Society Bulletin* 35(3) (2011), p.133

⁶³⁸ Scott E. Hygnstrom, Gary W. Garabrandt & Kurt C. Vercauteren, ‘Fifteen Years of Urban Deer Management: The Fontenelle Forest Experience’ *Wildlife Society Bulletin* 35(3) (2011), p.133 (with sources)

Further discussion of monitoring, evaluation and reporting can be found in Section 10.3.2 of this report. Of particular importance, the Committee notes the Government's commitment in its strategy *Protecting Victoria's Environment – Biodiversity 2037* to developing a Monitoring, Evaluation and Reporting Framework for environmental activity generally. The Government has indicated that this will include standardised measures to bring consistency across programs.

FINDING 32: Program designs need to address community concerns relating to recreational hunting, such as increases in invasive animals on surrounding private land, reductions in amenity for other park users, increases in illegal hunting and risks to community safety.

FINDING 33: Many Victorians have a cautious attitude towards the use of firearms and concerns about the safety of recreational hunting, especially unsupervised recreational hunting. For any program involving shooting to control invasive animals, it is important for there to be effective communication and consultation to ensure community confidence and understanding.

Further discussion of the need to raise awareness about the impacts of invasive animals and programs to control them can be found in Section 10.2.6.

Shooting is recognised as an effective control method for a number of invasive species (see Chapter 8 of this report). The Committee notes the importance of collaboration and co-operation in relation to undertaking shooting. Volunteer hunters cannot and should not displace paid professional shooters. However, there is a place for both in invasive species control.

FINDING 34: Paid professional pest controllers play an important role in invasive animal control as they are able to apply a flexible approach, providing not only shooting but also a range of other animal control methods. Recreational hunting should not be seen as a substitute for the use of paid professional shooters.

FINDING 35: Paid professional pest controllers and recreational hunters can work well together to achieve effective invasive animal control. These two methods can complement each other as a part of a multi-method animal control program.

RECOMMENDATION 8: That programs using volunteer hunters be used to complement rather than displace the use of paid professional pest controllers. Any funding to support co-ordinated recreational hunting programs should be in addition to funding for engaging professional pest controllers.

7

Other methods of control

7.1 Introduction

At present, shooting is recognised as the only method of control for reducing deer numbers. However, the use of shooting to control invasive animals (as set out in Chapter 6 of this report) is not the only method of invasive animal control. A wide variety of other methods are also employed and additional methods are being researched or trialled. In order to assess the effectiveness of the programs set out in Chapter 6, it is necessary to compare those programs to the other possible methods of invasive animal control.

The Committee heard from and met with a number of people who advocated for the use of multiple methods to control invasive species. Other methods that are used to reduce animal populations include poisoning, biological control (such as releasing diseases or encouraging predators) and live capture (followed by humanely killing or rehoming the animals).

Another approach is to change the animals' environment to make it less hospitable. This includes destroying animals' homes and harbour, erecting fences or using deterrents to keep certain animals away from particular areas.

Some people have advocated for methods involving fertility control to prevent animals from breeding as a more humane way to reduce animal populations.

This chapter looks at what is involved with each of these methods of animal control. Chapter 8 assesses which methods may be most effective for the different invasive species in Victoria.

7.2 Poison

The Committee heard that poison is used widely on private and Crown land in Victoria. The two most common poisons are 1080 and PAPP. A major advantage of poison is that it can be more cost-effective than other control techniques in many situations. Aerial baiting can also be undertaken to access areas that would be difficult to reach by road or on foot due to remoteness or hard terrain.

For rabbits, fumigation of warrens with toxic gasses is also used. In contrast to some other methods of poison, fumigation is labour-intensive and costly.⁶³⁹

Concerns were expressed to the Committee about the humaneness of poison and the risks its use poses to other species, including humans.

639 PestSmart, *Rabbit Factsheet RABFS7: Fumigation for Rabbit Control* (2012), p.2

7.2.1 Humaneness

A number of submitters and witnesses argued against the use of poison, especially 1080, because of the suffering caused to the animal. For example:

Poison is a cruel, barbaric, painful and slow acting control method and in any civilised society such as ours it must be viewed with abhorrence.⁶⁴⁰

The use of 1080 baits should be banned outright as this poison takes up to 26 hours to take affect, with total agony resulting for the animal that has ingested the bait ...⁶⁴¹

Ms Jenni Reside, from Wildlife Unlimited, however argued that there was less suffering involved with the use of 1080 than appearances would suggest:

... I think there is a misbelief that 1080 hurts the animal. I am not saying the death that animals have with 1080 is a pleasant-looking death, but it does not affect them because it actually knocks the centres out of their brain first. They go into fits and things like that, but they do not actually feel it.⁶⁴²

However, the Humaneness Assessment Panel (a group of scientists, pest control experts and veterinarians – see Section 5.5.3 of this report) was less confident about the amount of suffering caused by 1080. In relation to its use on foxes, the panel found:

After a fox has ingested a bait containing 1080 there is a latent period of around 30 minutes to 3 hours before initial signs such as hyperexcitability, vocalisation, manic running and retching are observed. Signs of central nervous system disturbance including collapse, convulsions and tetanic spasms, then follow. Death occurs usually about two hours after the onset of clinical signs.

...

The latent period is likely to be associated with minimal pain or distress. After the onset of clinical signs when animals are retching, displaying manic running and there is little or no CNS [central nervous system] disturbance, it is likely that they will suffer and could experience distress, confusion, anxiety and pain.

In the later stages, when severe CNS dysfunction has developed, it is unknown if animals are perceiving pain ... With 1080 poisoning it is difficult to assess if animals are conscious after collapse and during convulsive episodes. During periods of prolonged convulsions it is possible that animals are lucid between fits. If animals are conscious during the convulsive episodes or if they become conscious afterwards it is possible that they may experience pain and/or anxiety.

There is also potential for injuries to occur after the appearance of clinical signs.⁶⁴³

⁶⁴⁰ Dennis Keith, *Submission 11*, Attachment 1, p.8

⁶⁴¹ Kathleen Whelan, *Submission 57*, p.1

⁶⁴² Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.6

⁶⁴³ Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humaneness of Pest Animal Control Methods* (2nd edition, 2011) Commonwealth Department of Agriculture, Fisheries and Forestry, pp.97-8

Other poisons may involve less suffering. PAPP is considered more humane by some.⁶⁴⁴ It is currently available for use on wild dogs and foxes in Victoria. A PAPP-based bait called Curiosity is being developed for feral cats.⁶⁴⁵ PAPP is currently being assessed for humaneness for use with wild dogs.⁶⁴⁶ However, PAPP is more expensive than 1080⁶⁴⁷ and poses a greater risk to other species (see Section 7.2.2 of this chapter).

Other poisons are also being investigated:

There is a new toxicant out called sodium nitrite ... It is used as a pig bait. I spoke to Invasive Animals CRC [Cooperative Research Centre], and they said it is a really good way to go. It converts haemoglobin into methaemoglobin, so you basically suffocate. Death within 90 minutes. Symptoms only last 30 minutes, and the symptoms are choking, not the thrashing about that you see with 1080. It is non-residual, and they claim that you can actually eat animals that have been poisoned with this. But it needs a species-specific delivery method, and I think that is possible.⁶⁴⁸

The Committee was advised that the humaneness of poison as a method of animal control may change with the development of new products.

7.2.2 Risks to species other than the target species

The Committee heard concerns raised by submitters about the risk of scavengers eating the poisoned carcasses or humans eating deer that have ingested poison.⁶⁴⁹ Poisoned baits may also pose a risk to animals that are not the target species if those animals eat the baits:

One of the biggest issues when baiting pest animals is to ensure that there are no non-target animals taking the bait ... Cats and foxes both take PIGOUT baits, and foxes ... actually cache baits. They take it away to a little hideaway and bury it. If the fox has eaten any of the PIGOUT bait, it then can die because of the poison it has ingested, and meanwhile the baits are hidden somewhere where we cannot find them and are available to other animals to find. Cats will take the PIGOUT baits, drag the PIGOUT baits away, have a little nibble on the outside and then decide, 'I've had enough, I don't want it', and off they go, leaving it open for other animals to eat.

...

The other thing is cache baits. Goannas, birds, quolls and other animals will take the PIGOUT baits or eat the PIGOUT baits if they are available. When using 1080 you must make sure that you know that your baits have been taken by the target animal and that you clean up anything that has not been taken. Of course if you have any animals taking it off, it is impossible to do it.⁶⁵⁰

⁶⁴⁴ Animals Australia, *Submission 213*, p.8

⁶⁴⁵ Mark Norman, Chief Conservation Scientist, Parks Victoria, *Public Hearing*, 10 October 2016, p.9

⁶⁴⁶ PestSmart, *PAPP for Wild Dog and Fox Control* <www.pestsmart.org.au/papp-for-wild-dog-and-fox-control/>, viewed 16 December 2016

⁶⁴⁷ PestSmart, *Frequently Asked Questions: PAPP for Wild Dog and Fox Control* (2016), p.2

⁶⁴⁸ Bob Gough, *Public Hearing*, 19 October 2016, p.11

⁶⁴⁹ Dennis Keith, *Submission 11*, p.9; Kathleen Whelan, *Submission 57*, p.1; Zac Forster, *Submission 78*, p.1; Luke Mitchell, *Submission 165*, p.2; Kerrie Allen, *Submission 190*, p.3; Animals Australia, *Submission 213*, p.8

⁶⁵⁰ Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.3

One of the reasons that 1080 is often used is that a number of native species have high tolerances to it.⁶⁵¹ This is less so with some other options, such as PAPP.⁶⁵²

The risks to other species can be mitigated by species-specific delivery mechanisms. For example, canid pest ejectors can specifically target foxes or wild dogs. The devices are placed in the ground with bait (such as dried meat) on top. When an animal pulls on the bait, the device releases poison from a capsule. The device can be set so that the amount of force required to trigger the release is more than most non-target species (such as small mammals and birds) are able to apply. The risk of these animals being poisoned by the device is therefore reduced. The device also makes it difficult for non-target species to move and cache baits.⁶⁵³ Canid pest ejectors are discussed further in Section 8.5.3 of this report.

Other species-specific devices have been developed for feral pigs⁶⁵⁴ and are being considered for feral cats.⁶⁵⁵

Particular processes can also reduce the risk to non-target animals. Ms Jenni Reside recommended a process for delivering poisoned grain to feral pigs:

Basically, when feeding pigs poison grain, the first thing that we do is identify the pig's activity, so we look for the pig-rooting and other activity. We then put cameras up to identify how many pigs and what is happening. When you identify the pig activity then you identify sites for bait stations. Then you put out the free feeds, which are the non-poison bait. Then you monitor that to see what takes it and keep replacing the free feeds to encourage the pigs to keep coming back, coming back. Then once the behaviour is established, introduce covers over the free feed, so you put boxes over the grain so no other animals can get it, because the pigs will dig underneath it to get it. Again, this is monitored closely. Then when you want to put the poison wheat out, or the poison grain out, you then peg those containers down because the pigs know the wheat is there and the pigs will dig into that. After the pigs have gone through a bait station like that there is hardly any grain left, so they have ingested nearly all of it. Then after the pigs taken the bait you go back and collect all the grain and dispose as per regulations and as legislation states. So there is very limited possibility for non-target animals to access it.⁶⁵⁶

Ms Reside noted that the attractiveness of grain to pigs not only makes the poisoning process effective but also means that the pigs do not leave much behind,⁶⁵⁷ reducing the risk of other animals consuming the poison.

651 Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.10

652 PestSmart, *Frequently Asked Questions: PAPP for Wild Dog and Fox Control* (2016), p.1

653 Clive A. Marks, Frank Busana & Frank Gigliotti, 'Assessment of the M-44 Ejector for the Delivery of 1080 for Red Fox (*Vulpes vulpes*) Control' *Wildlife Research* 26(1) (1999), pp.107-8; Clive A. Marks & Rebecca Wilson, 'Predicting Mammalian Target-Specificity of the M-44 Ejector in South-Eastern Australia' *Wildlife Research* 32(2) (2005), p.152

654 PestSmart, *Poison Baiting for Feral Pig Control in Australia* (2014), p.2

655 Mark Norman, Chief Conservation Scientist, Parks Victoria, *Public Hearing*, 10 October 2016, p.9

656 Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.4

657 Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.9

Other processes, such as using PAPP in cooler months when goannas (which are susceptible to PAPP) are less active can also reduce the risk of poisoning non-target animals.⁶⁵⁸

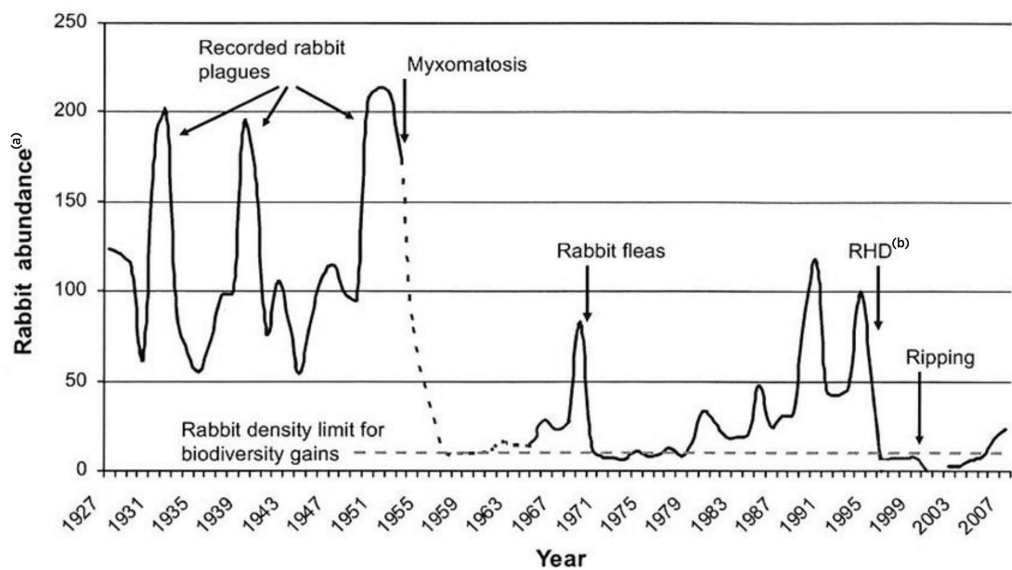
7.3 Biological control

The Committee explored the use of biological control, which involves using other organisms to control a species. This typically consists of the use of pathogens or predators.

7.3.1 Pathogens

Releasing pathogens has been a key approach with rabbit control in Australia. The use of myxomatosis in the 1950s (enhanced by the introduction of the rabbit flea in the 1970s to spread it) and the release of rabbit calicivirus in the 1990s achieved significant reductions in the rabbit population (see Figure 7.1).

Table 7.1 Rabbit abundance since 1927



(a) in north-eastern South Australia

(b) rabbit haemorrhagic disease

Source: adapted from Wimmera Catchment Management Authority, presentation at *Public Hearing*, 30 November 2016, p.5

A new strain of rabbit haemorrhagic disease virus (known as 'K5') was released across Australia in 2017, including 150 sites across Victoria. Agriculture Victoria will be monitoring the spread and impact of K5 at 13 sites.⁶⁵⁹

⁶⁵⁸ PestSmart, *Frequently Asked Questions: PAPP for Wild Dog and Fox Control* (2016), p.1

⁶⁵⁹ Agriculture Victoria, 'Over 400 Sites Selected for Rabbit Virus Release' (media release), 16 December 2016

The Committee heard that the humaneness of biological control has been questioned by some:

Every year it is extremely distressing to see them suffering horrendously from the man made myxomatosis virus. The virus causes all openings to swell, rendering it impossible for the animals to eat, drink or see. They suffer for days, even weeks, blind and starving until they starve to death or are gored by a predator. The pain from their stinging eyes (we witness their shock if they bump their weeping pussy eyes on fence wire), from slowly starving and being completely disorientated unable to find their families, is obvious. This is far from a kind death and it is unfathomable humans have allowed it.

Not much better is RHDV [rabbit haemorrhagic disease virus] (calici virus). Despite what authorities may say, this is not a painless or quick death either. The animals are absolutely conscious right until the end when we have witnessed the poor things terrified and convulsing, wiping away a flea from their eyes before gasping, panicked stricken for their last breath.⁶⁶⁰

In relation to rabbit haemorrhagic disease (RHD), however, PestSmart has stated:

In most rabbits, death from RHD is sudden. Some animals show no signs of illness prior to death whilst others will have elevated temperature, anorexia, apathy, dullness, prostration and reddened eyes. Respiratory signs (eg rapid respiration, bloody nasal discharge) and occasionally nervous signs (eg convulsions, paralysis, squealing) may be seen in the later stages. 5 to 10% of rabbits may show a chronic or subclinical course of disease. These animals may have jaundice, weight loss and lethargy for up to 1 to 2 weeks before dying.⁶⁶¹

Some submitters advocated for the development of pathogens for other invasive animals. The Committee notes, though, that many diseases are able to pass between wild mammals and farm animals. This limits the scope for the use of pathogens for many of Victoria's invasive animals.⁶⁶² There are also concerns about pathogens spreading to populations in other countries where the target animals are not considered to be undesirable.⁶⁶³

7.3.2 Predators

The dingo traditionally played an important role in managing the population of various species in Victoria. The Committee notes that some submitters argued that dingoes could assist with reducing some invasive animal species today:

While the dingo is an introduced species, it has been in Australia long enough to become a functional and integral part of the natural ecological system as a top-order predator.

⁶⁶⁰ Kerrie Allen, *Submission 190*, p.3

⁶⁶¹ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure RAB001: Inoculation of Rabbits with Rabbit Haemorrhagic Disease Virus (RHDV)* (2012), p.2

⁶⁶² Euan Moore, *Submission 203*, p.6

⁶⁶³ Glen Saunders, Brian Cooke, Ken McColl, Richard Shine & Tony Peacock, 'Modern Approaches for the Biological Control of Vertebrate Pests: An Australian Perspective' *Biological Control* 52 (2010), p.291

In one of the great ecological ironies the loss of predators can disadvantage their prey species. Top end predators are ecosystem shapers and exert control over smaller predators – foxes and wild cats – and large herbivores – kangaroos and wallabies. Eliminate the top of the food chain and predators lower down may flourish to the greater detriment of the smaller prey species whilst the large prey species will flourish unchecked and over populate.

The Dingo and now the Wild Dog/Dingo is a keystone species protecting mammal biodiversity in Australia and is the most significant constraint on the destructive power of introduced exotic predators – cats and foxes. This means that positive management of Dingoes/Wild Dogs should be seen as an essential element of biodiversity conservation in Australia and given a very high priority of management as opposed to the current practice of aiming for species elimination.⁶⁶⁴

Submitters called for the protection of existing dingo populations, dingo-dog hybrids or even wild dog populations.⁶⁶⁵ Some advocated for the re-introduction of dingo populations.⁶⁶⁶

The introduction of the Tasmanian devil was also suggested as a possible method of controlling invasive animals by some submitters.⁶⁶⁷

The Committee notes that previous introductions of predators to control other species in Australia have had unfortunate consequences for the broader ecosystem. The Committee notes that this approach requires a significant degree of caution.

7.4 Live capture

Another approach to invasive animal control that the Committee received evidence about is capturing animals alive and then either euthanasing or rehoming them. For smaller animals, such as dogs, this may involve the use of traps. In the case of larger animals, such as wild horses, this can involve mustering them into yards or ‘roping’.

7.4.1 Trapping

Trapping is widely used in Victoria, particularly in relation to wild dogs.

Victorian legislation restricts the use of traps to certain types and in specified areas.

⁶⁶⁴ Dennis Keith, *Submission 11*, Attachment 1, p.2

⁶⁶⁵ Zac Forster, *Submission 78*, p.1; Piers Jansen, *Submission 79*, p.1; Samantha Guyett, *Submission 80*, p.1; June-Alice Dewhirst, *Submission 101*, p.1; Australian Brumby Alliance, *Submission 159*, p.4; David Howell, *Submission 198*, p.2

⁶⁶⁶ Kathleen Whelan, *Submission 57*, p.1; Evie Jones, *Submission 127*, p.1; Nina Earl, *Submission 163*, p.2; Lawyers for Animals, *Submission 208*, p.8

⁶⁶⁷ Evie Jones, *Submission 127*, p.1; Nina Earl, *Submission 163*, p.2

Leg-hold traps

The use of leg-hold traps is permitted to catch rabbits, foxes and wild dogs. However, the traps must be set to minimise harm to the trapped animal and to minimise the risk of catching animals other than the target species. This includes only using traps with certain features, such as rubber padding, a spring in the anchor chain to act as a shock absorber and an ability to adjust the pan tension so that only a rabbit, fox or wild dog can trigger the trap.⁶⁶⁸

A major disadvantage of trapping is that it requires a significant amount of labour to set and check traps. In particular, people setting traps are required to check them regularly to ensure that animals are not caught in the traps for excessive periods. In relation to leghold traps, regulations state that ‘a trapped animal must not be left alive in the trap for more than 24 hours’,⁶⁶⁹ meaning that traps need to be checked every day. However, the Minister for Agriculture can make an exemption in the case of wild dog traps and the Minister currently allows people working for the Department of Environment, Land, Water and Planning to leave dog traps for up to 72 hours.⁶⁷⁰

The RSPCA has expressed concern about leg-hold traps from an animal cruelty perspective. The organisation considers that they ‘involve considerable suffering even when carried out according to best practice.’⁶⁷¹ Similar concerns were expressed by Animals Australia.⁶⁷²

Trap-yards

Trap-yards can be used for larger animals, such as deer, goats or horses. These are temporary or permanent enclosures with one-way gates or ramps that allow animals to enter but not leave. The animals can be enticed into the trap by making water or food available within it. The food and water can also reduce the animals’ suffering once captured and can extend the length of time between checks of the trap-yard.

A major advantage of trapping larger animals is that the trapped animals can be transported and then either re-homed or sold to abattoirs, partly offsetting the costs of capturing them.⁶⁷³

The level of distress experienced by animals in trap-yards varies between species. For some animals, such as feral goats, trapping in groups may generally cause relatively little agitation.⁶⁷⁴ However, deer may be more distressed if trapped

⁶⁶⁸ *Prevention of Cruelty to Animals Act 1986*, s.15AB; *Prevention of Cruelty to Animals Regulations 2008*, Regulations 26-32

⁶⁶⁹ *Prevention of Cruelty to Animals Regulations 2008*, Regulation 32(2)

⁶⁷⁰ Victoria Government Gazette No. G 27, 7 July 2016, pp.1774-5; Barry Tayler (Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.8) argued for the importance of this additional time.

⁶⁷¹ Mhairi Roberts, Animal Welfare Policy Manager, RSPCA Victoria, *Public Hearing*, 5 September 2016, p.2

⁶⁷² Animals Australia, *Submission 213*, p.8

⁶⁷³ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure HOR004: Trapping of Feral Horses* (2011), p.1

⁶⁷⁴ Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humanness of Pest Animal Control Methods* (2nd edition, 2011) Commonwealth Department of Agriculture, Fisheries and Forestry, p.91

in groups rather than singly.⁶⁷⁵ For some species, such as horses, trapping may cause more distress if they are confined with animals that are not part of their regular group.⁶⁷⁶

If the trap-yard is in a non-urban environment, even if it contains food, water and shelter, the animals cannot be left in the yard for more than 48 hours.⁶⁷⁷ More regular checking is recommended for some species.⁶⁷⁸ Trap-yards can therefore be relatively labour-intensive.

Trap-yards with one-way gates or similar devices may also pose a risk to native animals, which may be trapped along with the target species.⁶⁷⁹ Native animals may also suffer as a result of being excluded from water sources that are included within trap-yards.⁶⁸⁰

7.4.2 Mustering

Mustering involves rounding wild animals up using horses, motorbikes or other vehicles. Dogs may also assist in rounding up the target animals. The mustered animals can then be culled or transported to other locations where they can be processed or re-homed (as with trapping).

Mustering is highly labour-intensive and generally only efficient and economically viable where there are dense populations of the animal.⁶⁸¹ However, like trap-yards, mustering provides the advantage of being able to use the animals once they have been captured. This can offset some of the costs involved with mustering.

Mustering has an advantage over trapping in that it is species-specific.⁶⁸² However, mustering may be more stressful for some animals than the use of trap-yards.⁶⁸³

⁶⁷⁵ Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humaneness of Pest Animal Control Methods* (2nd edition, 2011) Commonwealth Department of Agriculture, Fisheries and Forestry, p.117

⁶⁷⁶ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure HOR004: Trapping of Feral Horses* (2011), p.2

⁶⁷⁷ Prevention of Cruelty to Animals Regulations 2008, Regulation 36

⁶⁷⁸ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure HOR004: Trapping of Feral Horses* (2011), p.2

⁶⁷⁹ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure HOR004: Trapping of Feral Horses* (2011), p.2

⁶⁸⁰ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure HOR004: Trapping of Feral Horses* (2011), p.2

⁶⁸¹ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure GOA003: Mustering of Feral Goats* (2011), p.1; *HOR003: Mustering of Feral Horses* (2011), p.1

⁶⁸² Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure GOA003: Mustering of Feral Goats* (2011), p.3

⁶⁸³ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure GOA003: Mustering of Feral Goats* (2011), p.1; *HOR003: Mustering of Feral Horses* (2011), p.1

7.4.3 Roping

In the case of horses, ‘roping’ or ‘brumby running’ is a traditional means of live capture, in which riders chase a wild horse, throw a rope around it and bring it under control. The captured animals can then be led to other locations and disposed of in the same ways as mustering and trapping.

Roping is one of the methods supported by the Mountain Cattlemen’s Association of Victoria,⁶⁸⁴ though others consider that it may involve excessive distress or risk of injury to the animals.⁶⁸⁵

7.5 Warren and harbour destruction

The Committee heard evidence that another way to control invasive animals is by destroying the places where they might live or shelter. This has been largely used for rabbits. Rabbit warrens can be destroyed using heavy machinery or explosives. The process of ‘ripping’ a warren will kill the rabbits within the warren through crushing, suffocation or direct contact with ripping machinery.⁶⁸⁶ Rabbits outside the warren may subsequently die due to a lack of shelter:

In many areas of Australia, rabbits depend on warrens for shelter from climatic extremes, predator avoidance and also for successful breeding ... Since rabbits do not readily dig new warrens, rabbit populations do not persist in areas where warrens are effectively destroyed and re-colonisation is made less likely.

... Because ripping gives long term management of rabbit populations the need for repeated control operations is reduced.⁶⁸⁷

The Committee was also informed that young rabbits particularly depend on warrens. Destruction of their warrens therefore greatly reduces the survival rates for young rabbits.⁶⁸⁸

Warren ripping may be more effective if accompanied by the removal of alternative shelter for rabbits in the area, such as low-growing vegetation, logs, rubbish piles and weeds.⁶⁸⁹

In terms of humaneness, PestSmart advises that, ‘When complete destruction of the warren is achieved, time to death is thought to be quick.’⁶⁹⁰ However, PestSmart also recommends:

⁶⁸⁴ Mountain Cattlemen’s Association of Victoria, *Submission 87*, p.4

⁶⁸⁵ Australian Brumby Alliance, *Submission 159*, p.4

⁶⁸⁶ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure RAB006: Rabbit Warren Destruction by Ripping* (2012), p.2

⁶⁸⁷ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure RAB006: Rabbit Warren Destruction by Ripping* (2012), p.1

⁶⁸⁸ Tim Bloomfield, *Submission 175*, p.2

⁶⁸⁹ PestSmart, *Rabbit Factsheet RABFS6: Warren and Harbour Destruction* (2012), p.2

⁶⁹⁰ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure RAB006: Rabbit Warren Destruction by Ripping* (2012), p.2

It is more humane to perform ripping when rabbit numbers are at their lowest e.g. after drought, disease, warren fumigation or poison baiting or when they are not breeding. This means that lower numbers of rabbits will be killed by this relatively inhumane technique.⁶⁹¹

Concerns about the humaneness of warren ripping were expressed by one submitter.⁶⁹² These activities may also pose a risk to native species that use abandoned rabbit warrens or the shelter in the vicinity of warrens.⁶⁹³

Mr Richard Hodgins from Moyne Shire Council noted that ripping sometimes required destroying native vegetation and expressed concern about that not being a good example for a council to set.⁶⁹⁴

One submitter noted that warren ripping creates a layer of soft soil in which it is easy for rabbits to create new warrens. He also noted that warren ripping is unsuitable where there is above-ground infrastructure or trees. Instead, he noted that he had had success with filling burrows with a slurry of mud.⁶⁹⁵

7.6 Fencing and deterrents

The Committee notes that invasive animals can also be kept out of specific areas through the use of fencing or deterrents. These methods can protect high-value assets and private land, but may have little impact on the overall numbers of invasive animals.

7.6.1 Fencing

While fencing may be effective for excluding certain species (such as deer or wild dogs), it is also expensive, requiring a significant initial outlay, regular patrolling and on-going maintenance.⁶⁹⁶ In 2005, the former Department of Sustainability and Environment produced a guideline on how to protect forest areas which were being regenerated from browsing. It found fencing to be effective, but significantly more expensive than poisoning, shooting or chemical repellents.⁶⁹⁷

⁶⁹¹ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure RAB006: Rabbit Warren Destruction by Ripping* (2012), p.2

⁶⁹² Kerrie Allen, *Submission 190*, p.3

⁶⁹³ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure RAB006: Rabbit Warren Destruction by Ripping* (2012), p.2

⁶⁹⁴ Richard Hodgins, Environment Officer, Moyne Shire Council, *Public Hearing*, 29 November 2016, p.3

⁶⁹⁵ Neil Gillies, *Submission 126*, p.2

⁶⁹⁶ Dave Forsyth, *Public Hearing*, 10 October 2016, p.4; Dennis Keith, *Submission 11*, Attachment 1, p.9

⁶⁹⁷ Mark Poynter & Peter Fagg, *Browsing Management: Native Forest Silviculture Guideline No. 7* (2005), pp.21-2

In addition to initial construction costs, fencing also requires regular maintenance to ensure that it has not been damaged (for example, by animals or falling tree branches). Fencing in forest areas may also be subject to theft.⁶⁹⁸ Fencing in urban areas may be aesthetically undesirable and be incompatible with the intended character of a town.⁶⁹⁹

The construction costs for fencing mean that it is only practical in relatively small areas, such as protecting high-value natural assets or farms.

In addition to preventing target animals from entering an area, fencing also prevents the free movement of other animals. The Wimmera Catchment Management Authority noted the potential for species recognition technology to be used to allow certain species through fences:

... there has been a bit of work done in Queensland, I believe, where using animal recognition technology they have been able to exclude what is considered a pest animal from water and just allow domestic animals in. On the large properties in, say, central Queensland you might have a trough in a location, and it might be fenced. The animal recognition technology has the capability of allowing cattle through that gate but not a goat or a kangaroo or whatever.

... it only works in areas where water is delivered through mechanical means, but it is a way to manage large populations of animals like kangaroos or pigs and things like that. You exclude them from water, and obviously their populations are under stress when you do that. Again that helps productivity of large farms. It would be one of those things that could potentially work in the north-west of the state, where you have got large properties with long distances between water supplies, which are delivered through troughs and those types of things ... They are the types of technologies we think we should be looking at.⁷⁰⁰

7.6.2 Deterrents

An alternative way to keep invasive animals out of an area is to deter them through smells, tastes or textures. This may involve chemical deterrents (such as 'Sen-Tree') or objects with human scent. Mr Bob Gough explained:

I have used Sen-Tree on my property. It is watered-down with PVA glue to make it stick. You mix in soap and egg powder, then you spray that on trees and sprinkle it with grit. It is a great browsing/grazing deterrent. It stops rabbits, wallabies and deer. It might not stop every one of them, but it has a really good effect.

Human scent is great for urban and peri-urban sites. I advise Trust for Nature and a lot of people on small properties. Human hair from the barber; get the barber's clippings — I have used that; it works very well — sweaty T-shirts, even your

⁶⁹⁸ Mark Poynter & Peter Fagg, *Browsing Management: Native Forest Silviculture Guideline No. 7* (2005), pp.14-15

⁶⁹⁹ John Atkins, Chair, Harrierville Community Forum, *Public Hearing*, 19 October 2016, pp.2-3; Harrierville Community Forum, *Submission 204*, p.3

⁷⁰⁰ Tony Baker, Statutory and Strategy Manager, Wimmera Catchment Management Authority, *Public Hearing*, 30 November 2016, p.8

handkerchief. If you have got a tree that has been rubbed by deer or an entry way where deer or foxes are coming in, you can hang a handkerchief there and that will really deter them well.⁷⁰¹

However, Mr Gough also noted that items carrying human scent ‘usually need to be replaced every few days for best effect’.⁷⁰² Ms Melissa Lord noted that deterrents are not dependable and generally not water-resistant, making them ‘suitable only for household garden application.’⁷⁰³

A major disadvantage of deterrents is that, like fencing, they are not species-specific.⁷⁰⁴ Therefore some native animals may also be deterred as well as invasive species. This might be desirable on an agricultural property or for particular assets (such as an area of revegetation). However, this would not be appropriate across a broad area of Crown land, which is intended to be a habitat for native species.

The Committee was also informed that deterrents like Sen-Tree are expensive.⁷⁰⁵

7.7 Fertility control

The Committee heard from some submitters and witnesses that viewed reproductive control as a more humane method of animal control.⁷⁰⁶ For example, the RSPCA’s policy on the management of wild animals states that:

RSPCA Australia believes there is a continuing need to improve current control methods or replace them with more humane and effective alternatives. The RSPCA supports research and development of humane alternatives, including the replacement of lethal methods with humane and effective non-lethal methods, such as reproductive control.⁷⁰⁷

Fertility control may also have advantages over some lethal methods of control. Compensatory mechanisms that lead to higher fertility following culling (see Section 5.4.1 of this report) may be less pronounced. Whereas shooting can disperse some populations of invasive animals, this is less likely with fertility control.⁷⁰⁸

⁷⁰¹ Bob Gough, *Public Hearing*, 19 October 2016, pp.3-4; see also Bob Gough, *Submission 67*, pp.19-20

⁷⁰² Bob Gough, *Submission 67*, p.20

⁷⁰³ Melissa Lord, *Submission 177*, p.4

⁷⁰⁴ J.D. Coleman, R.P. Pech, B. Warburton & D.M. Forsyth, *Review of Research into Alternatives to the use of 1080 for Management of Browsing Damage by Mammals in Tasmania* (2006), report for Tasmanian Department of Primary Industries and Water, p.16

⁷⁰⁵ Steven Tucker, Project Officer, Environment, Alpine Shire Council, *Public Hearing*, 19 October 2016, p.5

⁷⁰⁶ Mhairi Roberts, Animal Welfare Policy Manager, RSPCA Victoria, *Public Hearing*, 5 September 2016, p.2

⁷⁰⁷ RSPCA, ‘Policy E02 Management of Wild Animals’, cited in RSPCA Victoria, *Submission 53*, p.5

⁷⁰⁸ Giovanna Massei & Dave Cowan, ‘Fertility Control to Mitigate Human-Wildlife Conflicts: A Review’ *Wildlife Research* 41 (2014), p.12

Ms Mhairi Roberts from the RSPCA explained to the Committee:

I think fertility control would be very hard to implement on a really large number of animals over a really large area. However, it might be effective when used in conjunction with other methods — for example, I know with kangaroos, which I know are outside of scope, but they might do an initial cull and then use fertility control on the remaining populations to keep them at a more sustainable level. So I think there is research being done, not by the RSPCA but by scientists who are experts in the field that are looking into whether or not they can make that more viable in the future.⁷⁰⁹

A major difficulty with reproductive control is finding an efficient delivery mechanism. Research has been undertaken in North America into reproductive control for a number of species, including deer.⁷¹⁰ However, most solutions are only deliverable by dart or by injection or implant following tranquilising with a dart. Darting on a large scale is difficult, costly and encounters many of the same challenges as shooting.⁷¹¹

Research has been conducted on the possibility of inserting genes into a virus that would then sterilise the animal. This has been investigated for foxes, mice and rabbits with some success, though practical difficulties with releasing the virus and public concerns have meant that these approaches have not progressed to use in the field.⁷¹²

Work has also been undertaken to investigate orally delivered contraceptives, including for use on deer.⁷¹³ However, as orally delivered contraceptives may work on multiple species, a key challenge with this approach is developing species-specific delivery mechanisms.⁷¹⁴

Mr Paul Hamlett from the Snake Island Cattlemens Association told the Committee about a sterilisation program for koalas that had been effective on Snake Island. Koalas on the island were captured, sterilised and released back into the bush on the island or mainland. Over 15 years, this reduced the koala population from approximately 5,000 to approximately 200. However,

⁷⁰⁹ Mhairi Roberts, Animal Welfare Policy Manager, RSPCA Victoria, *Public Hearing*, 5 September 2016, p.6

⁷¹⁰ See, for example, Lowell A. Miller, Kathleen A. Fagerstone, & Douglas C. Eckery, 'Twenty Years of Immunocontraceptive Research: Lessons Learned' *Journal of Zoo and Wildlife Medicine* 44(4s) (2013), pp.S84-S96; James P. Gionfriddo, John D. Eisemann, Kevin J. Sullivan, Ronald S. Healey, Lowell A. Miller, Kathleen A. Fagerstone, Richard M. Engeman & Christi A. Yoder, 'Field Test of a Single-Injection Gonadotrophin-Releasing Hormone Immunocontraceptive Vaccine in Female White-Tailed Deer' *Wildlife Research* 36 (2009), pp.177-84; Lowell A. Miller, Brad E. Johns, Donald J. Elias, & Gary J. Killian, 'Oral Vaccination of White-Tailed Deer Using a Recombinant Bacillus Calmette-Guérin Vaccine Expressing the *Borrelia burgdorferi* Outer Surface Protein A: Prospects for Immunocontraception' *American Journal of Reproductive Immunology* 41(4) (1999), pp.279-85

⁷¹¹ Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.4

⁷¹² Glen Saunders, Brian Cooke, Ken McColl, Richard Shine & Tony Peacock, 'Modern Approaches for the Biological Control of Vertebrate Pests: An Australian Perspective' *Biological Control* 52 (2010) pp.292-3; Giovanna Massei & Dave Cowan, 'Fertility Control to Mitigate Human-Wildlife Conflicts: A Review' *Wildlife Research* 41 (2014), p.7

⁷¹³ Lowell A. Miller, Brad E. Johns, Donald J. Elias, & Gary J. Killian, 'Oral Vaccination of White-Tailed Deer Using a Recombinant Bacillus Calmette-Guérin Vaccine Expressing the *Borrelia burgdorferi* Outer Surface Protein A: Prospects for Immunocontraception' *American Journal of Reproductive Immunology* 41(4) (1999), pp.279-85; United States Department of Agriculture, *Reproductive Control Research* <www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nwrc/research-areas/sa_reproductive_control/ct_reproductive_control>, viewed 16 February 2017

⁷¹⁴ Melissa Lord, *Submission 177*, p.4; Giovanna Massei & Dave Cowan, 'Fertility Control to Mitigate Human-Wildlife Conflicts: A Review' *Wildlife Research* 41 (2014), p.7

Mr Hamlett noted that this was ‘hugely expensive’.⁷¹⁵ The Committee also notes that this was a population that was isolated on an island, so re-population through immigration was not possible.

Chapter 8 of this report assesses which methods may be most effective for the different invasive species in Victoria.

715 Paul Hamlett, Snake Island Cattlemen’s Association, *Public Hearing*, 7 October 2016, p.2

8 Comparison of recreational hunting with other methods of invasive animal control

8.1 Introduction

Chapters 6 and 7 of this report explore the animal control methods currently in use or potentially in use in Victoria. This chapter explores the evidence about which techniques may be suitable for which species.

As discussed in Chapter 5, it is not possible to determine a single ‘most appropriate control method’ for each species. Different methods will be needed at different times and places, depending on factors such as the environment, the density of the animal population and the species’ invasion stage. It is beyond the scope of this inquiry to identify exactly when and under what circumstances each method (or combination of methods) should be used. As the focus of this inquiry is on recreational hunting, the primary goal of this chapter is therefore to determine whether or not recreational hunting can be useful in the control of each invasive species.

The chapter finishes by considering the overall role that recreational hunting may play in invasive animal control. Recommendations for invasive animal control going forward are made in Chapter 10 of this report.

8.2 Rabbits

Rabbits are present in large numbers across much of Victoria and their prolific breeding rate means that more than 87 per cent of a rabbit population would need to be killed each year to reduce the population (see Section 5.4.1 of this report). Shooting by itself is unlikely to be able to achieve the required numbers. Mr Tim Bloomfield also noted that rabbits spend most of their time underground, which compounds the difficulty of shooting the required numbers.⁷¹⁶

PestSmart has concluded that shooting ‘is ineffective in significantly reducing rabbit populations or even maintaining them at low levels’ but may be useful when rabbit numbers have already been reduced through other techniques.⁷¹⁷

⁷¹⁶ Tim Bloomfield, *Submission 175*, p.3

⁷¹⁷ Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure RAB009: Ground Shooting of Rabbits* (2016), p.1

A multiple-method approach including shooting by recreational hunters was found to be effective in managing rabbits at Werribee Park (see Section 6.6.1 of this report):

Since 2012, a number of alternatives to baiting were adopted. These included the removal of all known rabbit warrens, harbour destruction within the park, the introduction of rabbit proof fencing, ferreting and trapping, and a ground shooting program conducted in collaboration with the Sporting Shooters' Association of Australia. This integrated approach has proved to be far more effective to reduce rabbit numbers, more cost effective and able to cover a greater area of the park. The shooting program is conducted when the park is closed without visitors present, ensuring the safety of the general public.⁷¹⁸

This multiple-method approach has reduced the rabbit population to less than it was in 2012.⁷¹⁹

The joint submission to this inquiry from government bodies stated that:

A study undertaken by William[s] and Moore (1995) compared the cost efficiency and effectiveness of the three different control techniques (baiting, ripping and fumigating). The study found that the most cost efficient means of controlling rabbits in eastern Australia required repeated treatments that both kill rabbits and disrupt their shelter with ripping and follow up maintenance being the most long-lasting, cost efficient combination.

In the last two and a half decades, effective control strategies have been implemented by Parks Victoria staff and contractors, to maintain rabbit populations at <1 rabbit per spotlight kilometre across large areas of the three national parks. Treatment methods have included warren ripping, baiting with 1080 or Pindone laced oats, shooting, fumigation and warren implosion.

An extensive 1080 baiting program, followed by ripping and fumigation, saw rabbit numbers plummet and finally dip below 1 rabbit per spotlight kilometre in 2013. This is a strong example of how an on-going, integrated approach can maintain consistently low population numbers and avoid the significant effort and cost required to bring large numbers back under control.⁷²⁰

Warren ripping and destruction had initial success in South Australia as part of Operation Bounceback, but later had to be supplemented by poisoning (see Section 6.7.2 of this report).

The use of viruses has also been particularly successful with rabbits in the past (see Section 7.3.1 of this report). As noted in Section 7.3.1, the new K5 strain of the rabbit haemorrhagic disease virus was released across Australia in March 2017. K5 is thought to have 'the potential to kill more rabbits and provide for a faster death than the current strain'.⁷²¹

⁷¹⁸ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.27

⁷¹⁹ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.27

⁷²⁰ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.20

⁷²¹ Agriculture Victoria, 'Over 400 Sites Selected for Rabbit Virus Release' (media release), 16 December 2016

Ms Kerrie Allen argued against the use of biological controls, poison and warren ripping based on the suffering involved. She advocated for the use of trapping, shooting or fumigation of burrows with carbon monoxide.⁷²² However, the Committee notes that these methods are labour-intensive and unlikely to be able to cull the large number of rabbits that need to be killed each year to reduce the size of the population.

Shooting may have a role supporting other techniques in rabbit control (as at Werribee Park). However, other methods that can kill large numbers with less effort (such as viruses, poison and warren destruction) will be needed to effectively control rabbit numbers.

FINDING 36: The most effective method of rabbit control has been combining methods such as viruses, poison and warren destruction. Recreational hunting has not significantly contributed to rabbit control.

8.3 Goats

A variety of techniques have been trialled to control feral goats in the Murray Sunset National Park in north-western Victoria. Aerial and ground shooting were found to be most effective. Shooting can be assisted by Judas goats – goats that are captured, fitted with radio collars and then released into the wild. Judas goats will seek out other goats, enabling hunters to follow the radio signal to locate goat populations. The government bodies in their joint submission to this inquiry explained:

Over the years, there have been a number of goat control programs conducted in the Mallee parks. During this time a variety of methods have been trialled to determine the most effective method of control. Some of these techniques include ground shooting by contractors or Parks Victoria staff which proved prohibitive financially and in terms of available resources. Mustering by contractors has previously been trialled with limited success due to inaccessible terrain, the size of target area and an unsuitable goat density. Trapping by staff and contractors has also been trialled. This method has proved useful to capture Judas goats to assist with other control techniques but has shown to be otherwise too labour intensive.

Ground shooting by the Sporting Shooters' Association of Australia accredited volunteers in conjunction with Parks Victoria staff has previously been effective in easily accessible areas of park, removing 7000 goats between 2002 and 2014. The collaborative effort between the two organisations has delivered strong results, is cost effective and has strengthened the partnership between the two organisations.

The limitations of ground shooting in this instance were that it was labour intensive and ineffective in remote areas of the park. Given the remote landscape and inaccessibility of large areas of the park; it became evident after several years that ground shooting alone could not address the threat from goats to threatened woodland communities.

⁷²² Kerrie Allen, *Submission 190*, pp.3-4

Aerial shooting was then introduced to complement the ground shooting program ... Utilising aerial control was considered effective within remote and inaccessible areas of the Mallee parks. A well planned integrated approach that included aerial shooting, ground shooting and the use of Judas goats to track remaining herds, has been the most effective way to reduce grazing pressure on susceptible vegetation types.⁷²³

A similar approach was adopted in the Warby Range in north-eastern Victoria. A mix of paid professionals and accredited volunteers undertook ground shooting, followed by aerial shooting once the number of goats had been reduced to less than 30. The joint submission from government bodies stated that the program was successful at achieving localised eradication of feral goats.⁷²⁴

Similar programs with combinations of recreational hunters and paid professional shooters have been successful in South Australia as part of the Bounceback program (see Section 6.7.2 of this report).

In addition to being effective, shooting is considered a relatively humane way to destroy goats when carried out by experienced, skilled shooters in the right conditions.⁷²⁵ Ms Trudy Sharp from the Invasive Animals Cooperative Research Centre has found that, 'Shooting from a helicopter is considered a more humane control method, as mobile wounded animals can be promptly located and killed. It is also a more effective method of quickly reducing feral goat populations.'⁷²⁶

Dr Clive Carlyle noted the success of programs including recreational hunters in South Australia, but was sceptical about whether the same models could be applied in the Grampians:

In the Grampians National Park, for example, there are significant feral goat populations ... I can imagine, just using the Grampians as an example, that any feral animal, goat or deer control there would be very difficult compared to, say, the Flinders [Ranges in South Australia], simply because the topography is similar but the vegetation is so much denser in the Grampians. Moving through it is difficult, so it is unclear to me how shooting in that particular national park could be implemented in a sufficiently intense way to impact on populations, unless it was something that involved spotlighting perhaps or even baiting to attract animals and then shoot them on that basis.⁷²⁷

FINDING 37: A combination of paid professional shooters and recreational hunting organisations has proven successful in reducing goat numbers in some areas of Victoria and South Australia.

723 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.26

724 Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.27

725 Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure GOA001: Ground Shooting of Feral Goat* (2016), p.1

726 Trudy Sharp (Invasive Animals Cooperative Research Centre), *Standard Operating Procedure GOA001: Ground Shooting of Feral Goat* (2016), p.1

727 Clive Carlyle, *Public Hearing*, 30 November 2016, p.4

8.4 Pigs

Hunting pigs (sometimes with dogs) is believed to have been effective at constraining pig populations in a number of places overseas.⁷²⁸ However, a study of experienced hunters using dogs in the Australian Capital Territory found that hunting was relatively ineffective, with hunters only able to kill 27 per cent of the pigs that they saw and many pigs remaining undetected.⁷²⁹ A study in the Northern Territory found that hunters with dogs were able to kill between 9 and 88 per cent of pigs encountered, depending on the size of the group of pigs.⁷³⁰

The type of environment appears to be an important factor in assessing the effectiveness of shooting for pigs. The Commonwealth Department of Sustainability, Environment, Water, Population and Communities has concluded that:

In open country, mustering and shooting from helicopters can be effective in the short term, and pigs shot in the wild may be used for their meat. Shooting from the ground is considered to only be effective in small accessible populations.⁷³¹

Similarly, Mr Jim Reside from Wildlife Unlimited noted that:

Shooting is pretty counterproductive in forested environments. It works in more open, arid range lands where they can conduct aerial shooting. But shooting in forested environments generally has the effect of dispersing groups of pigs. If shooters disturb them, they generally do not get the whole mob. They get some of the mob and the others run off and form new little subgroups somewhere else, so it ends up just moving them around all over the place.

... as soon as there is a disturbance factor they are gone — boom, they just disappear. That makes shooting pretty ineffective as a control technique by itself. In some cases where you might be down to just the last three or four animals — you know, we know where they are — a shooter accompanied by a good scent dog can track those last handful of animals down, but otherwise you just move them all over the landscape.⁷³²

⁷²⁸ J.C. McIlroy & R.J. Saillard, 'The Effect of Hunting with Dogs on the Numbers and Movements of Feral Pigs, *Sus scrofa*, and the Subsequent Success of Poisoning Exercises in Namadgi National Park, A.C.T.' *Australian Wildlife Research* 16 (1989), p.360; Peter Caley & Brett Ottley, 'The Effectiveness of Hunting Dogs for Removing Feral Pigs (*Sus scrofa*)', *Wildlife Research* 22 (1995), p.147; Hannes Geisser & Heinz-Ulrich Reyer, 'Efficacy of Hunting, Feeding, and Fencing to Reduce Crop Damage by Wild Boars' *The Journal of Wildlife Management* 68(4) (2004), p.943

⁷²⁹ J.C. McIlroy & R.J. Saillard, 'The Effect of Hunting with Dogs on the Numbers and Movements of Feral Pigs, *Sus scrofa*, and the Subsequent Success of Poisoning Exercises in Namadgi National Park, A.C.T.' *Australian Wildlife Research* 16 (1989), pp.357-8

⁷³⁰ Peter Caley & Brett Ottley, 'The Effectiveness of Hunting Dogs for Removing Feral Pigs (*Sus scrofa*)' *Wildlife Research* 22 (1995), pp.149-50

⁷³¹ Commonwealth Department of Sustainability, Environment, Water, Population and Communities, *The Feral Pig (Sus scrofa)* (2011), p.3

⁷³² Jim Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.5; cf. p.10

The Committee notes that some studies have found that pigs do not disperse after shooting,⁷³³ though one study found that the centres of feral pigs' home ranges moved by approximately 500 metres as a result of helicopter shooting.⁷³⁴ One study looking at pigs' behaviour in response to multiple control methods (including ground and helicopter shooting), found that most pigs did not disperse, but one of 27 tracked pigs was found 55 kilometres away from the exercise area.⁷³⁵

Poison baiting is considered 'one of the most economical and effective ways to control feral pigs on a broad scale' by PestSmart.⁷³⁶ A study seeking to compare shooting and poisoning pigs concluded that 'Hunting with dogs can be used to reduce pig numbers in densely forested hill country in eastern Australia but it is not as effective as poisoning in terms of cost, effort, or effect on pig numbers.'⁷³⁷

According to Ms Jenni Reside, from Wildlife Unlimited, a program involving grain poisoned with 1080 (see Section 7.2.2 of this report) is the most effective method for controlling feral pigs.⁷³⁸ Mr Jim Reside stated that this technique has been used successfully in the Australian Capital Territory to reduce feral pigs.⁷³⁹ It has also achieved positive results at two sites in Western Australia, with minimal impacts on native animals.⁷⁴⁰ However, Ms Reside noted that this method is currently not permitted in Victoria.⁷⁴¹ Ms Reside stated that while this prohibition is not clear in the legislation, she was informed it was due to the commercial availability of the bait PIGOUT and because the production of 1080 poisoned grain has not been licenced by the government.⁷⁴²

Mr Reside noted that trapping can also be effective with pigs, though it requires a significant amount of labour.⁷⁴³

⁷³³ J.C. McIlroy & R.J. Saillard, 'The Effect of Hunting with Dogs on the Numbers and Movements of Feral Pigs, *Sus scrofa*, and the Subsequent Success of Poisoning Exercises in Namadgi National Park, A.C.T.' *Australian Wildlife Research* 16 (1989), p.361; see also (in relation to helicopter shooting) Nick Dexter, 'The Effect of an Intensive Shooting Exercise from a Helicopter on the Behaviour of Surviving Feral Pigs', *Wildlife Research* 23 (1996), pp.435-41

⁷³⁴ Tyler A. Campbell, David B. Long, & Bruce R. Leland, 'Feral Swine Behavior Relative to Aerial Gunning in Southern Texas' *Journal of Wildlife Management* 74(2) (2010), p.339

⁷³⁵ Glen Saunders & Hedy Bryant, 'The Evaluation of a Feral Pig Eradication Program during a Simulated Exotic Disease Outbreak' *Australian Wildlife Research* 15(1) (1988), pp.73-81

⁷³⁶ PestSmart, *Poison Baiting for Feral Pig Control in Australia* (2014), p.1

⁷³⁷ J.C. McIlroy & R.J. Saillard, 'The Effect of Hunting with Dogs on the Numbers and Movements of Feral Pigs, *Sus scrofa*, and the Subsequent Success of Poisoning Exercises in Namadgi National Park, A.C.T.' *Australian Wildlife Research* 16 (1989), p.362

⁷³⁸ Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.2

⁷³⁹ Jim Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.7

⁷⁴⁰ Laurie E. Twigg, Tim Lowe, Gary Martin & Michael Everett, 'Feral Pigs in North-Western Australia: Basic Biology, Bait Consumption, and the Efficacy of 1080 Baits' *Wildlife Research* 32 (2005), pp.281-96; Laurie E. Twigg, Tim Lowe & Gary Martin, 'Bait Consumption by, and 1080-Based Control of, Feral Pigs in the Mediterranean Climatic Region of South-Western Australia' *Wildlife Research* 34 (2007), pp.125-39

⁷⁴¹ Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.2

⁷⁴² Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.6

⁷⁴³ Jim Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.5

Overall, Ms Reside recommended a combination of techniques:

It is also really important for us to be able to use a range of measures. The poison grain is not the only measure, but it is one of the tools we need if we want to eradicate pigs. There are other control measures, such as shooting, trapping, poisoning — all those sorts of things — but it depends on the habitat and what the pig's activity is and those sorts of things.⁷⁴⁴

Mr Roger Bilney, a representative of two Gippsland environmental groups and a former fisheries and wildlife officer, noted that shooting and trapping cannot occur at the same time:

If you talk to the operators in southern New South Wales, they will all tell you that whenever they have a program of trapping going on, as soon as hunters arrive it is three to four weeks before you can get back to trapping in those areas again ... I have come across a number of hunters who have shot pigs in the Snowy, for instance. They have seen a pig or two, they have fired a shot and 30 have broken out from the scrub directly underneath the one that they saw. They disperse and you do not see them again. They will come back, and they do. If you are allowing recreational hunting, you cannot be trapping at the same time. It is not going to work.⁷⁴⁵

However, it has been suggested that hunting with dogs may be valuable 'towards the end of eradication campaigns to kill those pigs that have survived other control methods, such as poisoning.'⁷⁴⁶ A study in the Northern Territory found that hunting pigs with dogs was more effective at removing solitary animals than pigs in groups.⁷⁴⁷ A program in the USA used ground-based shooting (with dogs) to successfully remove some of the last feral pigs on an island after other control techniques (fencing, trapping and helicopter shooting) had removed most of the animals. A final phase to remove the very last pigs consisted of using radio-collared pigs to find other pigs and then destroying them through helicopter-based shooting.⁷⁴⁸

The Committee notes that it may be necessary to cull more than 70 per cent of a pig population to reduce the numbers in the long term.⁷⁴⁹ This requires intensive and highly effective programs. The evidence received by the Committee suggests that recreational hunting by itself is not able to achieve the required reductions in most circumstances and may interfere with other control methods by dispersing pigs. While it may have a role to play in certain situations, this role is limited and would need to be co-ordinated with other control methods.

⁷⁴⁴ Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.4

⁷⁴⁵ Roger Bilney, Gippsland Environment Group and Environment East Gippsland, *Public Hearing*, 6 October 2016, p.10

⁷⁴⁶ J.C. McIlroy & R.J. Saillard, 'The Effect of Hunting with Dogs on the Numbers and Movements of Feral Pigs, *Sus scrofa*, and the Subsequent Success of Poisoning Exercises in Namadgi National Park, A.C.T.' *Australian Wildlife Research* 16 (1989), p.362

⁷⁴⁷ Peter Caley & Brett Ottley, 'The Effectiveness of Hunting Dogs for Removing Feral Pigs (*Sus scrofa*)' *Wildlife Research* 22 (1995), p.149

⁷⁴⁸ John P. Parkes, David S.L. Ramsey, Norman Macdonald, Kelvin Walker, Sean McKnight, Brian S. Cohen & Scott A. Morrison, 'Rapid Eradication of Feral Pigs (*Sus scrofa*) from Santa Cruz Island, California' *Biological Conservation* 143 (2010), p.638

⁷⁴⁹ Invasive Species Council, *Recreational Hunting NSW: Claims v Facts* (fact sheet) (2012), p.1; Andrew J. Bengsen & Jessica Sparkes calculate a lower figure of 51 per cent ('Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.301)

FINDING 38: Recreational hunting by itself is not an effective method of controlling pigs in most circumstances.

8.5 Dogs

The current Victorian Wild Dog Control Program relies on a combination of trapping and baiting to control wild dogs.⁷⁵⁰ In 2016, a bounty was also introduced to encourage recreational hunters to shoot wild dogs.⁷⁵¹

8.5.1 Shooting

The Committee was informed that the potential of shooting as a control mechanism for wild dogs is limited by the difficulty of finding the animals:

Everyone seems to think that you can just walk out in the bush and shoot a dog. That is not the case ... He knows you are there 15 minutes before you step your foot out of the car, and he does what he needs to do in that period of time to either evade you or hide or watch or do whatever. That is just the way the animal is. For hunters to walk into the bush and just say, 'We're just going to go and hunt and look for dogs', you could walk around the bush all day — three days — and not even see a dog. You might not even see a mark on the ground.⁷⁵²

They are a tough animal to hunt. The way to hunt them is to find yourself a good position and call them in yourself — imitate another dog howling — and it might take 2 hours of howling to get a dog to come, and he will answer you. He will be a kilometre away when he starts, and he will gradually come in and he will be talking to you. Then he comes in and he will stop somewhere around about the 40-metre mark, knowing something is up — what's up? — and he will be looking around. That is when you can take him.⁷⁵³

Mr Barry Tayler (from the Gippsland Wild Dog Advisory Group) considered that there is potential for opportunistic shooting of wild dogs while hunting for deer. However, he believed that bounties are important to motivate deer hunters to take advantage of these opportunities.⁷⁵⁴

Mr Dennis Keith, a recreational hunter for over 40 years, proposed using a bounty to attract those recreational hunters that are particularly good at hunting dogs. He informed the Committee that 'Not every one can hunt wild dogs/dingos successfully but there is small percentage of these recreational hunters who are stand out performers when it comes to wild dog/dingo hunting.'⁷⁵⁵ Mr Keith

⁷⁵⁰ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.21

⁷⁵¹ Hon. Jaala Pulford MLC, Minister for Agriculture, 'New Advisory Group on Wild Dogs, Bigger Bounty' (media release), 26 October 2016

⁷⁵² Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.6; see also Brendan Mahoney, *Public Hearing*, 20 October 2016, p.5

⁷⁵³ Dennis Keith, *Public Hearing*, 19 October 2016, p.3; see also Shooting Sports Council of Victoria, *Submission 202*, p.5

⁷⁵⁴ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.7

⁷⁵⁵ Dennis Keith, *Submission 11*, Attachment 1, p.5

advocated for offering a bounty and making sure that it is easy to collect to motivate these hunters to shoot wild dogs in problem areas. He argued that the bounty should be increased to recognise the time required to shoot dogs and collect the bounty.⁷⁵⁶

Bounties are discussed further in Section 9.5.1 of this report. The Committee notes that, between 2011 and 2015, when a \$100 bounty per dog was in place in Victoria, 2,129 wild dogs were shot.⁷⁵⁷ It is not clear whether this number was sufficient to make an impact on wild dog numbers, though the Committee notes general concerns about the effectiveness of bounties (see discussion in Section 8.6.1 on the effectiveness of Victoria's fox bounty).

In 2016, the State Government re-introduced a dog bounty, which was increased to \$120. The bounty is open to Victorian landholders and residents in two designated areas (one in eastern Victoria and one in the north-west). It is also open to members of several community hunting organisations for dogs hunted in the designated areas. The Government intends for a ministerial advisory committee on wild dog management to evaluate the bounty after one year.⁷⁵⁸

8.5.2 Trapping

Some submitters and witnesses argued that trapping was an effective method for controlling wild dogs. Mr Tayler stated that, 'We as farmers know that a trap in the ground gets results and that a trapped dog can be dispatched fast and painlessly with a shot to the brain.'⁷⁵⁹ Mr Brendan Mahoney, a farmer from Merrijig, similarly stated that traps have been effective on his property for catching wild dogs.⁷⁶⁰ However, Mr Mahoney noted that he is not allowed to set traps on surrounding Crown land and advocated for farmers being allowed to trap within 10 kilometres of a kill site and for a bounty to reimburse farmers for their time.⁷⁶¹

Mr Keith, however, noted that 'Recreational trapping of wild dogs/dingoes is a specialised, technical skill'⁷⁶² and believed that 'Farmers do not generally have the skills base, time or the tools to trap effectively and consistently.'⁷⁶³ Mr Tayler recommended the employment of dedicated full-time trappers.⁷⁶⁴ He argued that, with professional trappers, 'the traps are inconspicuous and targeted to a particular spot by someone trained to make sure they are undetectable.'⁷⁶⁵

⁷⁵⁶ Dennis Keith, *Public Hearing*, 19 October 2016, p.5; Dennis Keith, *Submission 11*, Attachment 1, pp.6-7

⁷⁵⁷ Field & Game Australia, *Submission 207*, p.9

⁷⁵⁸ Agriculture Victoria, *Terms and Conditions of Collecting the Bounty* <agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/fox-bounty/terms-and-conditions-of-collecting-the-bounty>, viewed 6 March 2017; Hon. Jaala Pulford MLC, Minister for Agriculture, 'New Advisory Group on Wild Dogs, Bigger Bounty' (media release), 26 October 2016

⁷⁵⁹ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.3

⁷⁶⁰ Brendan Mahoney, *Public Hearing*, 20 October 2016, p.5; Brendan Mahoney, *Submission 108*, p.3

⁷⁶¹ Brendan Mahoney, *Submission 108*, p.3

⁷⁶² Dennis Keith, *Submission 11*, Attachment 1, p.6

⁷⁶³ Dennis Keith, *Submission 11*, Attachment 1, p.5

⁷⁶⁴ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.4

⁷⁶⁵ Barry Tayler, Gippsland Wild Dog Advisory Group, *Submission 26*, p.1

Mr Phillip Paton believed that government trappers have been ‘a big help’ in combatting wild dogs and foxes,⁷⁶⁶ though others noted concerns about the number of government trappers and difficulties accessing trapping services⁷⁶⁷ (see further discussion about communication in Section 10.2.3 of this report).

8.5.3 Poisoning

Baiting is commonly used to control wild dog populations and was supported by a number of submitters and witnesses. Mr Geoff and Ms Janette Bussell, farmers in north-east Victoria, found that baiting for wild dogs and foxes has improved their lambing percentages by 30 per cent, though they noted that it is a year-round activity and costs \$800-900 per year. This is currently subsidised but they expressed concern that this subsidy may not continue.⁷⁶⁸

Some witnesses, including Mr Cameron Skedd (President of the Vertebrate Pest Managers Association Australia), advocated for the use of canid pest ejectors (see Section 7.2.2 of this report).⁷⁶⁹ In contrast, Mr Tayler believed that they do not work for dogs:

They do not work and they will not work, and it is a total waste of money ... wild dogs are not scavengers or ground scent trackers. Baits are only of interest to them when they are starving, with no food source available, and we all know there is plenty of food source available.⁷⁷⁰

He also believed that baiting was ineffective because dogs ‘recognise baits in the ground, and are familiar with human scent.’⁷⁷¹

However, the NSW Parks and Wildlife Service noted that 35 wild dogs were killed by ejectors in 10 days at one Queensland site in 2001.⁷⁷²

Mr Frank Gigliotti advised the Committee that research is being undertaken into a multi-dose ejector which can deliver multiple doses of poison over a prolonged period of time. He explained:

Their innovative design allows MDE’s [multi-dose ejectors] to be deployed as permanent sentinel sites, capable of remaining field-active for several months. In light of this, it would then be possible to establish buffer zones, a corridor between public land and private land, to provide a permanent control line, preventing animals movement across public/private land. This approach would reduce the likelihood of destroying the pack structure, thereby allowing the pack to hunt larger prey within the park boundary, while providing a line of protection to control individual or

⁷⁶⁶ Phillip Paton, *Submission 64*, p.1

⁷⁶⁷ Brendan Mahoney, *Submission 108*, p.2; Harvey Benton, *Submission 109*, p.2; Barry Tayler, *Public Hearing*, 6 October 2016, pp.3-4; Luke Mitchell, *Submission 165*, p.4; Name withheld, *Submission 174*, p.2; Geoff and Janette Bussell, *Submission 199*, p.2

⁷⁶⁸ Geoff and Janette Bussell, *Submission 199*, p.1

⁷⁶⁹ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.5; Lisette Mill, Landcare Network Facilitator, Basalt to Bay Landcare Network, *Public Hearing*, 29 November 2016, p.4

⁷⁷⁰ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.3

⁷⁷¹ Barry Tayler, *Submission 26*, p.1

⁷⁷² NSW National Parks and Wildlife Service, *Ejector Field Trial Update No.4* (2010), p.2

juvenile animals from dispersing onto private land. Similarly it would reduce the movement of domestic dogs gone wild into national parks and thereby reducing hybridisation.⁷⁷³

Poison for wild dogs is also delivered through aerial baiting. Some submitters, including the Victorian Farmers Federation, considered that the aerial baiting program has been effective.⁷⁷⁴ The Mountain Cattlemen's Association of Victoria stated:

MCAV understands the complexities associated with wild dog control and fully supports the current program across public and private land tenures, using baiting, both ground and aerial, trapping and shooting. MCAV also supports the ongoing research to find new methods and technology that can be incorporated into the current program.⁷⁷⁵

However, it was suggested by others that the area currently baited should be increased:

In the past baiting used to occur in a 20 kilometre buffer zone around crown land and this has now been reduced to 2 to 3 kilometres. This is clearly not effective. What is worse is that we hear that this will soon be reduced further to 1 ½ kilometres. Given that we have been shown that wild dogs can travel up to 20 kilometres these miniscule buffer zones seem crazy.⁷⁷⁶

In 2016, the State Government announced its intention to increase aerial baiting for wild dogs.⁷⁷⁷

Some people expressed concern about baiting to control wild dogs deep in the bush. Mr Gigliotti, a former officer of the Department of Primary Industries' Vertebrate Pest Research Unit, argued that:

While aerial baiting deep within public land is considered by some to be the answer to the wild dog problem, I believe this strategy further exacerbates the problem and poses an increased risk to native non-target species. Dingoes naturally run in packs composed of an alpha male and female. As a pack they are able to hunt larger prey such as kangaroos and wallabies. Public land managers see this as a natural means of reducing overabundant macropod populations, thus the rationale of protecting 'dingoes' in National Parks. By aerial baiting these areas there is a high risk of killing the dominant alpha animals thus fragmenting the pack structure resulting in individual animals having to hunt independently and being forced to seek easier prey.⁷⁷⁸

Mr Keith also noted the need for caution in managing wild dog numbers. He argued that wild dogs had replaced dingoes as the top predator in the Victorian bush. While acknowledging that too large a population of wild dogs would cause problems for farmers, he suggested that having too few wild dogs might lead to an

773 Frank Gigliotti, *Submission 42*, p.2

774 Chips Boucher, *Submission 48*, p.1; Victorian Farmers Federation, *Submission 184*, pp.6-7, 18

775 Mountain Cattlemen's Association of Victoria, *Submission 87*, p.6

776 Name withheld, *Submission 174*, p.2; see also Brendan Mahoney, *Public Hearing*, 20 October 2016, pp.4-5

777 Hon. Jaala Pulford MLC, Minister for Agriculture, 'Fox Bounty Extended, Wild Dog Control Measures Doubled' (media release), 20 April 2016

778 Frank Gigliotti, *Submission 42*, p.2

increase in other invasive animals (especially foxes and cats) and an increase in macropods, which may have negative effects on the environment and farmers.⁷⁷⁹ He was concerned that current approaches may not be achieving the right balance⁷⁸⁰ and concluded that:

Information as to the required population numbers of predator and prey for sustaining ecological health is necessary when contemplating any management plan. This comes down to research which is not being done. The government needs to expand its budget for the necessary research to be undertaken.⁷⁸¹

A report by the Australian Bureau of Agricultural and Resource Economics and Sciences found that:

The effect of wild dogs on Australia's environmental assets is uncertain. There is some evidence that wild dogs are an 'apex predator' and have a positive impact by reducing the density of other feral animal populations such as rabbits, goats, pigs, cats and foxes, thereby protecting some smaller native species. However, there is also a view that wild dogs have a negative impact through the reduction of native species populations.⁷⁸²

Given this uncertainty, it will be important to monitor the baiting program to ensure that it achieves overall benefits for the environment.

8.5.4

Other methods

Fencing can be an option for limiting the impact of wild dogs. However, Mr Keith noted, 'Exclusion by dog proof fencing and/or electric fencing is an option but is exorbitantly expensive which puts it beyond most farmers financial means plus it needs regular patrolling and maintenance.'⁷⁸³

Mr Keith called for research into other technological solutions to wild dog problems:

Research into a viable, cost effective and new technological deterrents needs to be immediately funded, developed and implemented. Technological deterrence research which is aimed at developing a visual – laser lights etc, scent – offensive to all canines, noise – both at human hearing levels and at levels which only canines can hear and react to or a combination of these three to be an effective deterrent. This new technology should be installed to prevent wild dogs/dingoes from crossing the exclusion zone [the land around farm boundaries].⁷⁸⁴

He indicated that he did not know whether or not such approaches would work but believed that 'it is worth throwing some money at it to have a look.'⁷⁸⁵

⁷⁷⁹ Dennis Keith, *Submission 11*, Attachment 1, pp.1-4

⁷⁸⁰ Dennis Keith, *Submission 11*, Attachment 1, p.7

⁷⁸¹ Dennis Keith, *Submission 11*, Attachment 1, p.3

⁷⁸² Santhi Wicks, Kasia Mazur, Patricia Please, Saan Ecker & Benjamin Buetre, *An Integrated Assessment of the Impact of Wild Dogs in Australia*, Australian Bureau of Agricultural and Resource Economics and Sciences Research Report No. 14.4 (2014), p.6 (with sources)

⁷⁸³ Dennis Keith, *Submission 11*, Attachment 1, p.8

⁷⁸⁴ Dennis Keith, *Submission 11*, Attachment 1, p.8

⁷⁸⁵ Dennis Keith, *Public Hearing*, 19 October 2016, p.6

Ms Mary Wilkins noted the importance of preventing domestic dogs becoming wild dogs by, for example, facilitating sterilisation, educating owners and fining irresponsible owners.⁷⁸⁶

8.5.5 Conclusion

While the benefits of controlling wild dogs deep in bush areas have been questioned by some, it is clear to the Committee that wild dogs on Crown land pose a significant problem for farmers (see Section 2.6.1 of this report). At a minimum, it is therefore necessary to control wild dogs on areas of Crown land bordering farm land.

Trapping and poisoning were recommended by a number of submitters and witnesses as effective means of controlling wild dogs. These are the primary means currently used by the Victorian Government.⁷⁸⁷ Trapping and poisoning were also found to be effective by the *National Wild Dog Action Plan* (developed by agricultural industry representatives, professional pest controllers and government departmental representatives). The plan includes a detailed assessment of different control methods for wild dogs, though it does not include recreational hunting. Some of the key findings are included in Table 8.1 below.

Table 8.1 Assessment of selected control methods for wild dogs in the *National Wild Dog Action Plan*

Method	Efficacy	Cost-effectiveness	Humaneness
Ground/aerial baiting with 1080	Effective	Very cost-effective	Conditionally acceptable
Canid pest ejectors	Effective	Likely high initial cost for purchase of unit. With low ongoing cost.	Will vary depending on toxin used
Exclusion fencing	Effective in suitable areas	Expensive	Acceptable
Padded/soft and laminated foot-hold traps; Laminated jaw traps	Effective	High initial cost for purchase of unit, with low ongoing cost	Conditionally acceptable

Note: The original source includes more control methods and more information about each one.

Source: adapted from WoolProducers Australia, *National Wild Dog Action Plan* (2014), pp.57-9

Trapping is considered less cost effective compared to baiting (trapping is estimated to cost 30 times more per night). However, dogs removed per trap night are greater than those removed per bait night. Trapping is best applied as part of a post-attack management strategy to limit a repeat attack by the same dog, whereas, baiting is best applied to achieve pre-attack reductions within the buffer zone.⁷⁸⁸

⁷⁸⁶ Mary Wilkins, *Submission 162*, p.3

⁷⁸⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.21; Department of Economic Development, Jobs, Transport and Resources, *Review of the Victorian Wild Dog Management Program and Recommendations for Future Approaches* (2016), p.2

⁷⁸⁸ Department of Economic Development, Jobs, Transport and Resources, *Review of the Victorian Wild Dog Management Program and Recommendations for Future Approaches* (2016), p.3

New innovations, such as the multi-dose ejector, have the potential to make poisoning cheaper and more effective. The bait PAPP, which is now available for dogs in Victoria, is considered by some to be more humane than 1080 (see Section 7.2.1 of this report). Animals Australia argued on this ground that PAPP should be used instead of 1080.⁷⁸⁹

The Committee notes the evidence that shooting wild dogs is difficult. Given this, it is not clear that shooting has the potential to remove enough dogs to reduce problems for farmers. However, if directed appropriately, it is possible that it may complement other control techniques. A bounty is currently in place to encourage more shooters in key areas but these areas are very large. The Committee is aware of concerns about the effectiveness of bounties, as discussed in Section 9.5.1. The Committee therefore emphasises the importance of evaluation for such programs and notes that an evaluation of the wild dog bounty is planned.

8.6 Foxes

Baiting is the main technique used to achieve broad-scale fox control in Victoria, though recreational hunting is also encouraged by the government through a bounty. On smaller-scale projects, co-ordinated and paid professional shooters, den fumigation, fencing and guard animals have been used.

8.6.1 Unsupervised hunting and bounties

The recreational shooting of foxes in Victoria has a long tradition. In fact, foxes were introduced into Australia specifically for recreational shooting. The Victorian Government currently encourages unsupervised recreational hunting of foxes through a bounty of \$10 per fox, which any Victorian resident or landholder can claim for any fox killed in Victoria.⁷⁹⁰

A large number of submitters and witnesses to this inquiry expressed support for the fox bounty. However, the effectiveness of fox bounties has been questioned by some people.⁷⁹¹ An evaluation of the fox bounty in Victoria in 2002-03 found that:

- there was a degree of fraud, with people presenting fox tails (which were required as proof of killing a fox) that had come from out of the zone and people stealing tails that had already been provided and re-presenting them; people could also provide tails from animals that had been killed by other means (such as road kills)
- shooters may have reduced their activity during the breeding season to ensure that next year's crop would be available for them to hunt (thereby reducing the effectiveness of the program as a control mechanism)

⁷⁸⁹ Animals Australia, *Submission 213*, p.8

⁷⁹⁰ Agriculture Victoria, *Terms and Conditions of Collecting the Bounty* <agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/fox-bounty/terms-and-conditions-of-collecting-the-bounty>, viewed 20 December 2016 – the bounty is intended for individual hunters and will not be paid to people or business which buy body parts from hunters.

⁷⁹¹ Such as PestSmart (PestSmart, *PestSmart Factsheet: Fox Bounties* (2011), p.1); Invasive Species Council (*Submission 192*, p.6); Tim Bloomfield (*Submission 175*, pp.4-5)

- the easiest animals to shoot may be the inexperienced, younger ones which may have been part of the ‘doomed surplus’ anyway (see Section 5.4.1 of this report), whereas a more important target is the older animals who are more likely to breed.⁷⁹²

A large number of foxes were shot during the 2002-03 evaluation period (109,904 tails were handed in over 44 weeks⁷⁹³). Similar numbers have been taken each year in recent bounty programs.⁷⁹⁴ However, the 2002-03 evaluation concluded that, while this had an impact in some areas, it was not sufficient by itself to reduce the fox problem:

Localised high reductions of foxes (> 2 km⁻²) were likely to have had a short term impact on populations but ... areas of more intense fox control were isolated and surrounded by large areas of low level control. These highly localised reductions are likely to be negated by the influence of reinvasion from non-bounty areas or where control was less intense.

... Reductions in abundance approaching the level required to result in a general population decline if sustained only occurred in less than 2.5% of the state’s area ... It is unlikely that this level of reduction was sufficient to contribute in any significant way to population reduction on a broad scale.

In most regions of the state, where control effort was highly variable, the impact of the bounty may be to stimulate or “prime” reproductive rates through moderate reductions in abundance and disruption of social groups. The likely result of increased reproductive rates will be a return to pre-bounty density or an increase in density over subsequent breeding seasons.⁷⁹⁵

Other reviews of bounties have reached similar conclusions.⁷⁹⁶ The Invasive Species Council has claimed that bounties in Australia have ‘typically reduced targeted animal numbers by only 2-10 per cent’.⁷⁹⁷ The Committee notes that more than 65 per cent of a fox population needs to be culled to reduce the size of the population (see Section 5.4.1 of this report). This threshold is particularly important for foxes, as compensatory mechanisms such as higher rates of pregnancy can occur in fox populations where culling occurs, quickly replacing the killed foxes.⁷⁹⁸

⁷⁹² Victorian Institute of Animal Science Vertebrate Pest Research Department, *Evaluation of the 2002/03 Victorian Fox Bounty Trial* (2003), p.16

⁷⁹³ Victorian Institute of Animal Science Vertebrate Pest Research Department, *Evaluation of the 2002/03 Victorian Fox Bounty Trial* (2003), p.20

⁷⁹⁴ 332,082 between October 2011 and October 2014 – Hon. Peter Walsh MP, Minister for Agriculture and Food Security, ‘Fox and Wild Dog Bounty to Continue Under Coalition’ (media release), 1 October 2014; ‘over 100,000’ in 2014-15 and ‘almost 75,000’ between July 2015 and April 2016 – Hon. Jaala Pulford MLC, Minister for Agriculture, ‘Fox Bounty Extended, Wild Dog Control Measures Doubled’ (media release), 20 April 2016

⁷⁹⁵ Victorian Institute of Animal Science Vertebrate Pest Research Department, *Evaluation of the 2002/03 Victorian Fox Bounty Trial* (2003), p.25

⁷⁹⁶ Hassall & Associates, *Economic Evaluation of the Role of Bounties in Vertebrate Pest Management*, prepared for the Bureau of Resource Sciences (1998), pp.7-8

⁷⁹⁷ Invasive Species Council, *Recreational Hunting NSW: Claims v Fact* (2012), p.2

⁷⁹⁸ Victorian Institute of Animal Science Vertebrate Pest Research Department, *Evaluation of the 2002/03 Victorian Fox Bounty Trial* (2003), p.12; Tim Bloomfield, *Submission 175*, p.4

In terms of evaluating a bounty, it is also important to understand how many animals would have been shot without the bounty. Farmers will shoot some foxes without a bounty to protect their livestock. Recreational hunters will shoot some foxes for recreation or for conservation reasons. The benefits of a bounty are only the animals that are shot in addition to what would be shot without a bounty. For the animals that would have been shot anyway, the bounty is effectively subsidising a service that would be otherwise provided for free. When this is factored in, the benefits of a bounty scheme may be less than they initially appear to be (see further discussion in Section 9.5.1 of this report).

PestSmart has concluded that:

There may be some situations where a bounty scheme has potential. There are examples from around the world where bounties have been used to successfully eradicate small, isolated populations of pest animals that are established in a relatively small area. Conditions of these bounties are usually set to limit the number of participants and the duration and areas of operation. Bounty payments are limited to the control of individual animals.

As an example, a bounty was used as part of a strategic campaign to eradicate the coypu (an aquatic rodent) in eastern England. The bounty payments offered financial incentives during the final stages of the campaign, to keep trappers motivated to catch the last difficult individuals and to finish the campaign on time.

Foxes and wild dogs are too numerous and widespread in Australia for a bounty payment to have any impact on their population numbers.⁷⁹⁹

It has also been noted that broad-scale bounties like the fox bounty in Victoria (which is open to foxes shot anywhere in Victoria) are ‘out of step’ with current control practices, which try to focus control activities on minimising damage to key assets (see Section 3.7.2 of this report).⁸⁰⁰

8.6.2 Co-ordinated and paid professional hunting

The Committee heard evidence about successful reductions of fox problems in local areas using co-ordinated recreational hunters. The St Helens Flora Reserve and Griffiths Island projects have been discussed in Sections 6.6.2 and 6.6.3 of this report. Based on anecdotal evidence, these projects appear to have been effective in protecting the native animals from fox predation and to have had minimal costs for the land managers. However, the Committee notes that both projects took place in relatively small areas.

⁷⁹⁹ PestSmart, *PestSmart Factsheet: Fox Bounties* (2011), p.2

⁸⁰⁰ Glen Saunders & Lynette McLeod, *Improving Fox Management Strategies in Australia*, report for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), p.55

A program in the Milton/Ulladulla region of New South Wales primarily relied on a paid professional shooter (plus some trapping). Over five years, the program appears to have reduced the number of foxes in the area. Some landholders have reported reductions in predation, though detailed data on this were not collected.⁸⁰¹

Another program in the Illawarra area of New South Wales used a mixture of paid professional shooters, recreational hunters and trapping. No formal monitoring of the impacts of the program took place, though there were anecdotal reports that certain native animals increased in numbers following the program.⁸⁰²

The costs of these programs were significant, at \$77 and \$72 per fox respectively. This is substantially higher than the cost per fox of recreational shooters or baiting.⁸⁰³

These programs suggest that shooting may provide benefits when co-ordinated or undertaken by a paid professional. However, it is not clear how effective these programs have been or to what extent they could be scaled up to larger areas.

8.6.3 Baiting

Mr Ben Fahey of Parks Victoria indicated that baiting is the most effective technique for foxes:

... we use a lot of broadscale 1080 baiting [for foxes]; trapping in areas where you cannot use baits. Certainly the preference is for broadscale baiting. That is the most effective technique we have got at the moment. Shooting occurs through some of the volunteer programs that we have got, but we do not expect that shooting can provide long-term outcomes in the management of that particular species because it is established at such a broad scale.

...

What we do know about most pest animals and particularly foxes is that they have a long history of control in Victoria and that reinvasion is a big issue, so you need to have a long-term approach and use the most appropriate tools. In that case most of the time it is baiting. Shooting is used where you have got site-specific constraints where you cannot deploy the most suitable tools. It would not be the preference in most cases.⁸⁰⁴

⁸⁰¹ PestSmart, *Case Study: Coordinated Fox Shooting Program* (2011), p.4; Lynette McLeod, Glen Saunders, Steve McLeod & Michelle Walter, *Effective Implementation of Regional Fox Control Programs*, produced for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), pp.61-72

⁸⁰² Lynette McLeod, Glen Saunders, Steve McLeod & Michelle Walter, *Effective Implementation of Regional Fox Control Programs*, produced for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), pp.73-6

⁸⁰³ Lynette McLeod, Glen Saunders, Steve McLeod & Michelle Walter, *Effective Implementation of Regional Fox Control Programs*, produced for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), pp.78-81

⁸⁰⁴ Ben Fahey, State Leader of Invasive Species, Parks Victoria, *Public Hearing*, 10 October 2016, pp.7-8

Similar conclusions were reached in the evaluation of the Victorian bounty scheme:

The key elements of successful programs are that they are intensive (baiting several times a year), well coordinated and cover large areas. Coordinated baiting programs in NSW and WA have achieved initial population reductions of 70–97% in both natural and agricultural habitats. In South Australia’s Flinders Ranges, coordinated broad scale baiting has resulted in a 100-fold reduction in fox density, down to <0.1 fox sighting 100 km⁻¹ over 6 years. In central Victoria (Puckapunyal Military Area) sustained strategic fox baiting program has achieved long term reductions in fox density. Increases in the abundance and range of a number of threatened prey species have also been recorded since fox control was initiated. In East Gippsland, monitoring has shown a sustained reduction in indices of fox activity and increases in a number of prey species are being recorded.

Factors such as baiting intensity, timing, bait density, habitat type, size of the baited area and the inclusion of buffer zones around the baited area may influence the level of control achieved. However, while continued research is needed to optimise baiting strategies for different environments, such an investment is likely to yield effective fox control programs.⁸⁰⁵

Trials in New South Wales between 2005 and 2010 showed an average of 78 per cent reduction in signs of fox activities at seven sites from the use of canid pest ejectors (see Section 7.2.2 of this report).⁸⁰⁶ Canid pest ejectors were also supported by Mr Cameron Skedd, President of the Vertebrate Pest Managers Association Australia, who told the Committee:

... for foxes by far the best result for time spent and money spent is using a 1080 bait. There has been some really good involvements in 1080 bait delivery of recent times. It is known in America as an M44. They are known as a CPE in Australia, canid pest ejector. It is something we can put in the field, sprinkle over it and it delivers 1080 bait straight into a fox’s mouth through a specific part of the two canids — foxes and dogs. That is a really exciting and good product to control numbers — good numbers — for a limited cost. In shooting foxes there are a lot of man hours. Sometimes the results are fantastic, but baiting foxes is many times more efficient in outcomes and dollars spent.⁸⁰⁷

The Basalt to Bay Landcare Network advised the Committee that it has also had success in controlling foxes with 1080 baits supported by private hunters.⁸⁰⁸ However, the Network indicated that it has had difficulties getting permission from Parks Victoria for the use of canid pest ejectors.⁸⁰⁹

⁸⁰⁵ Victorian Institute of Animal Science Vertebrate Pest Research Department, *Evaluation of the 2002/03 Victorian Fox Bounty Trial* (2003), p.26; see also Glen R. Saunders, Matthew N. Gentle & Christopher R. Dickman, ‘The Impacts and Management of Foxes *Vulpes vulpes* in Australia’ *Mammal Review* 40 (2010), p.197

⁸⁰⁶ NSW National Parks and Wildlife Service, *Ejector Field Trial Update No.4* (2010), p.2

⁸⁰⁷ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.5

⁸⁰⁸ Basalt to Bay Landcare Network, *Submission 188*, p.2

⁸⁰⁹ Lisette Mill, Landcare Network Facilitator, Basalt to Bay Landcare Network, *Public Hearing*, 29 November 2016, pp.4, 6

8.6.4 Other methods

Den fumigation is also a possibility for foxes. Trials using carbon monoxide in Australia have found it to be effective. However, it relies on finding the dens, which can be difficult and time-consuming.⁸¹⁰ Moreover, foxes only inhabit dens consistently for part of the year, limiting the effectiveness of this approach.⁸¹¹ A review of fox control techniques concluded:

Unless used to treat localised fox problems such as active dens within lambing paddocks or near poultry, fumigation, like many other techniques, cannot be considered a cost-effective measure for broadscale application. It is suitable for use in urban areas.⁸¹²

Similarly, trapping is possible but time-consuming, making it inappropriate for broad-scale programs.⁸¹³ Fences have been found to be effective for excluding foxes in some cases, but are also very expensive.⁸¹⁴

Guard animals (such as dogs, alpacas, llamas and donkeys) have also been used in Australia to keep foxes away. A number of submitters advocated for wider use of this approach.⁸¹⁵

Guard animals are usually used to protect livestock. A 2007 review notes that there is anecdotal evidence about their effectiveness but ‘little empirical data to verify these claims.’⁸¹⁶ However, guard dogs can be relatively cheap and require relatively little time after an initial phase. They can therefore pay for themselves, even if they only save relatively small numbers of livestock.⁸¹⁷

However, the Kara Kara Conservation Management Network was concerned that, ‘The introduction of guard animals on farms has reduced the need for fox control activities by landholders, but is likely to have increased fox predation on native wildlife.’⁸¹⁸

Guard dogs have also been used to protect native wildlife. Maremma dogs were introduced to Middle Island, near Warrnambool, to protect little penguins from fox predation. This followed unsuccessful attempts to reduce fox predation using

⁸¹⁰ Glen R. Saunders, Matthew N. Gentle & Christopher R. Dickman, ‘The Impacts and Management of Foxes *Vulpes vulpes* in Australia’ *Mammal Review* 40 (2010), p.194

⁸¹¹ Glen R. Saunders, Matthew N. Gentle & Christopher R. Dickman, ‘The Impacts and Management of Foxes *Vulpes vulpes* in Australia’ *Mammal Review* 40 (2010), p.194

⁸¹² Glen Saunders & Lynette McLeod, *Improving Fox Management Strategies in Australia*, report for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), p.56

⁸¹³ Glen R. Saunders, Matthew N. Gentle & Christopher R. Dickman, ‘The Impacts and Management of Foxes *Vulpes vulpes* in Australia’ *Mammal Review* 40 (2010), p.195

⁸¹⁴ Glen Saunders & Lynette McLeod, *Improving Fox Management Strategies in Australia*, report for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), pp.74-6; Lynette McLeod, Glen Saunders, Steve McLeod & Michelle Walter, *Effective Implementation of Regional Fox Control Programs*, produced for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), p.88

⁸¹⁵ Kathleen Whelan, *Submission 57*, p.1; Evie Jones, *Submission 127*, p.1

⁸¹⁶ Glen Saunders & Lynette McLeod, *Improving Fox Management Strategies in Australia*, report for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), p.74

⁸¹⁷ Linda van Bommel, *Guardian Dogs: Best Practice Manual for the use of Livestock Guardian Dogs*, prepared for the Invasive Animals Cooperative Research Centre (2010), pp.55-6

⁸¹⁸ Kara Kara Conservation Management Network, *Submission 160*, p.1

paid professional shooters and nearby den fumigation. Since the introduction of maremmas, the number of little penguins has increased from fewer than 10 in 2006 to approximately 120 by 2010.⁸¹⁹ Subsequently, maremmas have also been used successfully to protect a colony of Australasian gannets at Point Danger, near Portland.⁸²⁰

However, the Committee notes that these have been relatively expensive projects compared to the other methods of control discussed in this section above:

Both at Middle Island and Point Danger, costs were mainly associated with the wages for the dog handler, equipment such as the remote cameras and virtual fences, dog care (food, vet treatment, etc) and public education. At Point Danger there was also the cost of getting help from the Warrnambool dog handler (travel, hours, etc.).

For Middle Island, the total project cost in 07/08 was AU\$46,000 and in 08/09 it was AU\$61,000. This also included maintenance of infrastructure on the island and weed management. For Point Danger the cost in 07/08 was AUD\$23,000.⁸²¹

These methods may be best reserved for small-scale protection of assets.

There was also a call for biological control agents to be developed for foxes.⁸²² The Committee notes that previous efforts in this area have not been successful.⁸²³

8.6.5 Conclusion

The appropriateness of control methods for foxes varies depending on the size of the area. The Government's code of practice for fox control explains:

The primary technique used to control foxes is 1080 poison baiting. Other techniques include den fumigation, shooting and trapping (which may be used for small-scale control at specific sites where broader approaches cannot be used). Exclusion fencing or the use of guard dogs will rarely be considered in broader public land areas. The scale of fox predation being addressed (ranging in size from confined areas to large national parks or agricultural regions) will determine the most appropriate means of control, or conversely, the effectiveness of control in individual situations.⁸²⁴

⁸¹⁹ Linda van Bommel, *Guardian Dogs: Best Practice Manual for the use of Livestock Guardian Dogs*, prepared for the Invasive Animals Cooperative Research Centre (2010), p.118; Kristie King, Robert Wallis, Anne Wallis, Amanda Peucker & David Williams, 'Successful Protection against Canid Predation on Little Penguins (*Eudyptula Minor*) in Australia Using Maremma Guardian Dogs: "The Warrnambool Method"' *International Journal of Arts & Sciences* 8(5) (2015), pp.139-50

⁸²⁰ Linda van Bommel, *Guardian Dogs: Best Practice Manual for the use of Livestock Guardian Dogs*, prepared for the Invasive Animals Cooperative Research Centre (2010), p.119

⁸²¹ Linda van Bommel, *Guardian Dogs: Best Practice Manual for the use of Livestock Guardian Dogs*, prepared for the Invasive Animals Cooperative Research Centre (2010), p.123

⁸²² Rena Gaborov, *Submission 182*, p.1

⁸²³ Glen R. Saunders, Matthew N. Gentle & Christopher R. Dickman, 'The Impacts and Management of Foxes *Vulpes vulpes* in Australia' *Mammal Review* 40 (2010), p.199

⁸²⁴ Department of Economic Development, Jobs, Transport and Resources, *Fox Control in Victoria: Code of Practice* (2015), p.10 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 13)

The Government has produced a comparison of different methods, part of which is reproduced in Table 8.2 below.

Table 8.2 Assessment of selected control methods for foxes in the Victorian fox control code of practice

Method	Efficacy	Cost-effectiveness	Humaneness
Ground baiting with 1080	Effective	Cost-effective	Conditionally acceptable
Den fumigation with carbon monoxide	Not effective	Not cost-effective	Conditionally acceptable
Ground shooting	Not effective	Not cost-effective	Acceptable
Soft jawed leg hold traps	Not effective	Not cost-effective	Acceptable
Exclusion fencing	Limited	Expensive	Acceptable
Guard animals	Unknown	Unknown	Acceptable
Eco-traps	Not effective	Not cost-effective	Acceptable

Note: The original source includes more information about each method.

Source: adapted from Department of Economic Development, Jobs, Transport & Resources, *Fox Control in Victoria: Code of Practice* (2015), p.22 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 13); see also Glen Saunders & Lynette McLeod, *Improving Fox Management Strategies in Australia*, produced for the Commonwealth Department of Agriculture, Fisheries and Forestry (2007), pp.94-5

The Government's code notes that ground shooting is 'Labour intensive, only suitable for smaller scale operations.'⁸²⁵ The Committee considers that this accords with the evidence it received, which indicated that shooting has been used effectively on small-scale projects, such as Griffiths Island. However, it is not clear that there are benefits from encouraging broad-scale recreational hunting that is not focussed on particular high-value assets. Further discussion about evaluating the fox bounty can be found in Section 9.5.1 of this report.

FINDING 39: Poisoning has been found to be the most effective and economical method to control foxes. Recreational hunting has been shown to be effective when concentrated in smaller areas.

8.7 Cats

Legislation currently restricts the methods that can be used to control feral cats. A cat at large can be destroyed by authorised officers if it is:

- where animals or birds are kept for farming purposes (owners of the animals or birds may also destroy cats in this situation)
- in designated zones
- attacking or harassing wildlife

⁸²⁵ Department of Economic Development, Jobs, Transport and Resources, *Fox Control in Victoria: Code of Practice* (2015), p.22 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 13)

- on certain public land and reasonable attempts have been made to catch it but these attempts have been unsuccessful.⁸²⁶

Apart from in those areas of Victoria with no local council (such as French Island),⁸²⁷ in most other circumstances, a cat found on public or private land must be captured and delivered to the local council so that it can be recovered by an owner (if it has one).⁸²⁸

Parks Victoria explained:

Feral cats are not treated as pests in Victoria, yet they are considered a threat to wildlife and conservation assets. The current rules say that a cat has to be taken to the local authority and tested to see if it is a domestic cat and then put down appropriately, which is a vet and a green needle thing.

...

I think there is work to be done about reclassifying cat categories so we are equipped again to play in that space without this, 'Let's drive the one cat to the local council, get it put down by the local vet and then let's go back to the next cat'. The scale of it is much, much larger as an issue.⁸²⁹

In addition to the difficulty scaling this approach up, Mr Daryl Panther noted the impracticality of this approach on an individual level:

If you get a feral cat that is quite a large cat in a soft-jaw trap and you have to take it into town, it does not work. It just does not happen. It turns into an OHS situation, because a feral cat will rip you to pieces.⁸³⁰

Mr Michael Johnston, a former research scientist working on invasive animals, added that, transporting a feral cat could also cause stress to the animal.⁸³¹

The Committee was told that, as a result of the current legislation, Parks Victoria undertakes little work to control feral cats. Mr Ben Fahey from Parks Victoria explained that:

... there are small projects from time to time, but because we do not have access to the best possible tools or the most effective and cost-efficient tools to do the job, it is not a very cost-effective way to manage cats.⁸³²

The joint submission from government bodies concluded that shooting would not be appropriate for feral cats 'given the current restrictions on the destruction of cats in Victoria'.⁸³³ Cats' behaviour may also make them less susceptible

⁸²⁶ *Domestic Animals Act 1994*, ss.30-1; *Wildlife Act 1975*, ss.48, 48A

⁸²⁷ Mark Norman, Chief Conservation Scientist, Parks Victoria, *Public Hearing*, 10 October 2016, pp.3, 9; Michael Johnston, *Submission 71*, p.2

⁸²⁸ *Wildlife Act 1975*, ss.48A-C

⁸²⁹ Mark Norman, Chief Conservation Scientist, Parks Victoria, *Public Hearing*, 10 October 2016, pp.8-9

⁸³⁰ Daryl Panther, Victorian Wildlife Management, *Public Hearing*, 29 November 2016, p.3

⁸³¹ Michael Johnston, *Submission 71*, p.2

⁸³² Ben Fahey, State Leader of Invasive Species, Parks Victoria, *Public Hearing*, 10 October 2016, p.9

⁸³³ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.28

to shooting. As Mr Andrew Cox from the Invasive Species Council noted, 'For something like cats, which are very cautious, very hard to spot and very smart, ground shooting has very limited effectiveness, and so baits and traps are far more effective.'⁸³⁴

The Shooting Sports Council of Victoria, however, believes that shooting may be effective, stating that 'a sound pest management program employing hunting techniques to destroy feral cats could be established.'⁸³⁵ Shooting was an important part of a successful program (along with poisoning) which eliminated feral cats from North West Island (approximately 1 km²) in Queensland.⁸³⁶

Dr Mark Norman from Parks Victoria indicated that recent work in developing a bait for feral cats may provide additional options in the future:

There is also a bait very close to release that is called Curiosity, which is a fantastic name for a cat bait. That could really change the whole arrangement, because they can get deployment systems where a cat will come and try and bite something, and it shoots the poison into the throat, so there are all sorts of opportunities there.⁸³⁷

Mr David Brennan from the Wimmera Catchment Management Authority also described 'grooming traps' – devices which can recognise cats (as opposed to other animals) based on size and then spray a poison gel onto them. When the cats groom themselves, they consume the poison and die. Animals that are larger or smaller than cats are not targeted by the devices.⁸³⁸

Mr Johnston noted that mechanisms such as these are important because, in contrast to some other invasive species, cats will rarely dig up buried baits and prefer live prey.⁸³⁹ He and Mr Brennan both noted that the Victorian legislation currently prevents such techniques from being used.⁸⁴⁰

Mr Johnston also advocated for legalising leghold traps for use with cats (using cat faeces and urine to attract the cats).⁸⁴¹

While the Committee recognises the importance of attempting to re-unite lost pets with their owners, the current regulations appear to prevent the effective control of feral cats. Given that feral cats are a major threat to native wildlife (see Section 2.3.2 of this report), the Committee considers that changes to the regulations are appropriate. The Committee notes the 'National Declaration: Feral Cats as Pests' endorsed by environment ministers in 2015. Among other things, this declaration states:

⁸³⁴ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.3

⁸³⁵ Shooting Sports Council of Victoria, *Submission 202*, p.5

⁸³⁶ Steven Domm & John Messersmith, 'Feral Cat Eradication on a Barrier Reef Island, Australia' *Atoll Research Bulletin* No.338 (1990), pp.2-3

⁸³⁷ Mark Norman, Chief Conservation Scientist, Parks Victoria, *Public Hearing*, 10 October 2016, p.9

⁸³⁸ David Brennan, Chief Executive Officer, Wimmera Catchment Management Authority, *Public Hearing*, 30 November 2016, p.3; see also Daisy Hatfield, 'State-of-the-Art Technology Targets Feral Cats in the Outback', *ABC News*, 21 April 2016

⁸³⁹ Michael Johnston, *Submission 71*, pp.2-3

⁸⁴⁰ David Brennan, Chief Executive Officer, Wimmera Catchment Management Authority, *Public Hearing*, 30 November 2016, p.5; Michael Johnston, *Submission 71*, p.3

⁸⁴¹ Michael Johnston, *Submission 71*, p.3

Ministers agreed that where effective and humane techniques to control feral cats are available, that do not pose an unacceptable threat to the survivability and ecological function of non-target protected species in the treatment area, they should be pursued in coordination with other pest control activities to benefit threatened species.

Ministers committed to reviewing their jurisdictional arrangements including consultation with key stakeholders and interested community members and, based on this review, remove any unnecessary legal impediments to land managers undertaking feral cat control and management within a 12 month timeframe, where possible.⁸⁴²

The Committee notes the suggestion that any cat found more than a certain distance into a park should be classified as feral and that authorities should be allowed to destroy it immediately.⁸⁴³ The Committee considers that this is a necessary first step for managing feral cats in Victoria.

Mr Bill Curren noted the importance of preventing domestic cats from becoming wild in the first place, and suggested greater regulation of cat ownership and fines for irresponsible owners.⁸⁴⁴ The Peri Urban Group of Rural Councils stated that some local councils did not have sufficient resources to enforce pet responsibility laws.⁸⁴⁵

The Committee notes that, while a number of techniques are available to control feral cats, current Victorian legislation prevents these from being used. The legislation does not distinguish between domestic and feral cats and therefore prohibits land managers from killing feral cats in most circumstances. The Committee supports change in this area, such as through declaring feral or wild cats to be 'established pest animals' through an order of the Governor in Council, similar to what has occurred with wild dogs.⁸⁴⁶

FINDING 40: Current Victorian legislation prevents any effective control of feral cats.

RECOMMENDATION 9: That the Government declare feral or wild cats to be 'established pest animals' under the *Catchment and Land Protection Act 1994*, mirroring the way wild dogs are classified.

8.8 Horses

One submitter advocated for allowing recreational hunters to shoot wild horses.⁸⁴⁷ However, a number of participants in this inquiry indicated that most recreational hunters would not be interested in shooting horses:

⁸⁴² 'National Declaration: Feral Cats as Pests', 16 July 2015

⁸⁴³ Daryl Panther, Victorian Wildlife Management, *Public Hearing*, 29 November 2016, p.3; Michael Johnston, *Submission 71*, p.2

⁸⁴⁴ Bill Curren, *Submission 62*, p.3

⁸⁴⁵ Peri Urban Group of Rural Councils, *Submission 149*, p.4

⁸⁴⁶ Victoria Government Gazette, No. S 399, *Declaration of Certain Animals to Be Prohibited Pest Animals, Controlled Pest Animals, Regulated Pest Animals or Established Pest Animals*, 1 October 2010, Schedule 4B

⁸⁴⁷ Luke Mitchell, *Submission 165*, p.3

I do not know any recreational hunter that would want to shoot a horse. There is nothing in it for them, and I think they would find it abhorrent, as I would.⁸⁴⁸

In my opinion there is no place for horse control by volunteer hunters as the areas where control is required extend to hundreds of thousands of hectares with horse numbers in the thousands, well beyond the capacity of a few volunteers to deal with. Most hunters would also not be interested in participating in the culling of horses or would be averse to such culling.⁸⁴⁹

A number of submitters and witnesses called for ground or aerial shooting. For example:

A control program [for feral horses] is urgently needed. This could involve attracting horses to salt licks where they can be trapped in corrals. But the main emphasis will need to be control by shooting, including shooting from helicopters supported by ground crews of shooters. This is work for professional shooters only.⁸⁵⁰

... the horse is easy to deal with. We can deal with that in a fortnight if we have the political will, and that is either through ground shooting or helicopter shooting. To quote the late Buff Rogers, 'There is nothing easier to shoot than a horse'. They are very easy to put down from the ground or from the air. I have spoken to people who have hunted them in the Northern Territory from the air, and in Western Australia and Queensland, and it is a very easy thing to do.⁸⁵¹

Horses — I think the government has got to bite the bullet and introduce either ground shooting by professionals or helicopter shooting by professionals. There are a lot of horses out there over a very broad area, and although some recreational hunters might be willing to target a horse if they see one, I would suspect that most hunters would say, 'No, not my thing'.⁸⁵²

The Mountain Cattlemen's Association of Victoria argued against shooting, suggesting that it causes undue suffering:

... you will end up with a mare being shot in the belly and crawling away to die, and what happens to her foal? It just wanders around till its dead.⁸⁵³

If any of you have ever seen a mob of horses when a helicopter comes and they know that something is going to happen, those horses will be at full gallop — 40 or 50 kilometres an hour — bashing through the trees, panic stricken; and every time the helicopter comes around after the first couple are shot they will take off at full gallop, and those horses will be stressed for weeks. With any helicopter, they will know within two runs that this is going on, and they will just be galloping through the bush, flat out, hitting trees, breaking legs and panic stricken because of the helicopter.⁸⁵⁴

⁸⁴⁸ Dennis Keith, *Public Hearing*, 19 October 2016, p.3

⁸⁴⁹ Ken Slee, *Submission 77*, p.1; see also Ken Slee, *Public Hearing*, 6 October 2016, p.7

⁸⁵⁰ Peter Lynch, *Submission 116*, p.2

⁸⁵¹ Roger Bileyn, Gippsland Environment Group and Environment East Gippsland, *Public Hearing*, 6 October 2016, p.10

⁸⁵² Ken Slee, *Public Hearing*, 6 October 2016, p.7

⁸⁵³ Charlie Lovick, President, Mountain Cattlemen's Association of Victoria, *Public Hearing*, 20 October 2016, p.4

⁸⁵⁴ Graeme Stoney, Executive Officer, Mountain Cattlemen's Association of Victoria, *Public Hearing*, 20 October 2016, p.7

The Australian Brumby Alliance did not support shooting for similar reasons.⁸⁵⁵

The Humaneness Assessment Panel (see Section 5.5.3 of this report) found a lack of statistics regarding wounding rates for aerial shooting. It cited a South Australian individual leading a team of aerial shooters, who stated that more than 90 per cent of animals were killed instantly.⁸⁵⁶ However, it concluded that ground shooting to the head was more humane than aerial shooting.⁸⁵⁷

A trial of aerial shooting in Guy Fawkes River National Park in New South Wales in 2000 harvested 606 horses using three helicopters for three days. A report by the Head of the Department of Veterinary Clinical Sciences at the University of Sydney concluded that, 'There was no evidence to support a claim that the horses had not been killed humanely' though one horse was shot twice without dying.⁸⁵⁸ The RSPCA initiated court action against New South Wales National Parks and Wildlife Service on a number of counts of animal cruelty in relation to this matter. All but one charge was dismissed.⁸⁵⁹

In 2016, an Independent Technical Reference Group in New South Wales concluded that:

If lethal control is required, we found that best practice aerial shooting had the least potential adverse impact on wild horses ... This was dependent on a number of conditions being in place including suitable vegetation, adherence to specific standards and the use of highly trained and competent pilots and shooters. Where these conditions are not achievable, ground shooting, or passive trapping/mustering followed by on-site humane killing were the next best options.⁸⁶⁰

The Mountain Cattlemen's Association of Victoria and Australian Brumby Alliance advocated the use of live capture techniques (see Section 7.4 of this report) instead of shooting. The Mountain Cattlemen's Association argued for the combined use of trap yards, roping and mustering. The captured horses could then be transported to local farms, sold or euthanased.⁸⁶¹

The Association argued that, when done well, the animal will experience limited stress:

... trapping works really well if they are allowed to do a full gamut of having yards set up, free feeding them for a week beforehand and luring them to the yards so the animals are not stressed once they are in the yard — things like that.⁸⁶²

⁸⁵⁵ Australian Brumby Alliance, *Submission 159*, p.4

⁸⁵⁶ Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humaneness of Pest Animal Control Methods* (2nd edition, 2011) Commonwealth Department of Agriculture, Fisheries and Forestry, p.94

⁸⁵⁷ Trudy Sharp & Glen Saunders, *A Model for Assessing the Relative Humaneness of Pest Animal Control Methods* (2nd edition, 2011) Commonwealth Department of Agriculture, Fisheries and Forestry, p.123

⁸⁵⁸ A.W. English, University of Sydney, *Report on the Cull of Feral Horses in Guy Fawkes River National Park in October 2000: Executive Summary* (2000), p.6

⁸⁵⁹ New South Wales Parliament Legislative Council General Purpose Standing Committee No. 5, *Feral Animals* (2002), p.59

⁸⁶⁰ Independent Technical Reference Group, *Final Report of the Independent Technical Reference Group: Supplementary to the Kosciuszko National Park Wild Horse Management Plan*, report for the Office of Environment and Heritage NSW (2016), p.15

⁸⁶¹ Mountain Cattlemen's Association of Victoria, *Submission 87*, pp.4-5

⁸⁶² Graeme Stoney, Executive Officer, Mountain Cattlemen's Association of Victoria, *Public Hearing*, 20 October 2016, p.7

Mr Charlie Lovick from the Association argued that hundreds of horses could be rehomed each year if captured.⁸⁶³ For those that would have to be euthanased, the carcasses could be processed rather than left in the bush, where they might feed wild dogs.⁸⁶⁴ The Committee notes that the extent to which wild dogs will eat carcasses killed by others is debated (see Section 6.8.4 of this report).

The Australian Brumby Alliance similarly supported passive trapping or slow mustering. However, it rejected roping, believing the risk of injury and distress to be high.⁸⁶⁵ The Independent Technical Reference Group in New South Wales also expressed concern about roping.⁸⁶⁶

The North East Catchment Management Authority noted that it currently has trapping and rehoming programs in place.⁸⁶⁷

The Australian Brumby Alliance also advocated for fertility control, citing a number of possible methods. The organisation considered these to be cheaper and more humane than trapping.⁸⁶⁸ Lawyers for Animals advocated for fertility control combined with passive trapping and rehoming.⁸⁶⁹ Recent investigations by Parks Victoria and the New South Wales Office of Environment and Heritage, though, concluded that fertility control is ‘currently only feasible for managing small, contained populations where maintaining a small population is desired.’⁸⁷⁰

Parks Victoria’s *Greater Alpine National Parks Management Plan*, released in August 2016, found that:

Ground or aerial shooting are considered by technical experts and some stakeholders to be humane and effective techniques particularly for control over extensive areas of rugged terrain such as the eastern Alps. Technical experts and some stakeholders consider shooting to be a more humane control option compared to live capture techniques as animals are not subject to the stresses of capture, yarding and long-distance transportation. They also make the case for aerial shooting as a humane and effective method when carried out by highly skilled and experienced shooters and pilots using the correct equipment and procedures. However, negative public perceptions around the use of aerial shooting for horses have influenced decision making on use of the technique for humane horse control in south eastern Australia. An approach involving trapping, mustering and shooting may be able to provide meaningful outcomes for the environment, and subject to community consultation, potentially acceptable management of Victoria’s feral horses.⁸⁷¹

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- ⁸⁶³ Charlie Lovick, President, Mountain Cattlemen’s Association of Victoria, *Public Hearing*, 20 October 2016, p.6
⁸⁶⁴ Charlie Lovick, President, Mountain Cattlemen’s Association of Victoria, *Public Hearing*, 20 October 2016, pp.4, 6
⁸⁶⁵ Australian Brumby Alliance, *Submission 159*, pp.3-4
⁸⁶⁶ Independent Technical Reference Group, *Final Report of the Independent Technical Reference Group: Supplementary to the Kosciuszko National Park Wild Horse Management Plan*, report for the Office of Environment and Heritage NSW (2016), pp.19, 20, 32
⁸⁶⁷ North East Catchment Management Authority, *Submission 138*, p.5
⁸⁶⁸ Australian Brumby Alliance, *Submission 159*, p.3
⁸⁶⁹ Lawyers for Animals, *Submission 208*, p.15
⁸⁷⁰ Parks Victoria, *Greater Alpine National Parks Management Plan* (2016), p.38; New South Wales Office of Environment and Heritage, *Draft Wild Horse Management Plan: Kosciuszko National Park* (2016), p.27; see also Independent Technical Reference Group, *Final Report of the Independent Technical Reference Group: Supplementary to the Kosciuszko National Park Wild Horse Management Plan*, report for the Office of Environment and Heritage NSW (2016), p.31
⁸⁷¹ Parks Victoria, *Greater Alpine National Parks Management Plan* (2016), p.38

As part of the plan, Parks Victoria intends to ‘Implement humane feral horse control in consultation with the community’, including considering all control options.⁸⁷²

FINDING 41: There has been little work done to control feral horses and therefore best control methods cannot be determined.

FINDING 42: Shooting feral and wild horses using recreational hunters is not a viable option of control as a horse-shooting culture does not exist in Victoria and hunters have expressed a strong disinterest in the act.

8.9 Deer

Dr Dave Forsyth, who was a wildlife ecologist with the Arthur Rylah Institute from 2002 to 2016, summarised the situation with deer control:

For deer the typical tools are generally ... fencing, which is useful for small areas and high-value agricultural products — crops et cetera. There is ground-based shooting with spotlights or without spotlights. There is ground-based shooting with hound teams, which in particular for sambar deer is likely to be effective. Then for some species it may be cost effective to use aerial, helicopter-based hunting, which is used widely in New Zealand and is being used in South Australia, New South Wales and Queensland.

...

[Fencing] is probably one of the most effective ways of keeping deer out of an area, but it is also initially quite expensive — initial capital outlay in terms of the fencing — and there is some ongoing patrolling, if you like, and maintenance of the fence when things such as trees fall over it. The otherwise most effective method would be shooting, as I mentioned, either ground-based with spotlights or with hound teams, or aerial-based shooting.⁸⁷³

Fencing and shooting are discussed below, along with alternative approaches that were suggested during this inquiry.

8.9.1 Fencing

As noted by Dr Forsyth, fencing can be effective but expensive. A number of submitters highlighted the cost of establishing and maintaining fences around agricultural properties and revegetation areas:

Farm fencing is quite expensive and one of the major issues we face is that whilst we continually work to maintain fencing along the boundaries of the adjoining Crown land at our own expense, the deer that enter our properties from the adjoining

⁸⁷² Parks Victoria, *Greater Alpine National Parks Management Plan* (2016), p.41

⁸⁷³ Dave Forsyth, *Public Hearing*, 10 October 2016, pp.3-4

Crown land continue to cause damage to our fencing. Further to this, the very mature size of many of the deer sees such large animals simply jumping over our standard farm fencing.⁸⁷⁴

The deer are causing economic hardship to private landowners who are faced with repeated expense to revegetate and re-fence, which is not a deterrent to deer. Deer proof fencing is very expensive and not economically viable at the scale required to mitigate the impacts of the deer.⁸⁷⁵

As an example at council’s Healesville Biodiversity Offset site it was necessary to construct deer proof fencing in order to undertake revegetation works. This fencing added over \$20,000 to the cost of the revegetation works, which had to be passed on to the purchasers of offsets from the site.⁸⁷⁶

The Friends of the Helmeted Honeyeater provided details of the costs and effectiveness of fencing and tree guards to protect conservation areas from deer (see Table 8.3).

Table 8.3 Cost and effectiveness of fencing and tree guards in Yellingbo Nature Conservation Reserve

Product/method	Cost per unit (inc gst)	Comments on effectiveness
Deer exclusion fencing (1800mm high wire net)	\$25.00/linear m	Highly effective provided regular perimeter checks & maintenance budgeted. Difficult and costly to install in dense, high conservation-value vegetation.
Tree Guard Tubex 1500mm	\$6.00/ea	Highly effective at establishment stage for Eucalyptus camphora seedlings. Moderately-quickly installed, however bulky. High cost per unit renders large scale plantings cost-prohibitive. Lifting of Tubex guard and antler rubbing observed on 2.5 year old plantings in open paddock sites (but not plantings within remnant vegetation).
Tree Guard chicken wire 1800mm (FOHH ^(a) -assembled +1800mm star picket)	\$10.80/ea	Highly effective at establishment stage and beyond for a range of tree and shrub species. Bulky and slow to install relative to other tree guard products. Bulk and high cost per unit renders large scale plantings cost-prohibitive.
Tree Guard heavy duty plastic wire mesh 900mm + 3 bamboo stakes	\$2.37/ea	Moderately effective at establishment stage, however seedlings easily browsed once emergent over top of guard. Guard easily displaced. Quickly installed and compact. Moderate cost. Well suited to flood-prone environments (eg. Yellingbo NCR [Nature Conservation Reserve]) as water can pass freely through the guard, unlike bag and rigid core flute products.

(a) Friends of the Helmeted Honeyeater
 Source: Friends of the Helmeted Honeyeater, *Submission 158*, p.4

Electric fencing can also be used. The Committee received mixed evidence as to its effectiveness at keeping out deer.⁸⁷⁷

874 Graham’s Factree, *Submission 34*, p.2
 875 Peri Urban Group of Rural Councils, *Submission 149*, p.3
 876 Yarra Ranges Council, *Submission 106*, p.3
 877 Bob Gough, *Public Hearing*, 19 October 2016, p.3; Bob Gough, *Submission 67*, p.19; anonymous member of the Mountain Cattlemen’s Association of Victoria, cited in Mountain Cattlemen’s Association of Victoria, *Submission 87*, p.2

The Victorian Farmers Federation noted that the *Fences Act 1968* (s.31) exempts the State from having to pay for fencing between Crown land and private land. The Victorian Farmers Federation suggested that the legislation be amended so that costs are shared.⁸⁷⁸ Graham's Factree, a wholesale nursery business with properties near Crown land, similarly argued for government grants for deer-proof fencing to be available to properties where deer from Crown land are having a financial impact (as did a number of other submitters):

Such contribution by the custodian of the Crown land would be deemed to be a fair contribution relative to what is effectively the source of the problem that is substantially impacting on the adjoining private land that is outside of the control of the private adjoining land owner. In most instances, the costs involved with installing deer proof fencing are realistically outside of the financial ability of the affected private adjoining land owner without contribution from the adjoining land that is the source of the problem.⁸⁷⁹

Partial payments or subsidies from the government could make fencing a more affordable option for farmers. The Committee considers that, where there are substantial ongoing problems for private landowners as a result of invasive animals on neighbouring Crown land, it would be reasonable for the government to assist private landowners with the cost of fencing.

In terms of managing deer impacts on wilderness areas, the East Gippsland Rainforest Conservation Management Network has fenced some rainforest gullies to exclude deer. Mr Tom Crook from the organisation explained that this was to demonstrate the impact of deer by showing what a gully is like in the absence of deer. He noted that fencing is 'not a solution at a landscape level.'⁸⁸⁰

However, fencing was noted as a potential part of controlling deer at Wilsons Promontory, due to its geographic features. Mr Bill Hansen, from the Friends of the Prom, explained:

So if you were going to completely rid the Prom of invasive overgrazing animals, then because it is a large area connected by an isthmus to the mainland you could build a fence across it somewhere. You might never totally get rid of every animal, but you would certainly be able to make inroads and then know that it was not going to be repopulated from outside areas.⁸⁸¹

Mr Hansen recommended a program including building a fence across the isthmus and culling invasive animals south of the fence.⁸⁸²

⁸⁷⁸ Gerry Leach, Chair, Land Management Committee, Victorian Farmers Federation, *Public Hearing*, 10 October 2016, p.11

⁸⁷⁹ Graham's Factree, *Submission 34*, p.3

⁸⁸⁰ Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.3

⁸⁸¹ Bill Hansen, Friends of the Prom, *Public Hearing*, 7 October 2016, p.4

⁸⁸² Bill Hansen, Friends of the Prom, *Public Hearing*, 7 October 2016, p.5

In some places, such as Wilsons Promontory, a fence along the boundary between private and Crown land is likely to provide significant environmental benefits. The Committee considers that, in such situations, government financial support to assist private landowners in establishing deer-proof fencing would be particularly appropriate, given the public benefit coming from the fences.

FINDING 43: Deer-proof fencing can be effective at keeping deer out of an area but is expensive. The government is not required to contribute to the cost of fences between private and Crown land, leaving private land owners with the full cost of fences to keep animals on Crown land from entering private property.

RECOMMENDATION 10: That the Government provide some financial support to private landowners to assist with the additional cost of deer-proof fencing (over and above the cost of regular fencing) where there are ongoing, severe problems with invasive animals entering the private property from Crown land or where establishing a deer-proof fence would provide significant environmental benefits.

8.9.2 Shooting

Shooting was seen by many submitters and witnesses as currently the only effective way to control deer numbers. However, there was much debate about the effectiveness of recreational hunting and whether paid professional shooting or other approaches would be more appropriate. Overall, the Committee notes that there have been limited robust evaluations of shooting as a control method, especially in the Australian context.⁸⁸³ The Alpine National Park trial (see Section 6.5.2 of this report) intends to gather more evidence in this area. It is too early for that trial to influence this report, but it should be helpful for future policy-makers.

Unsupervised recreational hunting

The size of the deer harvest by recreational hunters in Victoria was noted by some as evidence that recreational shooting may be having an impact. For example, the Australian Deer Association stated:

There is no definitive evidence either to support or to disprove the contention that normal recreational hunting plays a significant role in overabundant wildlife management. However, the recreational deer harvest of 60,000 animals in 2015 must have an impact on the population, and should not be discounted simply because that impact is difficult to quantify.⁸⁸⁴

⁸⁸³ Andrew J. Bengsen & Jessica Sparkes, 'Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.304; Naomi E. Davis, Ami Bennett, David M. Forsyth, David M. J. S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), p.525; Andrew Bengsen, *A Systematic Review of Ground-Based Shooting for Pest Animal Control*, prepared for Invasive Animals Cooperative Research Committee (2016), pp.7-8

⁸⁸⁴ Australian Deer Association, *Submission 168*, p.5 (with sources)

Mr Barry Howlett from the Australian Deer Association suggested that, even though unsupervised hunting may not be reducing the overall number of deer in Victoria, it may be having localised impacts:

It has been suggested that recreational hunters killed in the order of 70 000 wild deer in Victoria last year, predominantly on public land, and there are local areas where this has undeniably put downward pressure on deer numbers. So even though deer numbers may be increasing, that does not mean that taking deer out is not having an impact on that.⁸⁸⁵

A number of submitters suggested that there are fewer impacts from deer in areas where shooting is allowed compared to areas where it is not permitted. Mr Luke De Boer informed the Committee that, based on his experience, he believed three seasons of hound hunting had had a significant impact on deer numbers in an area north of Briagolong in Gippsland.⁸⁸⁶

The Committee notes that there is a lack of data to confirm or reject these assertions.

However, as noted in Section 5.4.1 of this report, deer are able to reproduce relatively quickly and it is necessary to kill more than 40 per cent of sambar deer each year to reduce the population. Given that estimates for sambar deer numbers are in the hundreds of thousands (see Section 2.3.1), killing 60,000 (or even 70,000 in 2015) deer is significantly less than required to reduce the population. As Mr Greg Hyams, Chief Executive Officer of the Game Management Authority, informed the Committee, ‘There are more deer than we will have enough hunters ... to impact on the population, with perhaps the exception of hog deer, which are a smaller population group and strain geographically.’⁸⁸⁷

This may mean that any short-term localised gains may be quickly lost due to recolonisation from other areas.

Other factors limiting the benefits from unsupervised recreational hunting are discussed in Section 6.8 of this report.

A variety of ways to make recreational hunting more effective in controlling deer were suggested as part of this inquiry. These are explored in Chapter 9 of this report.

Co-ordinating recreational hunting so that the hunting effort is concentrated at particular times and places is also a key method used to improve the impact of recreational hunters.

⁸⁸⁵ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.2

⁸⁸⁶ Luke De Boer, *Public Hearing*, 7 October 2016, pp.5-6

⁸⁸⁷ Greg Hyams, Chief Executive Officer, Game Management Authority, *Public Hearing*, 5 September 2016, p.4

Co-ordinated recreational hunting

Mr Tom Crook (East Gippsland Rainforest Conservation Management Network) noted his group's experience with using co-ordinated recreational hunting. He indicated that short-term benefits have been achieved:

There have been some effective programs. There is one at a property called Trevertons with Parks Victoria at the moment which we are not so heavily involved in but which I am aware of, where the management outcomes are really about trying to see a large-scale regeneration and revegetation project — just reducing the browsing pressure in the short term to allow those trees and vegetation to grow up to a certain height out of the deer browse range, if you like. That has been relatively successful in the short term, but that is an isolated example.⁸⁸⁸

However, he noted that such programs are not effective in the long term:

We have also got quite a long history, in the extent of 10 years now, working with the Australian Deer Association and other hunting organisations in cooperation with Trust for Nature and Parks Victoria undertaking localised control programs to try and mitigate the impacts of these animals on specific rainforest gullies, but increasingly we are finding that those efforts are largely in vain and that their outcomes are very short term and certainly very localised. It is only a matter of months once those programs have finished, which in some instances have taken out large amounts of animals and in others not so many, that, irrespective of the number we take out, in six months to a year the deer have returned and the impacts are increasing and certainly ongoing.⁸⁸⁹

The co-ordinated recreational hunting program in the Yarra Ranges also appears to have been effective, at least in some areas (see Section 6.5.3 of this report). The Friends of the Helmeted Honeyeater indicated that it has reduced deer density and may have reduced the impacts of deer on vegetation and that local staff have noticed a reduction in deer impacts on vegetation and waterways.⁸⁹⁰ As with the programs noted by Mr Crook, however, this program is only seeking localised results. It is an ongoing program and it is therefore not clear what would occur if the hunting pressure ceased.

The Committee notes a lack of meaningful data about the effectiveness of the co-ordinated hunting trial on Wilsons Promontory (see Section 6.5.1).

The Alpine National Park trial will provide a clearer understanding of the effectiveness of co-ordinated recreational hunting (see Section 6.5.2).

⁸⁸⁸ Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.4

⁸⁸⁹ Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.3

⁸⁹⁰ Friends of the Helmeted Honeyeater, *Submission 158*, pp.1-2; Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.24

Paid professional shooters

Paid professional shooters or employees of land management agencies have been used in some cases to control deer.

Melbourne Water has conducted shooting programs that have successfully reduced contamination of drinking water sources by deer faeces. Shooting was conducted by Melbourne Water and Parks Victoria staff in water catchment areas.⁸⁹¹ An evaluation of work between 2008 and 2012 looked at the effectiveness of the program in keeping deer away from a key asset in the Upper Yarra Catchment. It found that shooting was effective at reducing deer presence at the asset, though it was unclear whether this was through reducing the deer population or through deterring deer from that particular location.⁸⁹²

On Kangaroo Island in South Australia, shooting has been used to almost eliminate fallow deer. The shooting was primarily undertaken by full-time animal control officers hired by the Kangaroo Island Natural Resources Management Board.⁸⁹³ The Committee notes that, as an island, the area is not subject to re-invasion from neighbouring areas.

A large number of submitters and witnesses advocated for paid professional shooters to be used to control deer. Some people recommended to the Committee that only professionals be used, such as:

Where shooting is deemed the most effective and humane method of control or eradication, only fully-trained professional shooters should be employed for the task and should operate under strictly monitored protocols.⁸⁹⁴

Anecdotal and actual evidence shows there are far too many irresponsible shooters. There are professional operators which do a good job but while the attitude of many hunters remains fairly careless, we don't believe there should be any system to allow free-ranging hunters inside areas that are specifically managed for nature conservation.⁸⁹⁵

The advantages attributed to paid professionals compared to recreational hunters are discussed in more detail in Section 6.3 of this report. These include higher levels of skill, more training, access to additional equipment and the ability to cull more animals in a shorter period. Studies in the USA found little cost difference per deer between using co-ordinated recreational hunters and government employees, when administration and support staff costs were factored in (see Section 6.9 of this report).

⁸⁹¹ Melbourne Water, *Public Health Compliance Quarterly Report: Quarter Four 2007/08* (n.d.), p.3; Melbourne Water, *Public Health Compliance Six Monthly Report: Quarters Three and Four 2008/09* (n.d.), p.3

⁸⁹² Ami Bennett, Shane Haydon, Melita Stevens & Graeme Coulson, 'Culling Reduces Fecal Pellet Deposition by Introduced Sambar (*Rusa unicorn*) in a Protected Water Catchment' *Wildlife Society Bulletin* 39(2) (2015), pp.273-4

⁸⁹³ PestSmart, *Case Study: Feral Deer Eradication on Kangaroo Island* (2013), p.1

⁸⁹⁴ Friends of the Gippsland Lakes Parks and Reserves, *Submission 166*, p.3; Nancy McMurray, *Submission 164*, p.3

⁸⁹⁵ Environment East Gippsland, *Submission 194*, p.2

Many people and organisation recommended a combination of paid professional and recreational hunters in controlling deer. For example, Dr Forsyth indicated:

Mr YOUNG — We sort of have to live with the fact that they [deer] are here and that we are not going to eradicate them, so we need to move more to a specific targeted approach just to protect certain assets. Given that, would shooting be an appropriate method to control around certain areas that we identify as having a need to move deer away from or to disperse them from those special assets?

Dr FORSYTH — I think it would be, but it needs to be recognised that to reduce deer to low density, particularly in typically heavily forested areas that are occupied by sambar deer in Victoria, it is going to be an expensive exercise to actually reduce deer to low densities. Sporting shooters and individuals can have a small effect on deer populations at large scales, but they are not going to have the large knockdown effect that you are probably going to need to alleviate effects on those high-value assets. So to do that, a group of recreational hunters have a go at that, if you want to go down that line. Then you need to engage professional contractors with key skills — and they cost money, of course — to actually further reduce the population to a level which is going to have some benefit for native biodiversity.⁸⁹⁶

Dr Clare Veltman from the New Zealand Department of Conservation similarly supported a mixture of paid professional and recreational hunting, though she recommended using professionals first:

... if you can suppress deer to very low densities, any recreational hunting at that point can help a lot because it can keep the animals in some sort of a predator pit. But to take animals from relatively high densities to a low value using recreational hunting — which means ground shooting — is simply inefficient and ineffective.⁸⁹⁷

A similar approach was recommended by Mr Kirk Stone, director of Strathbogie Wildlife (an animal control business):

Recreational hunting is a valuable element of any integrated deer / invasive animal management program on public land but does not provide the capacity or expertise to effectively and efficiently reduce deer impacts. The key element of a balanced and effective program is the use of professional shooters in the initial population reduction phase of the program. Professional shooters provide the skills, accountability and expertise required in the population reduction phase of any program and then recreational shooters are ideal for maintaining pressure on the already reduced deer or overabundant animal populations.⁸⁹⁸

The evaluation of the Supplementary Pest Control program in New South Wales (see Section 6.7.1 of this report) noted the importance of correctly sequencing recreational hunting and other control methods.⁸⁹⁹

⁸⁹⁶ Daniel Young MLC, member of the Committee, and Dave Forsyth, *Public Hearing*, 10 October 2016, p.4

⁸⁹⁷ Clare Veltman, Principal Science Adviser, New Zealand Department of Conservation, *Public Hearing*, 10 October 2016, p.3

⁸⁹⁸ Strathbogie Wildlife, *Submission 205*, p.2

⁸⁹⁹ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), p.9

Aerial shooting

Some people called for helicopter shooting to be used to control deer.⁹⁰⁰ The use of paid professional shooters with helicopters has been one component of successful strategies to control deer numbers in New Zealand. However, Dr Veltman indicated that much of this work is funded by commercial operators exporting the venison:

... most of the helicopter shooting that is done in New Zealand is done by commercial venison harvesters, and depending on the price of aviation fuel, the price of deer, all of the costs that go into whether to hunt or not, they will target their hunting at places on the landscape where they can see the animals, where the animals are vulnerable. Where the department might have to do deer control and where it contracts air-based work, depending on the layout of the landscape we may or may not have open country to hunt the animals in, in which case then the helicopter works usually from lower slope to upper slope until animal movement is sighted and then the animals are tracked and shot. But 20 000 to 30 000 carcasses are exported a year from the commercial venison recovery off public conservation land.⁹⁰¹

She noted that the harvest had been as high as 100,000 carcasses per year. However, this had reduced due to the legalisation of deer farming and changes in the economics of harvesting deer by helicopter (and therefore the number able to be taken out profitably by this means), which varies with the value of the New Zealand dollar, oil prices and demand for beef.⁹⁰² If Victoria's regulations forbidding the sale of deer meat remain in place (see Section 9.3.5 of this report), helicopter shooting would be much more expensive in Victoria, as costs could not be offset by selling the meat.

Aerial shooting of deer has also taken place in New South Wales and South Australia,⁹⁰³ though the Committee is not aware of any evaluations of these programs.

A number of people told the Committee that aerial shooting would not be as effective in Victoria:

... the big impact in New Zealand was the helicopters were shooting the open tops above the forest level and shooting gullies and landslips and so on where there was no vegetation. If you come to the Victorian sambar situation, the sambar are a forest deer species and most of the habitat that they inhabit in Victoria is dense forest. There are some areas obviously where helicopters could get deer. The very low rainfall along the Snowy River, for example, you could shoot through the tree canopy there. It is very open. Some of the alpine meadow country up on the top of the Dargo high plains, Dinner Plain area, Wellington high plains, yes, you could certainly have a localised impact there. But across the whole area, most unlikely.⁹⁰⁴

⁹⁰⁰ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.9

⁹⁰¹ Clare Veltman, Principal Science Adviser, New Zealand Department of Conservation, *Public Hearing*, 10 October 2016, p.3

⁹⁰² Clare Veltman, Principal Science Adviser, New Zealand Department of Conservation, *Public Hearing*, 10 October 2016, p.8

⁹⁰³ Naomi E. Davis, Ami Bennett, David M. Forsyth, David M. J. S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), p.524

⁹⁰⁴ Ken Slee, *Public Hearing*, 6 October 2016, p.4

[In New Zealand, helicopter shooting was used to control] red deer. So a herd animal, open country; it is not really comparable to sambar in the Alps.⁹⁰⁵

... up into the High Country, Bogong and Falls, because of the difficult and heavily timbered terrain and the high population numbers, even F-A-S-T [Feral Animal Aerial Shooters Team] or fast shooters would struggle out of the helicopters.⁹⁰⁶

Helicopter-based culling is untried on sambar in Victoria and is widely considered to not be feasible in heavily forested alpine terrain. It may be of use in large open areas, such as those typically associated with Alpine Bogs. In New Zealand, where helicopters are widely used in a number of applications (tourism, forestry, aquaculture and horticulture), and, where helicopter-based culling was once commonplace, the practice is increasingly becoming economically unviable.⁹⁰⁷

Mr Bob Gough suggested that some of these problems may be overcome if aerial shooting were used following hazard reduction or accidental bushfires, when tree canopies are reduced.⁹⁰⁸

8.9.3 Other methods

Mr Bob Gough called for trialling trap-yards (see Section 7.4.1 of this report):

If you have got a deer trap, rather than a hunter who comes when he can, you have got water and food in there for the deer. It is not a cage; it is a paddock. I am talking 10 acres or something, if you have got it. The deer come in. I saw this in New South Wales — it worked really well — where a farmer had a 200-acre paddock with an old homestead site with fruit trees that were attractive to the deer. There was a deer fence right around it on steep slopes. He had a couple of ramps, where the deer would jump in but could not jump out. When he had a truckload, he would just call the truck up, stick them on a truck and sell them. That worked really well.

Under the current regs in Victoria, if we could get a deer trap going, and the landholder then rings up his shooter and says, 'Look, I've got some deer in a trap', and the shooter comes out at a good time when it is not going to upset the neighbours, like in the middle of the day when they are all at work or something like that, and puts the deer down, it is probably a good way to go. I am looking into trying to find a grant. I would like to find a Landcare-type grant to trial it on a farm. We obviously have a lot of ground to go; we have got to make sure we can do it legally first.⁹⁰⁹

The benefits and disadvantages of trap-yards are discussed in Section 7.4.1.

A number of submitters and witnesses called for further research to identify alternative techniques. Mr Andrew Cox of the Invasive Species Council stated, 'For deer, we do acknowledge that ground shooting is the most effective technique currently available, but part of the problem is there are no other techniques.'⁹¹⁰

⁹⁰⁵ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, pp.6-7

⁹⁰⁶ Robert Rosicka, *Public Hearing*, 20 October 2016, p.3

⁹⁰⁷ Australian Deer Association, *Submission 168*, p.25 (with sources)

⁹⁰⁸ Bob Gough, *Public Hearing*, 19 October 2016, pp.3, 8

⁹⁰⁹ Bob Gough, *Public Hearing*, 19 October 2016, p.11

⁹¹⁰ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.3

Mr Cox called for research into poisons:

There is no approved poison for deer control in New South Wales and Victoria. This is a problem because this could be the most effective way of controlling it. Part of the reason is because the research to get the approvals has not been done. 1080 is not the best poison you could use, but if you are trying to solve a problem — the out-competing of feed for prolific feeders and for native animals and some of the plants that are at threat of extinction from feral deer — we should be looking at that. We are not actively looking at that, and that should change.⁹¹¹

Mr Cox also called for more research into poison delivery mechanisms.⁹¹²

Mr Gough considered that poison was worth consideration in some instances for deer as there are areas where recreational hunters will never go and other methods are too expensive.⁹¹³ Mr Roger Bilney (representing two environment groups) stated that 1080-laced carrots had successfully controlled fallow deer in Tasmania and could be used to control fallow deer and hog deer in Victoria.⁹¹⁴ Research into using cyanide for deer is being undertaken in New South Wales.⁹¹⁵

Other submitters and witnesses called for research into methods of reproductive control of deer.⁹¹⁶ However, as noted in Section 7.7 of this report, delivery mechanisms for this type of control are difficult. Where they must be administered by dart, the same difficulties that are encountered with shooting would be found.⁹¹⁷

Some advocated for research into biological controls for deer.⁹¹⁸ Bushwalking Victoria noted that these 'are obviously potentially the solution to the problem but they currently do not exist, as far as we are aware'.⁹¹⁹

Overall, the Victorian National Parks Association noted the limitations of the methods that are currently available and called for further research into various options:

There is a crying need for research programs into a range of options for pest control, including targeted, humane options for baiting animals (including delivery techniques); and innovative biological and genetic controls for pest animals. It will be particularly hard to reduce populations of the various species of deer in Victoria

⁹¹¹ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.10

⁹¹² Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.10

⁹¹³ Bob Gough, *Public Hearing*, 19 October 2016, p.11

⁹¹⁴ Roger Bilney, Gippsland Environment Group and Environment East Gippsland, *Public Hearing*, 6 October 2016, p.11

⁹¹⁵ Naomi E. Davis, Ami Bennett, David M. Forsyth, David M. J. S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, 'A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia' *Wildlife Research* 43 (2016), p.524; Peter O'Donnell, Upper Ovens Valley Landcare Group, *Public Hearing*, 19 October 2016, p.8

⁹¹⁶ Mhairi Roberts, Animal Welfare Policy Manager, RSPCA Victoria, *Public Hearing*, 5 September 2016, p.2; Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.4; People for the Ethical Treatment of Animals, *Submission 124*, p.5; Melissa Lord, *Submission 177*, p.4; Lawyers for Animals, *Submission 208*, pp.14-15

⁹¹⁷ Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.4

⁹¹⁸ Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.4; Peter Lynch, *Submission 116*, p.1; Peri Urban Group of Rural Councils, *Submission 149*, p.3; Stuart Stagg, *Submission 186*, p.3

⁹¹⁹ Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.4

to suitable levels by any of the control methods currently in use. That leaves us with a scenario of long-term expensive management, most likely also including fencing off large areas of Victoria's public land. There are increasing options for any number of biological controls, potentially enabling cost-effective population reductions in targeted areas. Research should be funded, and options explored as a matter of urgency.⁹²⁰

The Committee notes that shooting and fencing are the only deer control methods used in Victoria. The Committee agrees that there is a need for more research into alternative methods, given the scale of the deer problem in Victoria and the limitations of shooting (whether by paid professionals or recreational hunters).

FINDING 44: Fencing and shooting are the only methods available to control deer and these are not enough. Deer-proof fencing is expensive and only suitable to protect small areas.

FINDING 45: Deer as invasive animals seem to be limited to Australia and New Zealand. Therefore, we cannot rely on international research or studies on how to control deer.

RECOMMENDATION 11: That the State Government raise, during a Council of Australian Governments forum (or other inter-governmental meeting), the need for urgent funding to research methods and techniques to control deer that could be practically implemented in Victoria.

8.10 The role of recreational hunters in invasive animal control

As the above sections of this chapter indicate, shooting is not the most effective means of animal control for most of Victoria's invasive species. Recreational hunting by itself will not solve any of the invasive animal problems on a broad scale, though it may have a role complementing other methods. This view was shared by Parks Victoria and the Game Management Authority:

... in the Alpine National Park there is now an increased area for the purposes of recreational hunting ... but it is not the answer for a control activity conversation. It might be part of it, but it is not the whole answer.⁹²¹

If you are trying to control animals ... recreational hunting can fit into that but so too can targeted strategic removal of animals via hunters and hunting organisations and also using a suite of other tools in the toolkit, because hunting alone just cannot do it unless it was very targeted, very focused and in very small areas really.⁹²²

For some species, shooting by either paid professionals or recreational hunters may be counter-productive or impractical. Dogs and cats may be difficult and time-consuming animals to hunt. This limits the possible contribution of

⁹²⁰ Victorian National Parks Association, *Submission 191*, p.6

⁹²¹ Roger Fenwick, Regional Director, Eastern Victoria, Parks Victoria, *Public Hearing*, 10 October 2016, p.10

⁹²² Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.10

shooting to animal control. Methods such as poisoning and trapping are better able to control these animals, as the animals can be drawn to the bait or trap, rather than the hunter having to find the animals. For pigs in forested environments, shooting is relatively ineffective and may disperse the animals, making other control methods less effective. Shooting may have a role with dogs, cats and pigs, but it is limited to circumstances where other techniques are not an option or as a complement to other techniques.

With rabbits and foxes, recreational hunting is able to cull large numbers of animals. However, the scale of culling that is required for these species is much larger than could be managed by recreational hunting alone. Shooting (whether by recreational hunters or paid professionals) may be helpful if focussed on particular areas or when combined with other control methods.

Shooting may be most effective with horses, goats and deer, though some participants in this inquiry preferred alternative methods for various reasons (such as humaneness). Regarding horses, the Committee heard from a number of witnesses that few recreational hunters would be interested in shooting the animals. Any shooting of horses may be best left to professionals (possibly using helicopters, trap-yards or mustering).

There are limited data available about the effectiveness of deer control programs using recreational hunting. The evidence presented to the Committee suggests that recreational hunting by itself is, at best, only able to achieve localised and short-term results.

Recreational hunting is most likely to be effective as a means of invasive animal control when used in combination with other techniques and when co-ordinated so that it is focussed on particular areas (see Sections 8.10.1 and 8.10.2 of this chapter). Co-ordinated recreational hunting combined with paid professional shooters appears to have been successful in controlling goat numbers at a number of locations. A similar approach was recommended by a number of people for deer. This is being examined as part of the Alpine National Park trial (see Section 6.5.2 of this report).

It appears that there are limited benefits in terms of animal control from unsupervised recreational hunting as currently conducted in Victoria. The Committee notes that this is not, in itself, a reason to stop this activity. Recreational hunting is a legal pursuit engaged in by thousands of Victorians. As noted in Section 1.4.4 of this report, the Committee does not intend to form a view on the legitimacy of hunting as a recreational pursuit.

Where recreational hunting is not achieving benefits in terms of animal control, though, the Committee considers that it should not be funded or subsidised as part of animal control programs.

8.10.1 Shooting as part of a broader program

The Committee heard from a number of submitters and witnesses that, although recreational hunting by itself is not sufficient to control invasive animals, it may be one part of a solution:

I think hunting is one tool in a suite of management options. I mean, hunting can create behaviour change in wildlife, so if the intent with wild goats or kangaroos, for example, or whatever it might be, is to get the numbers down to zero or close to zero, you would look at all the options and how shooting and hunting would contribute to that population objective. If it was wild goats in some hill country, for example, tracking and removal might be in the first instance to take out 80 per cent of the population or 70 per cent of the population before they get smart to it, and then you come in later and shooting might be the final solution, if that does not sound too much like a cliché. Alternatively the use of sound moderators and very targeted selective shooting might be the way to go ... the ability to get a population down to zero with the use of firearms — by definition, they are loud — is not particularly effective. But certainly in terms of controlling populations or very targeted solutions, it is definitely an effective management tool.⁹²³

Recreational hunting is not wildlife control and is not what we are doing in the park, but we have got to acknowledge that the Victorian recreational harvest is the longest running and most cost-neutral wildlife program in Australia. It has an economic effect and it must have an environmental effect. How we manage that is a challenge. To me, who else is going to going to take 60 000 deer out of the environment every year? I think it is not an either/or situation with recreational hunting, volunteers and professionals, poison, exclusion fencing and everything else. It is not an either/or; I think we can do it all concurrently. It comes back to that, 'What can we do now and what's stopping us from doing it now?'.⁹²⁴

It will be, if we succeed, a whole variety of mechanisms and tools all used concurrently at the same time that will affect any kind of real population control for any of the species. Does that include recreational hunting? Yes, quite likely. But, as we have said, will recreational hunting provide the solutions by itself? No, it will not, but nor will probably any other sole mechanism, even things that were incredibly successful in the past, like myxomatosis for rabbits, which now has minimal impact on the rabbit population.⁹²⁵

This was reflected in the evidence the Committee received about the successful goat eradication programs (see Section 8.3 of this chapter) and rabbit control at Werribee Park (see Sections 6.6.1 and 8.2). This was also suggested in relation to deer (see Section 8.9.2) and pigs (see Section 8.4).

The use of recreational hunting as part of a suite of measures is discussed further in Section 10.4.

⁹²³ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.9

⁹²⁴ Bob Gough, *Public Hearing*, 19 October 2016, p.4

⁹²⁵ Tom Crook, Programs Manager, East Gippsland Rainforest Conservation Management Network, *Public Hearing*, 6 October 2016, p.10

8.10.2 Co-ordinated or focussed recreational hunting

It is also important for recreational hunting to be focussed on particular areas at particular times for it to be effective as a means of animal control.

Focussing recreational hunting efforts enables them to be integrated with other control techniques (as discussed in Section 8.10.1). Co-ordinating shooting can be important to ensure that shooting takes place with the right intensity. Co-ordination can also be necessary if shooting is needed in areas of high visitation which must be closed to other users.

The joint submission from government bodies emphasised the importance of focussing recreational hunting efforts:

Accredited volunteer shooters can provide a positive contribution to biodiversity outcomes where this contribution is managed in a strategic, systematic way and is integrated with other management actions. Opportunistic or ad hoc ground shooting is generally not an effective means of invasive animal control.⁹²⁶

A similar point was made by the Invasive Species Council:

Recreational hunting is not an effective means of controlling invasive animals. However, the use of skilled volunteer shooters, recruited and inducted through community hunting organisations within a tightly monitored strategic pest management program under government management, can be one effective tool in an integrated pest control program.⁹²⁷

The interim evaluation of the trial of co-ordinated recreational hunting in New South Wales (see Section 6.7.1 of this report) found:

Increasingly, the Commission's findings for Gundabooka and the other trial areas show SPC [supplementary pest control, i.e. co-ordinated recreational hunting] as being effective only when a specific set of factors combine. Already, trial results reveal that SPC should be used in combination with the right tools and techniques and in the right sequence, timing and geographic locations, for the right species and coordinated across tenures.⁹²⁸

As noted in Section 6.9, co-ordinating recreational hunters also has costs for the government or land manager, such as planning and supervision. This may limit the capacity for co-ordinated recreational hunting to be used on a broader scale.⁹²⁹

If there are ways to reduce these costs, recreational hunting may be able to play a larger role in effective animal control.

⁹²⁶ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.ii

⁹²⁷ Invasive Species Council, *Submission 192*, p.2

⁹²⁸ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), p.9

⁹²⁹ Tim Hajenko, *Submission 95*, p.1

Some people saw passing responsibilities to the recreational hunting organisations as a means of reducing costs:

The cost of such a program is able to be further subsidised with the delegation of more responsibility to the ADA [Australian Deer Association], who would be tasked with running the program at an arm's length from Parks Victoria. This would free up more resources for the Parks Victoria organisation and allow them to monitor the ADA running of the program.⁹³⁰

Other options include volunteers undertaking planning or monitoring roles or supervising staff participating in shooting activities.⁹³¹

In New South Wales, over the first 18 months of the Supplementary Pest Control trial (see Section 6.7.1 of this report), the New South Wales National Parks and Wildlife Service was able to reduce average operational costs by almost 50 per cent and monitoring costs by approximately 75 per cent. This was partly achieved by reducing the amount of support staff.⁹³²

Some costs might also be recovered by charging recreational hunters for the opportunity to hunt at certain locations. The Australian Deer Association suggested that a ballot system with a fee for entry could be used at Wilsons Promontory to offset administration costs:

There are a number of sites towards the northern end of the park which would lend them well to balloted hunting – a highly controlled program and model used effectively on Blond Bay State Game Reserve and Boole Poole Peninsular for over 25 years. This would have multiple benefits: it would address any environmental concerns (particularly if hunters were required to take a female before taking a male animal), provide an adequate level of control (again as evidenced by the Blond Bay model) and provide an equality of opportunity for licensed hunters to participate. Such an approach would share the opportunity more equitably, ensure long term viability, and give an opportunity for cost recovery via utilising the ballot fee to cover administration, any scientific research costs and land manager oversight of the hunters and hunting area.⁹³³

A ballot with larger fees for international tourists to hunt in various parts of Victoria was also suggested by Mr Travis Onslow from Dingley Dell Safaris.⁹³⁴ A ballot system with fees is currently in place for hog deer hunting at Blond Bay and Snake Island in Victoria and has been used in other jurisdictions to offset costs.⁹³⁵

⁹³⁰ Sean Kilkenny, *Submission 36*, p.1

⁹³¹ New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), p.33

⁹³² New South Wales Natural Resources Commission, *Supplementary Pest Control Trial: Interim Evaluation* (2016), pp.31-2

⁹³³ Australian Deer Association, *Submission 168*, p.16

⁹³⁴ Dingley Dell Safaris, *Submission 216*, p.1

⁹³⁵ See, for example, Andrew Bengsen, *A Systematic Review of Ground-Based Shooting for Pest Animal Control*, prepared for Invasive Animals Cooperative Research Committee (2016), p.20

Another factor limiting the scale of co-ordinated hunting programs is the availability of recreational hunters at the times and places required. The Australian Deer Association highlighted some of these issues and suggested that this problem may also be reduced by a larger role for the organisation:

The vast majority of Victoria's 36,000 licensed deer hunters are excluded from participation in programs by virtue of availability to commit to rosters, etc. There are around 300 active participants in co-ordinated wildlife management programs organised through hunting organisations – less than 1% of the hunters in the State. Hunting organisations are best placed to manage efforts and broader hunter education programs, owing to the multi-faceted and trust-based relationship with members. Government support is critical to maintaining and expanding these efforts.⁹³⁶

FINDING 46: Recreational hunting has not had the capacity by itself to control invasive animals in Victoria. However, it has played a useful role when part of co-ordinated programs using a number of animal control methods and when focussed at particular places and times.

936 Australian Deer Association, *Submission 168*, pp.11-12

Part C

Improving invasive animal control in Victoria

9 Suggested changes to recreational hunting

9.1 Introduction

As discussed in Chapter 8 of this report, recreational hunting may be one component of a multi-method strategy to control invasive species in Victoria. However, to effectively contribute to invasive species control, recreational hunting must be focussed and targeted.

Throughout this inquiry, the Committee was told about various changes that could make recreational hunting more effective as a means of invasive animal control. In particular, focussing recreational hunters to smaller areas and shorter durations was often proposed as a way to improve the effectiveness of recreational hunting as animal control. Changes that enable hunters to kill more animals in shorter periods may facilitate such an approach.

The Committee also heard from hunters that advocated for the expansion of recreational hunting to allow them to pursue hunting as a legitimate recreational pastime.

This chapter examines the proposed changes to permissions, regulations and practices relating to recreational hunting as a means of reducing the impacts of invasive animals. These changes are intended to increase the size of the harvest, facilitate more effective hunting or make recreational hunting more effective as a method of invasive animal control. However, the Committee also heard a number of concerns about the potential risks of expanding recreational hunting or changing hunting regulations. Potential benefits to invasive animal control need to be carefully weighed up against these potential risks. Investment in recreational hunting for the control of invasive species must also be weighed up against the effectiveness and cost of other control methods.

9.2 Expanding hunting

A number of suggestions were made to the Committee which might increase the number of animals shot by recreational hunters. Section 9.2.1 examines opening more areas of public land to hunting and considers the possible safety and environmental consequences of this. Section 9.2.2 considers allowing hunters to shoot pest species in areas where game hunting is permitted, specifically in state game reserves. Section 9.2.3 looks at whether or not there would be benefits to classifying deer as a pest animal as opposed to a game species. Improvements to track access and the promotion of hunting tourism in Victoria are discussed in Sections 9.2.4 and 9.2.5 as methods of increasing the contribution of recreational hunters to invasive species control.

9.2.1 Expanding hunting to more areas

Currently in Victoria, shooting is permitted on approximately 50 per cent of Crown land.⁹³⁷ As outlined in Chapter 4, game hunting is allowed in state forests, forest parks, state game reserves (for some species) and on leased or licensed Crown land and private land, subject to permission. Hunting of pests is permitted in state forests, forest parks, sanctuaries and on leased or licensed Crown land and private land, subject to permission. Generally hunting of any kind is not permitted in national, state, coastal, wilderness or regional parks, as well as Melbourne water catchment areas, flora and fauna reserves, nature conservation reserves and alpine resorts. Overall, the Shooting Sports Council of Victoria has estimated that hunting is not permitted on approximately two-thirds of the sambar deer's habitat in Victoria.⁹³⁸

National and state parks comprise approximately 33 per cent of Victoria's public land and state forests make up approximately 34 per cent.⁹³⁹ National and state parks were identified throughout this inquiry as areas where invasive animals were causing issues.⁹⁴⁰ Mr Barry Howlett of the Australian Deer Association argued that '... deer are emerging as an invasive animal in areas where we [hunters] are excluded from recreational hunting. There is a correlation there.'⁹⁴¹ It was suggested that the 'lock it up and leave it mentality' provided invasive species with a safe breeding ground, which may have caused their overabundance on public land, as well as their spilling out to adjoining private property.⁹⁴²

Mr John Atkins, Chair of the Harrietville Community Forum, highlighted the abundance of deer in Harrietville and the destruction they are causing as a result of their township being surrounded by Crown land where hunting is not permitted:

Harrietville is a strip of private land approximately 8 kilometres long and at no point probably wider than 3 or 4 kilometres ... we are surrounded on the eastern side by national park and on all other sides by state forest. I could say we feel a bit like the proverbial wagon train surrounded by the Indians, but this time it is the deer ... We are saying deer are impacting significantly on our environment. Deer are common every night throughout the township zone and are literally destroying gardens.⁹⁴³

This section examines the current approach to hunting permissions and explores potential benefits and disadvantages of expanding recreational hunting into areas where it is currently not permitted.

⁹³⁷ Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.9

⁹³⁸ Shooting Sports Council of Victoria, *Submission 202*, p.6

⁹³⁹ Victorian Environmental Assessment Council, *Statewide Assessment of Public Land Fact Sheet* <veac.vic.gov.au/documents/VEAC-SAPL_Factsheet_masthead%20template%20FINAL.pdf>, viewed 16 January 2017

⁹⁴⁰ Name withheld, *Submission 30*, p.3; Deerstalkers Club, *Submission 63*, pp.1-2; John Dol, *Submission 93*, p.1; Ken Pearce, *Submission 110*, pp.2-3; Shooting Sports Council of Victoria, *Submission 202*, p.6

⁹⁴¹ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.5

⁹⁴² Name Withheld, *Submission 30*, p.2; Graham's Factree, *Submission 34*, p.3; Darryl Bastin, *Submission 40*, p.1; Nillumbik Shire Council, *Submission 196*, p.5

⁹⁴³ John Atkins, Chair, Harrietville Community Forum, *Public Hearing*, 19 October 2016, p.2

Potential benefits of opening more areas

Allowing recreational hunting on more public land may increase the hunting pressure on invasive animals. Mr Anthony Carroll, in his submission to the inquiry, argued that ‘There are far too many areas, both small and large, where they simply “hop the fence” and are mainly free from hunting pressure.’⁹⁴⁴ The limited ability to hunt on Crown land that adjoins private property is cited as a reason for the prevalence of invasive animals on private land.⁹⁴⁵ Permitting recreational hunting in more areas would reduce the number of ‘safe havens’ and breeding grounds available to invasive species.⁹⁴⁶

In its submission to the inquiry, the Sporting Shooters Association of Australia (Victoria) supported this view:

Licensed hunters should be given greater access to national parks, state parks and state forests to help control deer numbers. Generally, more Crown or public land should be open to recreational hunting because the habitat provided in these areas is the source of migration of animals onto private property and onto public roads.⁹⁴⁷

Opening more areas of public land to recreational hunting may also reduce the incidence of illegal hunting on private property due to greater access to hunting opportunities (see Section 4.7 of this report for a discussion of the incidence of illegal hunting in Victoria).

In addition, expanding recreational hunting to larger areas of public land may facilitate an increase in hunting tourism and may result in increased economic benefits to those areas (see Section 4.6.2 of this report for the economic impact of hunting in Victoria and Section 9.2.5 of this chapter for a discussion of hunting tourism).

Potential risks of opening more areas

The Committee received opposition to expanding hunting areas due to concerns around:

- safety (including illegal hunting and the well-being and comfort of other land users)
- potential community division
- environmental damage.⁹⁴⁸

See Section 6.8 of this report for the possible negative side effects of recreational hunting.

⁹⁴⁴ Anthony Carroll, *Submission 92*, p.2

⁹⁴⁵ Graham’s Factree, *Submission 34*, p.2; Robert Rosicka, *Submission 142*, p.1; Nillumbik Shire Council, *Submission 196*, pp.4-5

⁹⁴⁶ Graham’s Factree, *Submission 34*, p.3

⁹⁴⁷ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.11

⁹⁴⁸ Margaret Sietsma, *Submission 133*, p.1; Louise Crisp, *Submission 185*, p.2; Environment East Gippsland, *Submission 194*, pp.1-3; Euan Moore, *Submission 203*, p.5; Animals Australia, *Submission 213*, pp.6-7

Section 6.8.2 of this report examines the safety of recreational hunting and finds that hunting in Victoria has a relatively good safety record. However, changes may be required if hunting were permitted in more areas. Possible methods to improve the safety of hunting are considered below.

It was argued that having more areas open to recreational hunters would not necessarily improve the effectiveness of their contribution to invasive animal control.⁹⁴⁹ Recreational hunting is most effective in controlling invasive species in small, targeted areas. It is unknown whether allowing access to larger sections of public land would increase the number of recreational hunters or whether it would disperse the current hunting effort. Therefore, it is difficult to predict whether opening more public land to hunting would increase the number of invasive animals shot or whether the same number would be shot but over a larger area.

Historical use of land

The Victorian Environmental Assessment Council (VEAC)⁹⁵⁰ is responsible for making recommendations to government on the appropriate use of public land throughout Victoria. VEAC's predecessor bodies conducted 'Public Land Assessments' in the 1980s that resulted in a number of recommendations for how certain areas of land should be utilised. A report from 1983 recognised that the sambar deer population was highest in the west and south-west parts of the Alpine area and recommended hunting be permitted in a number of areas.⁹⁵¹ However, the Committee heard that the deer population has expanded considerably since the 1980s (for instance in the east of the Alpine National Park).⁹⁵² The *Greater Alpine National Parks Management Plan*, released in August 2016, acknowledged this population expansion and proposed changed hunting permissions in some areas of the east Alps of the Alpine National Park.⁹⁵³

What areas should be opened

As discussed above, VEAC is responsible for evaluating the appropriate use of public land in Victoria. Any changes to areas of land where recreational hunting is permitted would be examined by VEAC. Field & Game Australia advocated for a review of all public land to identify which areas invasive species are using as 'sanctuaries'.⁹⁵⁴ The Snake Island Cattlemens Association recommended that land managers undertake a risk assessment of each area of land that is being considered for recreational hunting, with a strong community consultation focus.⁹⁵⁵

⁹⁴⁹ Friends of the Gippsland Lakes Parks & Reserves, *Submission 166*, pp.1-2; Victorian National Parks Association, *Submission 191*, p.2; Euan Moore, *Submission 203*, p.5

⁹⁵⁰ The Land Conservation Council was established in 1971, with the Environment Conservation Council and the Victorian Environmental Assessment Council (VEAC) its successors.

⁹⁵¹ Land Conservation Council, *Alpine Area Special Investigation – Final Recommendations* (November 1983), p.101 and passim

⁹⁵² Doug Read, *Submission 32*, p.2; Ken Slee, *Submission 77*, p.2

⁹⁵³ Parks Victoria, *Greater Alpine National Parks Management Plan* (2016), p.122

⁹⁵⁴ Field & Game Australia, *Submission 207*, p.5

⁹⁵⁵ Paul Hamlett, Member, Snake Island Cattlemens Association, *Public Hearing*, 7 October 2016, p.11

A view frequently presented to the Committee was that the State should ‘open public land to recreational hunting where there is no good reason not to do so’.⁹⁵⁶ Mr Anthony Carroll suggested that hunting permissions on certain areas of land were determined seemingly arbitrarily: ‘You go up King River; the left side you cannot hunt, and the right side you can hunt. It is almost farcical that you cannot hunt on one side of the river.’⁹⁵⁷

Populous places and areas with a high density of people other than hunters are often cited as areas where hunting should not be permitted.⁹⁵⁸ For example, in his submission to this inquiry, Mr Tim Hajenko proposed all Crown land, including national parks, should be opened to recreational hunting, but acknowledged that certain, discrete areas may need to be excluded:

Where there are areas of sensitivity or high public use, small areas around the particular site should be restricted from general hunting access and a coordinated program implemented to prevent a safe haven for invasive animals from being established.⁹⁵⁹

Mr Barry Howlett of the Australian Deer Association agreed that recreational hunting should be allowed where there is ‘no practical or logical reason to exclude hunters’, but suggested high population areas should be excluded and may be better controlled by supervised hunting programs:

There are parks where there is, and I think the programs in the Dandenongs are a really good example of parks that you would probably never open to recreational hunting. It is just too high visitor, very urban, too tightly controlled, and programs are really appropriate there.⁹⁶⁰

The Grampians and Wilsons Promontory were also identified as areas with high visitation, where it was considered inadvisable to allow recreational hunting unless the parks are closed to other users.⁹⁶¹

Areas where hunting may negatively impact on other tourism business may also be inappropriate for recreational hunting. In speaking to the Committee, the Snake Island Cattlemens Association emphasised the importance of consultation in any decision to allow recreational hunting in new areas, both to understand local issues and to build community support.⁹⁶²

956 Anthony Carroll, *Submission 92*, p.2; Federation of Hunting Clubs, *Submission 97*, p.5; Name withheld, *Submission 119*, p.2; Australian Deer Association, *Submission 168*, p.3; Steve Garlick, *Submission 197*, p.3; Field & Game Australia, *Submission 207*, p.2

957 Anthony Carroll, *Public Hearing*, 19 October 2016, p.9

958 N. Cauchi, *Submission 143*, p.1

959 Tim Hajenko, *Submission 95*, p.2

960 Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.5

961 Catherine and Clive Carlyle, *Submission 167*, p.1; Federation of Hunting Clubs, *Submission 97*, p.3

962 Paul Hamlett, Member, Snake Island Cattlemens Association, *Public Hearing*, 7 October 2016, pp.8-9

Alpine sites, such as the Bogong High Plains, were identified as areas where hunting should be permitted as it would have minimal impact on other park users. A number of submissions received by the Committee specifically highlighted the Alpine and Snowy River National Parks as regions where invasive animal control would benefit from increased access by recreational hunters.⁹⁶³

The Government, in its *Sustainable Hunting Action Plan 2016-2020*, released in December 2016, listed an action proposing to:

Expand game hunting — by removing restrictions on hunting other deer species in areas reserved under the *National Parks Act 1975* where Sambar Deer hunting is already permitted and exploring options to expand hunting in Victoria in partnership with Traditional Owners, land managers and relevant stakeholders.⁹⁶⁴

The Committee received advice that opening areas of land that have a particular need for invasive animal control might be more effective than a broad opening of areas, as it focusses recreational hunting.⁹⁶⁵ This approach was part of Parks Victoria's supervised deer hunting trials (see Chapter 6 of this report).

The Committee notes that the current permissions for hunting on certain categories of land may be making the control of invasive animals more difficult. In some cases, it may also reflect historic rather than current distributions of animals. The Committee supports the Government's plan to examine options to expand hunting in Victoria, though it notes the importance of balancing hunting opportunities with the need to ensure safety and the amenity of Crown land for other users. The Committee also notes the need to ensure that opening additional land does not reduce the effectiveness of recreational hunting as an animal control method. These factors should be considered as part of any review of what areas should be opened for hunting.

FINDING 47: There are more areas in Victoria that would benefit from recreational hunting to control invasive animals. However, there is a lack of data about where hunting would be most beneficial. Comprehensive trials (such as the deer control trial in the Alpine National Park) have not been finalised but should provide more information in the future.

RECOMMENDATION 12: That the Victorian Environmental Assessment Council undertake a land use investigation to assess what areas of public land could be available for recreational hunting. This investigation should include risk assessments and community consultation.

⁹⁶³ Darryl Bastin, *Submission 40*, p.1; Trevor Dennis, *Submission 45*, p.4; Mountain Cattlemen's Association of Victoria, *Submission 87*, p.2; Tim Hajenko, *Submission 95*, p.2; Mark Chaplin, *Submission 104*, p.3; Ken Pearce, *Submission 110*, p.3; Name withheld, *Submission 148*, p.2

⁹⁶⁴ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.15

⁹⁶⁵ Environment East Gippsland, *Submission 194*, p.1

Regulating for a safer hunt

As discussed in Section 6.8.2 of this report, a number of witnesses and submitters expressed concerns about safety with respect to recreational hunting. Any expansion of hunting would need to take these into account.

The Committee notes that there was a divergence of opinion in relation to the occurrence of illegal hunting (see Section 4.7 of this report).

The Committee received evidence that, to guarantee public safety, land should be closed to other park users when hunting is permitted.⁹⁶⁶ This could be achieved by seasonal closures or closures of parks or areas of land over a short period of time. However, the Committee received a variety of suggestions for ways to improve safety which would facilitate the presence of hunters and other land users at the same time.

Increasing the resourcing of the Game Management Authority was recommended to the Committee to improve the oversight and management of recreational hunting.⁹⁶⁷ Game licencing was acknowledged as an important regulatory safeguard, as it provides a monitoring mechanism.⁹⁶⁸ However, the Committee heard from a number of witnesses that the Game Management Authority has limited capacity to patrol and enforce regulations (see Section 4.4 of this report). An increase in the number of authorised Game Officers may improve the regulatory presence in the field, which could further strengthen the licencing system.⁹⁶⁹ Effective co-ordination with police may also be necessary to permit adequate enforcement (see Section 4.4). This may be particularly important given the recent growth in the numbers of hunters in Victoria (see Section 4.5).

In its submission to this inquiry, Field & Game Australia outlined how safety in recreational hunting can be achieved:

Appropriate accreditation of hunters, combined with public awareness campaigns through signage and education, and other control measures such as timing hunting access to coincide with periods where other use of public land is reduced ...⁹⁷⁰

Improved signs on public land indicating hunting permissions would assist hunters and other land users to safely share the area.⁹⁷¹

⁹⁶⁶ Catherine and Clive Carlyle, *Submission 161*, p.2; Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.13

⁹⁶⁷ Australian Deer Association, *Submission 168*, p.4; Mark Chaplin, *Submission 104*, p.3

⁹⁶⁸ Alvar Dalton, *Submission 10*, p.1

⁹⁶⁹ Bob Gough, *Submission 67*, p.13

⁹⁷⁰ Field & Game Australia, *Submission 207*, p.8

⁹⁷¹ Trevor Dennis, *Submission 45*, p.4; Field & Game Australia, *Submission 207*, p.4

Mr Michael Watson, from Watson’s Mountain Country Trail Rides, discussed with the Committee the importance of communication in ensuring hunters and other land users can co-exist safely:

My concern is the increasing numbers [of invasive animals] and increasing number of hunters, which I acknowledge need to be there, but I would like to think there might be some possible management processes that might be introduced to enable both the hunting and the existing activity to take place in a safe manner. Such proposals might be perhaps hunters giving prior notice to the areas where they might be hunting so other activities that are existing at the time might be notified or vice versa so they know we are in the area.⁹⁷²

In its *Sustainable Hunting Action Plan 2016-2020*, the government highlighted the promotion of responsible hunting via a number of proposed actions, including better access to information for hunters and improved compliance and enforcement, including working with the Firearms Safety Foundation (Victoria) to facilitate firearm safety courses.⁹⁷³ The plan also highlighted the need for more education and training for new hunters.⁹⁷⁴

The Committee supports these proposed actions. The Committee believes educating the hunting and non-hunting community and continuing to promote responsible hunting are essential actions for a safe recreational hunting industry, regardless of whether or not hunting is expanded. The Committee notes that additional actions should be considered for the improvement of hunting safety and compliance, including improved signage and additional authorised Game Officers.

FINDING 48: Safety for public land users is the primary concern raised in the consideration of opening more areas of public land for recreational hunting.

FINDING 49: The game licencing system provides an important regulatory safeguard on game hunters. However, the Game Management Authority has limited capacity to provide in-field oversight.

RECOMMENDATION 13: That the Government provide the Game Management Authority with additional resources to manage an increase in recreational hunting, specifically additional authorised Game Officers to improve the in-field monitoring of hunters.

FINDING 50: Communication, education and training are all essential elements to a safe and effective recreational hunting industry.

RECOMMENDATION 14: That the Government develop mechanisms to improve information sharing and communication between hunters and other land users to facilitate safe co-existence on public land.

⁹⁷² Michael Watson, Watson’s Mountain Country Trail Rides, *Public Hearing*, 20 October 2016, p.3

⁹⁷³ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.13

⁹⁷⁴ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.13

9.2.2 Removal of restrictions on hunting pest species

Regulations permit the hunting of species declared as ‘pests’ (see Section 3.4.1 of this report for the definition of a ‘pest species’) at any time of the year in state forests, forest parks, on leased and licensed Crown land, on private land and in sanctuaries. Pest-hunting is not permitted (unless specifically authorised) in state game reserves, where game hunting is allowed or in areas of national parks where hunting certain deer species is permitted (see Chapter 4 of this report for hunting permissions).

Mr Jack Wegman, the Chief Executive Officer of the Sporting Shooters Association of Australia (Victoria), suggested that allowing pest hunting in certain areas where game hunting is permitted would further enable recreational hunters to assist with controlling pest species:

People are licensed. People have their permits. They are allowed one species, yet there are other opportunities and they are not allowed to. We cannot really make sense of that ... There are clearly problems with dogs, cats, foxes and all the rest of it, and to be allowed to go after one species and not others in the same place at the same time with the right certification and licences we are at a bit of a loss to explain. I am sure it has been a historical development, but it does not mean it should not be reviewed now. You would be well-advised that it should be reviewed.⁹⁷⁵

Mr David McNabb from Field & Game Australia highlighted that prohibiting hunters from shooting pest species in game reserves was counter-intuitive to the reason the reserves exist:

Pest animal hunting is currently not permitted in these state game reserves, which is to the detriment of the native species that these reserves are intended to provide precious breeding habitat and sanctuary for.⁹⁷⁶

The Committee received a number of submissions advocating for a change in the regulations to permit hunting of pest species in all areas where recreational hunting is allowed.⁹⁷⁷ However, the Committee notes that any changes to hunting permissions must give consideration to the potential negative side-effects of occasional shooting of certain species, as discussed in Section 6.8.4 of this report. For some species in particular (such as feral pigs – see Section 8.4), occasional shooting may disperse the animal and make other control methods less effective. In such cases, allowing hunters to shoot pests may be unhelpful if other control methods are in place or planned.

As noted in see Section 8.10.1 of this report, recreational hunting is unlikely to assist with controlling pest species by itself, but may be useful when combined with other techniques. The Committee therefore considers that removing regulatory impediments to taking advantage of recreational hunting may assist land managers.

⁹⁷⁵ Jack Wegman, Chief Executive Officer, Sporting Shooters Association of Australia (Victoria), *Public Hearing*, 5 September 2016, p.4

⁹⁷⁶ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.3

⁹⁷⁷ Gregory Morrissy, *Submission 114*, p.1; Name withheld, *Submission 119*, p.2; Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.11

The Government, in its *Sustainable Hunting Action Plan 2016-2020*, addressed the issue of hunting pests in state game reserves, and proposed the following action:

Expand pest hunting — by exploring further hunting opportunities by game licence holders at State Game Reserves, subject to appropriate pest control protocols.⁹⁷⁸

Furthermore, there is support for targeting all invasive animals during any park closures for Parks Victoria’s recreational hunting programs. Mr Peter Campbell from Bushwalking Victoria encouraged an opportunistic approach when arranging these programs and advocated for the inclusion of all invasive species during the hunt:

We support targeting all invasive animals during closures. We are not in favour of having a closure and just saying, ‘We’re going to shoot deer’. If there are foxes in there and there are rabbits in there, the opportunity should be taken to deal with as many as possible.⁹⁷⁹

The Committee is of the view that recreational hunting could be incorporated into the control strategies for some pest species. The Committee supports the Government’s proposed action to expand pest hunting in state game reserves where appropriate and believes consideration should also be given to extending this to other areas where game hunting is permitted.

FINDING 51: In some cases, current legislation prevents hunters shooting pest animals on certain categories of land, resulting in lost opportunities for game hunters to contribute to reducing the pest species population.

RECOMMENDATION 15: That the Government review its current pest management plans and explore legislative barriers that prevent shooting of pest species whose control might be assisted by recreational hunting.

9.2.3 Classification of deer

In Victoria, all deer are declared ‘wildlife’ for the purposes of the *Wildlife Act 1975*. ‘Wildlife’ are considered ‘protected’ and may not be destroyed without authorisation. However, the six most common and widespread species of deer are listed as game, meaning that they may be hunted in certain areas, as regulated by the *Wildlife (Game) Regulations 2012*.⁹⁸⁰ For most deer species in Victoria, hunting is permitted throughout the year and there are no bag limits (see Section 4.2.3 of this report). In addition, while wildlife are normally protected on private land, an exemption allows private landowners to shoot deer on their property.

⁹⁷⁸ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.15

⁹⁷⁹ Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.3

⁹⁸⁰ This is done via a Governor in Council Order, as per the *Wildlife Act 1975*. Six species of deer were classified as ‘game’ in the Victoria Government Gazette, No. 4, 26 January 1977, p.195.

There has been much debate over whether deer should continue to be classified as game or whether their classification should be changed to pest. A reclassification as a pest species would change the areas of land deer may be hunted, remove the requirement to possess a game licence to hunt them and would place a legal onus on landowners to take all reasonable steps to control deer on their land.

A view frequently presented to the Committee on this issue, as expressed by Mr Peter Campbell, President of Bushwalking Victoria, is ‘... they are a pest, so they should be classified as such.’⁹⁸¹ The Harrierville Community Forum’s submission argued that ‘deer are a pest animal if not by legal definition, then by their action and impact on the environment and community’.⁹⁸² Those that supported reclassifying deer as pests argued that a game classification sends a confusing message and does not reflect the potential risk or damage that they are causing.

Nillumbik Shire Council recommended all species of deer should be listed as established pests under the *Catchment and Land Protection Act 1994* to facilitate effective invasive animal control strategies.⁹⁸³ Conversely, Ms Nina Cullen from the Department of Environment, Land, Water and Planning argued that ‘not declaring something as a pest does not mean you cannot take control action.’⁹⁸⁴ For instance, the government, in its *Sustainable Hunting Action Plan 2016-2010*, committed to ‘Develop a deer management strategy’ that ‘sets a strategic plan to maintain sustainable hunting opportunities while reducing the impact of deer on biodiversity on all land tenures in the state.’⁹⁸⁵ The Committee also notes the various deer control programs discussed in Chapter 6 of this report.

A number of hunting organisations claimed that there is nothing to be gained from changing the status of deer from game to pest.⁹⁸⁶ In its submission to this inquiry, Firearm Owners United stated that ‘There is no proven benefit or empirical evidence that this reclassification will have a positive impact.’⁹⁸⁷ Furthermore, the Sporting Shooters Association of Australia (Victoria) was of the view that ‘Deer must remain a game species. It should not be assumed that the reclassification of deer to pest species would automatically reduce their numbers significantly.’⁹⁸⁸

981 Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.8

982 Harrierville Community Forum, *Submission 204*, p.1

983 Nillumbik Shire Council, *Submission 196*, p.7

984 Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.7

985 Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.17

986 See, for example: Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.11; Australian Deer Association, *Submission 168*, pp.4, 7-8; see also Game Management Authority, *Unprotection of Deer on Private Property FAQ* <www.gma.vic.gov.au/research/deer/deer-on-private-property/deer-faq>, viewed 20 December 2016

987 Firearm Owners United, *Submission 146*, p.2

988 Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.11

Currently, all deer species in Victoria, other than hog deer, are able to be hunted at any time throughout the year with no bag limit.⁹⁸⁹ Though ordinarily game species are protected on private land, an exemption has been in place since 2013 for all deer species except hog deer. The exemption allows the destruction of deer on private property where they are causing damage to landowner's property or injuring livestock.⁹⁹⁰ A reclassification to pest would not enable hunters or land managers to harvest higher deer numbers or enable them to harvest deer using any additional methods.⁹⁹¹ In fact, there would be a decrease in the areas where deer hunting is permitted, as pest species cannot be hunted in state game reserves.

Under the *Catchment and Land Protection Act 1994*, landowners have a legal duty to take all reasonable steps to prevent the spread of established pest animals on their land and to eradicate them as far as possible.⁹⁹² Therefore, classifying deer as pests would place a legal obligation on landowners to control them on their property.⁹⁹³ This may create a significant financial and time burden on landowners, particularly those experiencing high numbers of deer migrating onto their land from bordering public land. Mr Bob Gough, in his submission to this inquiry, outlined this requirement and the situation that has occurred in Queensland:

A detailed examination of the situation, including the various legislation, regulation and law reveals that removing Game Status for deer in Victoria will give no additional management benefit to land managers, and could have the unintended consequence of making individual landholders financially responsible for the removal of deer from their properties, as presently occurs with other pest species such as rabbits. Indeed, in Queensland, where deer are declared a pest, landholders are now required to have a management plan for deer on their properties. This is sound practice, but the requirement adds another layer of administration and scrutiny to landholders, and would be legally enforceable should the government of the day decide to take action.⁹⁹⁴

The Australian Deer Association also raised this issue, stating that 'Reclassification of deer as a "pest" species would create additional financial burdens on government and private land managers in terms of compliance for management of deer.'⁹⁹⁵ Mr Robert Rosicka supports a pest classification for deer, but recommended the legal obligation on landowners to control pest species should be examined:

Some farmers do all they can to control invasive pests, but quite often they work — I used to work on a farm — 12, 14, 16, 18 hours a day. I mean, where are they going to find the time? They cannot. Now if there is a requirement on them legally after

989 Except for the closed season in the Alpine National Park during the high visitor summer period.

990 *Wildlife Act 1975*, s.7A; Declaration of Certain Wildlife as Unprotected Wildlife on Private Property, Order in Council, 9 July 2013

991 Bob Gough, *Submission 67*, p.25

992 *Catchment and Land Protection Act 1994*, s.20(1)(f)

993 Bob Gough, *Submission 67*, p.25

994 Bob Gough, *Submission 67*, p.25

995 Australian Deer Association, *Submission 168*, p.2

that 16 or 18 hours work to then go and control pest animals, I mean it is not really realistic, is it? So there has to be some sort of regulation or some sort of dispensation there for them ...⁹⁹⁶

A pest classification may alter how people view the species and highlight them as a pest that requires managing. Conversely, a change in classification may also decrease hunters' motivation to target the species. This may lead to a reduction in the number of deer shot by recreational hunters. Mr David McNabb from Field & Game Australia explained:

So I think the status as a game species attributes a value. That value motivates the recreational user enormously, and it is a really difficult one to define ... My intuitive approach to it is that this is one of those things where you apply a value to something, you motivate people, you can then mobilise people to do things around the management of them, whether it is wetlands and ducks or whether it is deer and deer habitat, tree planting at Clydebank morass, whatever it might be.⁹⁹⁷

The Sporting Shooters Association of Australia (Victoria) highlighted a further consequence that may be observed, stating that 'If deer are declared a pest species and removed from the game list, the potential reduction in the annual economic contribution by hunters to the rural community is likely to be significant.'⁹⁹⁸ Firearm Owners United supported this argument in its submission:

The economic benefits of deer being maintained as a game species and advertised for international and domestic tourism, as done very successfully in New Zealand, far outweigh their classification as a pest species.⁹⁹⁹

Maintaining a game classification also ensures a game licence is required to hunt deer, which provides an additional layer of regulation on the hunter. This assists in identifying, regulating and upholding the accountability of deer hunters. If deer were classed as a pest and the requirement to obtain a game licence were removed, revenue from game licences would decline. Mr Barry Howlett from the Australian Deer Association summarised these arguments:

A shift to pest status would disenfranchise Victoria's hunting community and undermine the game licensing system and the successful Respect campaign that has been developed in partnership with government agencies, recreational hunting organisations and industry.¹⁰⁰⁰

In addition, a pest classification carries a number of legislative constraints. If deer were reclassified as a pest, legislative and regulatory changes would be required, specifically in relation to rules for hound hunting and spotlighting.

Deer are listed as a pest species across much of Australia, with the exclusion of Victoria, Tasmania and New South Wales (where its status is currently under review). A Draft Report of the New South Wales Natural Resources Commission

⁹⁹⁶ Robert Rosicka, *Public Hearing*, 20 October 2016, p.4

⁹⁹⁷ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.12

⁹⁹⁸ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.13

⁹⁹⁹ Firearm Owners United, *Submission 146*, p.2

¹⁰⁰⁰ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.3

released in March 2016 recommended that the status of all deer species be changed from game to pest and their management should be regulated by their *Biosecurity Act 2015*.¹⁰⁰¹ The primary reasons for this recommendation were to provide greater flexibility in the management of deer and ensure a mandatory control measure was implemented.¹⁰⁰²

Overall, the Committee finds that the classification of deer as game in Victoria does not restrict or limit deer management. Recreational hunters are afforded year-long hunting seasons and are not restricted by bag limits (except for hog deer). The private land exemption removes control barriers for landowners. The Committee notes the comments by Mr Simon Toop from the Game Management Authority and Mr Bob Gough that:

... there has been a lot of energy expended for a long period of time about whether deer should be declared game, pests or, have the same status as wildlife — what they should be. I think there has been a lot of energy and antagonism and arguing among the different sides about that. I would like to think that we need to shift the argument to how they are managed and focus on that rather than what they are called.¹⁰⁰³

... overabundant and invasive native and introduced species respond to management rather than name calling.¹⁰⁰⁴

The Committee agrees that deer management should focus on what methods will effectively reduce the deer population. Under the current regulations, the Committee does not believe a reclassification to pest would facilitate better management. However, it would remove the requirement to attain a game licence to hunt deer, which would be to the detriment of hunting regulation and oversight.

FINDING 52: The current game classification of deer, and the exemption that allows the destruction of deer on private land, does not restrict the ability of landowners and land managers from implementing deer management strategies.

9.2.4 Access to tracks

Improving access to more areas was also suggested as a way to improve the efficiency of recreational hunters in controlling invasive animals. The Committee heard evidence that isolation from access tracks and roads, track closures, insufficient tracks and poor maintenance of existing tracks are all barriers to

¹⁰⁰¹ NSW Government Natural Resources Commission, *Shared Problem, Shared Solutions Pest Animal Management Review, Draft Report* (2016), p.76

¹⁰⁰² NSW Government Natural Resources Commission, *Shared Problem, Shared Solutions Pest Animal Management Review, Draft Report* (2016), pp.74, 76

¹⁰⁰³ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.11

¹⁰⁰⁴ Bob Gough, *Submission 67*, p.24

the amount and success of recreational hunting that occurs.¹⁰⁰⁵ Studies in North America and New Zealand have found that ‘hunted populations are often lower in areas with high track density than in areas where tracks are sparse’.¹⁰⁰⁶

Mr Anthony Carroll explained that ‘If you have not got a track to get in, we are not going to go in there.’¹⁰⁰⁷ He highlighted the issue of track access in his submission:

At present there are far too many areas on Crown land that provide ‘safe havens’ where deer cannot be legally hunted or are not effectively accessible due to terrain or tracks closed or not maintained. Also, there are large areas that back onto farm land that are equally inaccessible. I do not advocate wholesale track access but more strategic tracks could be opened during the wet (main hunting) seasons and maintained. The effectiveness of control measures are greatly reduced when deer can simply move to a safe haven. There are far too many areas, both small and large, where they simply ‘hop the fence’ and are mainly free from hunting pressure. This needs to change.¹⁰⁰⁸

Mr Ken Slee raised seasonal road closures as a barrier to effective recreational hunting:

Seasonal road closures is one issue — for example, you cannot drive into the Wonnangatta station during the winter months; high rivers and gates stop that, and there are lots of examples of that around the area. The King Spur track, for example, down to Mayford and the head of the Dargo River, the gate does not officially open until 1 December, and by that stage the weather is hot. Deer hunting is not really a proposition by 1 December.¹⁰⁰⁹

Furthermore, track access influences the capacity for hunters to remove animal carcasses (see Section 6.8.4 of this report for the importance of this), as a large animal shot too far from an accessible track or road would be impossible to retrieve.¹⁰¹⁰ The Mountain Cattlemen’s Association of Victoria advocated for improved track access to aid the removal of these carcasses:

To assist the removal of a significant number of carcasses, closed seasonal tracks and some management only tracks would have to be opened to accredited hunters and key tracks gravelled and upgraded to avoid damage during the Winter. This would greatly assist the practical removal of some of the carcasses.¹⁰¹¹

Mr Ken Slee pointed to improved track access as a method to enhance the impact hunters have on invasive animal control, explaining that hunters will be less selective about what animals they shoot if they have greater opportunity to shoot more:

¹⁰⁰⁵ Dennis Keith, *Submission 11*, p.6; Alexandar Krstic, *Submission 24*, p.4; Anthony Carroll, *Submission 92*, p.2; Robert Strecker, *Submission 96*, p.1

¹⁰⁰⁶ Andrew J. Bengsen & Jessica Sparkes, ‘Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?’ *Mammal Review* 46 (2016), p.302; G. Nugent, ‘Successful Control of Fallow Deer by Recreational Hunters in the Blue Mountains, Otago’ *New Zealand Journal of Forestry Science* 18(3) (1988), p.250

¹⁰⁰⁷ Anthony Carroll, *Public Hearing*, 19 October 2016, p.6

¹⁰⁰⁸ Anthony Carroll, *Submission 92*, p.2

¹⁰⁰⁹ Ken Slee, *Public Hearing*, 6 October 2016, p.6

¹⁰¹⁰ Dennis Keith, *Submission 11*, p.6

¹⁰¹¹ Mountain Cattlemen’s Association of Victoria, *Submission 87*, p.3

So when people go into isolated areas, they tend to focus very much on a trophy stag and nothing else, because it is just impossible to carry out meat from that situation. I guess the solution to that issue is that the better the access to areas, the more people are likely to be non-selective in the way they hunt. That is a major issue. People, depending on what they are targeting, will go to areas where they can best target what they want.¹⁰¹²

One study noted that, for some hunters, the amount of leisure time they have is one of the key factors limiting how much hunting they do. Improving access to hunting areas will enable these hunters to spend less time travelling. This may be an important way to free up their time so they can spend more time hunting.¹⁰¹³

The Committee received evidence that some tracks on Crown land were not maintained to a usable standard and costly repairs were required to restore their functionality.¹⁰¹⁴ It was also noted that not all tracks are suitable for use at all times of the year. Mr Michael Watson of Watson's Mountain Country Trail Rides highlighted that users should take greater responsibility in ensuring tracks remain useable by exercising better judgment:

From our perspective, we are allowed in there all months of the year, but we take it upon ourselves to not travel in there when we think it is unsuitable, too wet. So I think that is just a bit of a respect and awareness issue, rather than putting more money into it. There are so many roads and tracks that need to be fixed up. Some of these more remote ones, realistically you just need to have the common sense to not go on them, but sometimes in the pursuit of their sport they overlook that. It comes back to sort of a lacking acknowledgement.¹⁰¹⁵

The Government, in its *Sustainable Hunting Action Plan 2016-2020*, included 'provide better hunting access' as one of its actions for improving hunting opportunities.¹⁰¹⁶ As with opening more land to recreational hunting in general (see Section 9.2.1 of this chapter), providing better access to more areas may be counter-productive if it spreads the existing hunters out and does not increase the size of the harvest. However, improving access to tracks and the usability of tracks may be useful tools to encourage more recreational hunters to focus on particular areas. This is discussed in Section 9.3.6 of this chapter.

FINDING 53: The current access to tracks on public land and their condition are limiting the number of invasive animals recreational hunters are able to cull and their ability to remove the carcasses.

¹⁰¹² Ken Slee, *Public Hearing*, 6 October 2016, p.6

¹⁰¹³ Graham Nugent & David Choquenot, 'Comparing Cost-Effectiveness of Commercial Harvesting, State-Funded Culling, and Recreational Deer Hunting in New Zealand' *Wildlife Society Bulletin* 32(2) (2004), pp.489, 491

¹⁰¹⁴ Robert Strecker, *Submission 96*, p.1

¹⁰¹⁵ Michael Watson, Watson's Mountain Country Trail Rides, *Public Hearing*, 20 October 2016, p.6

¹⁰¹⁶ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.15

9.2.5 Tourism

Encouraging hunting tourism is another method that could be utilised to increase the contribution of recreational hunters to invasive animal control. Increasing the number of hunters should increase the number of animals shot. If this effort is directed effectively, it may play a role in invasive animal control. The Committee also heard that hunting provides a ‘niche tourism opportunity’ that can offer Victoria economic benefits.¹⁰¹⁷

Hunting opportunities in Victoria are highly sought after by interstate hunters, with access to public land in Victoria being ‘held in high regard’.¹⁰¹⁸ The Committee received evidence that residents of other states around the country travel to Victoria to participate in recreational hunting opportunities.¹⁰¹⁹ Mr David McNabb from Field & Game Australia described the hunting opportunity in Australia as ‘unique’ and highlighted that his North American colleagues see Australia’s hunting opportunity as ‘absolutely enormous’.¹⁰²⁰ The Committee met with Mr Travis Onslow of Dingley Dell Safaris at his farm in Cloverlea, Gippsland (see Box 9.1 of this chapter). He identified that he had received substantial interest in Victoria’s hunting opportunities from the Asian market.¹⁰²¹

Mr Barry Howlett from the Australian Deer Association highlighted that Victoria has a unique hunting resource which is not being utilised to its full potential:

I think that research estimating the economic impact really shows that, and it is very under-tapped. If you look at hog deer, Victoria is the only place in the world where there is a viable huntable population of hog deer. There are international tourists coming onto probably two private properties that specialise in that at the moment. But if we could encourage landowners to see the value in conserving a bit of their agricultural enterprise for deer, there is serious money to be made. With sambar deer, again Victoria and New Zealand are the only two places in the world you can go and hunt sambar.¹⁰²²

The Committee received a number of submissions highlighting Victoria’s hunting tourism opportunity and supporting the promotion and expansion of the industry.¹⁰²³ One submission suggested that Victoria should embrace this resource and promote hunting like the government does in New Zealand:

Public land hunting provides an opportunity for specialised tourism activities and to provide additional income for Victoria. We should draw on the experiences of NZ [New Zealand], where the government has taken an active role in promoting and

¹⁰¹⁷ Sean Kilkenny, *Submission 36*, p.2; Darren Horkings, *Submission 54*, p.1; Ken Farmer, *Submission 76*, p.1; Victorian Deer Association, *Submission 84*, p.2; Federation of Hunting Clubs, *Submission 97*, p.5

¹⁰¹⁸ Federation of Hunting Clubs, *Submission 97*, p.5

¹⁰¹⁹ David Waldoock, *Submission 27*, p.1; Colin Curtis, *Submission 28*, p.1; Gerard Brereton, *Submission 117*, p.1

¹⁰²⁰ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.6

¹⁰²¹ Dingley Dell Safaris, *Site Visit*, 7 October 2016

¹⁰²² Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.9

¹⁰²³ Sean Kennedy, *Submission 19*, p.1; Darren Horkings, *Submission 54*, p.1; Ken Slee, *Submission 77*, p.2; Federation of Hunting Clubs, *Submission 97*, p.5; David Howell, *Submission 198*, p.5; Charlie Lovick, President, Mountain Cattlemen’s Association of Victoria, *Public Hearing*, 20 October 2016, p.8

fostering hunting opportunities. NZ is recognised worldwide as an international hunting destination and we have a fantastic opportunity to develop something similar in Victoria. There are very few places in the world where free range Sambar and Hog deer can be hunted and we have some of the best hunting available in the world, right here in Victoria. The government should adopt a strategy to develop this opportunity.¹⁰²⁴

Hunting guides or tours were proposed as tourism opportunities that could be further developed in Victoria to increase the economic benefit of hunting. Mr Greg Hyams from the Game Management Authority believed that ‘the potential for things like hunting-led tourism is significant.’¹⁰²⁵ Hunting guides could be useful in directing hunting efforts to where they are most needed.

Mr Simon Toop from the Game Management Authority suggested that guides may be an area where regulation may need to be developed:

There are a couple of other emerging areas, particularly in the guiding sphere. So people are, as you suggested, paying a guide to educate them, take them either to private land holdings or into those areas of public land that are open to hunting. So there is a guiding base that is starting to develop, and that is another thing that we have to look into: whether they are regulated, whether there is a code of practice, so voluntary versus a regulated approach to controlling behaviour.¹⁰²⁶

Mr Travis Onslow runs Dingley Dell Safaris in Cloverlea, which offers fully guided or semi-guided hunting experiences for recreational hunters (see Box 9.1 of this chapter). Mr Onslow suggested that international hunters could be included in the deer control trials through a ballot system. He outlined how this could be managed and the benefits this could have for Victoria’s tourism:

Once the international hunters have been drawn, make it mandatory that they use a Victorian registered safari outfitter to guide their hunt, as the same applies for Australians when we choose to hunt internationally. Most international hunters bring their families on these types of holidays, which would benefit tourism businesses and the Victorian economy.¹⁰²⁷

However, international visitors are required to apply for a temporary visitor firearm permit to use a firearm in Victoria and this attracts a 28-day minimum waiting period (see Section 4.3.3 of this report). Mr Onslow discussed with the Committee that this regulation has limited his international clientele as, on most occasions, visitors are unaware of this requirement prior to their arrival in Australia.

Mr Alex Green from the Mansfield Shire Council recognised the benefit that Mansfield Shire gains from recreational hunting and acknowledged that the initiation of hunting guides may provide an opportunity to expand the industry. However, he commented that they may not be as popular in Australia compared to overseas:

¹⁰²⁴ Name withheld, *Submission 119*, p.2

¹⁰²⁵ Greg Hyams, Chief Executive Officer, Game Management Authority, *Public Hearing*, 5 September 2016, p.9

¹⁰²⁶ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.9

¹⁰²⁷ Dingley Dell Safaris, *Submission 216*, p.1

I would say that is I think that opportunity further expands the opportunity for individuals in the community to set up businesses and further grow and develop the industry, and that is the way in which the industry can actually grow. How those opportunities are actually realised I am unsure. At the moment individuals have got the ability. In fact the culture in Australia is to perhaps not use guides — is my sense. That is across a whole range of things, whether it be bike riding or fishing or hunting or walking. If you compare that to the likes of North America or Europe, where the market is perhaps more developed, the use of those guides is accepted and the costs associated with that are more accepted, people are willing to do it. So how you get to that, I think, is a broader conversation for all of us to work out, but we as a council would absolutely encourage that because it grows the economy around those elements.¹⁰²⁸

The Committee received some opposition to the idea of recreational hunting being promoted as a tourism activity. Dr Nancy McMurray from Friends of the Gippsland Lakes Parks and Reserves argued that ‘financial gain and recreational pursuits are totally unacceptable reasons for keeping invasive animals in the landscape’.¹⁰²⁹ Given the damage to the environment and agriculture caused by invasive animals (see Sections 2.5 and 2.6 of this report), the Committee agrees that it would not be beneficial to preserve invasive animals solely to provide tourism or recreation opportunities. However, tourism may nonetheless be part of efforts to control invasive animals.

Mansfield and Alpine Shire Councils were wary about the promotion of recreational hunting within a tourism context, as it may be in direct contrast with the other tourism activities that are popular and promoted in their area.¹⁰³⁰ Representatives of Mansfield Shire Council told the Committee:

Care must be taken to ensure the development of this market, as allowed by regulation and policy, is not at the expense of the destination’s core and mainstream markets. We have this wide range of people visiting, and in some ways we are a microcosm of what we are seeing across Australia, where you start to see conflicting uses, whether it be with families wanting to go bike riding on the rail trail, motorbikes wanting to come and enjoy enduro motorbiking opportunities, and vehicles and car touring conflicting with cyclists. Increasingly across Australia as our population grows we are starting to see these conflicting uses, so we just want to acknowledge that it needs careful management if we see an increase in hunting. We believe that it is an opportunity, but we need to do so in a way that is consistent and ensures that we meet everyone’s needs.¹⁰³¹

It is challenging around promoting it, because the vast bulk of the tourism dollars that we have that support our economy come from tourism areas that would not necessarily resonate with branding, imagery or marketing messages around hunting, so we would be very cautious in that space.¹⁰³²

1028 Alex Green, Chief Executive Officer, Mansfield Shire Council, *Public Hearing*, 20 October 2016, p.4

1029 Nancy McMurray, Friends of the Gippsland Lakes Parks and Reserves, *Public Hearing*, 6 October 2016, p.5

1030 Steven Tucker, Project Officer, Alpine Shire Council, *Public Hearing*, 19 October 2016, p.3; Alex Green, Chief Executive Officer, and Judy Dixon, Acting Tourism and Economic Development Manager, Mansfield Shire Council, *Public Hearing*, 20 October 2016, pp.3, 6

1031 Alex Green, Chief Executive Officer, Mansfield Shire Council, *Public Hearing*, 20 October 2016, p.3

1032 Judy Dixon, Acting Tourism and Economic Development Manager, Mansfield Shire Council, *Public Hearing*, 20 October 2016, p.6

This concept was examined by The Australia Institute, in research on duck hunting in Victoria. The Institute found that the presence of hunters would deter 51 per cent of non-hunting tourists from an area.¹⁰³³

The Snake Island Cattlemens Association was also concerned that increased hunting could impact on Australia's reputation with international tourists:

Parks Victoria is recognized around the world as a leader in managing community assets and natural resources in way which balances environmental needs while maximizing public access to Australia's unique landscapes. This reputation is critically important to the global marketing of Australia, our national values and as a result will impact on our ability to successfully compete for the global tourism dollar.

The potential to irreversibly damage this reputation and as a consequence devalue the tourism opportunities is very real. Trophy hunting around the world is seen, at best as unnecessary and in countries where controls are inadequate can impact on the very survival of species.¹⁰³⁴

The Committee notes the following actions identified in the Government's *Sustainable Hunting Action Plan 2016-2020* in relation to growing hunting's benefits:

Monitor social and economic benefits — by conducting a study every five years to determine the contribution of hunting to the economy. This will inform investment decisions, and improve services and regulatory outcomes.

Promote regional hunting opportunities — through targeted communication with relevant regional agencies and organisations.¹⁰³⁵

The Committee believes that economic benefits may come from expanding hunting tourism. Actions to achieve this may include opening more areas for hunting, greater promotion of hunting opportunities and the development of hunting guides and tours. If directed effectively to areas where it can be most beneficial, an expansion of hunting tourism may also assist with invasive animal control. The potential for guides to direct hunters to target specific areas could increase the effectiveness of hunting tourism in species control. However, any increase in hunting tourism would need to be managed carefully to reduce negative impacts on other forms of tourism and to ensure that the benefits outweigh the costs.

FINDING 54: Victoria has significant hunting tourism potential due to its game and pest species population and its extensive areas of public land. Facilitating hunting tourism, specifically in a way that targets hunters to certain areas, may provide economic benefits to the state and contribute to invasive animal control.

¹⁰³³ Rod Campbell, Richard Denniss & David Baker (the Australia Institute), *Out for a Duck: An Analysis of the Economics of Duck Hunting in Victoria* (2012), p.6

¹⁰³⁴ Snake Island Cattlemens Association, *Submission 167*, p.3

¹⁰³⁵ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.14

BOX 9.1: Site visit – Dingley Dell Safaris

The Committee was invited to Dingley Dell Safaris, a family-operated business in Cloverlea, Gippsland. Run by experienced hunters, Dingley Dell provides guided deer hunting tours on private property and Crown land. The company also offers accommodation and can help with licencing, meat and taxidermy services.

The Committee heard that Dingley Dell Safaris attracts hunters and tourists from overseas and interstate. Mr Travis Onslow believed that there was significant potential for hunting tourism in Victoria to grow, particularly for international tourists. Among other things, he advocated for greater promotion of hunting opportunities in Victoria and for changes to firearm regulation to facilitate international visitors getting licences at short notice.

The Committee is grateful to Dingley Dell Safaris for assisting with this inquiry.



Deer on Dingley Dell's property

9.3 Barriers to successfully using hunting in invasive animal control

A number of barriers to recreational hunting were cited during this inquiry. The Committee was told by shooting organisations that recreational hunters' contribution was limited by the lack of access to some types of firearm and noise suppressors. It was also suggested that allowing spotlights and hound hunting in more situations would facilitate locating and killing larger numbers of invasive animals. In addition, the Committee heard that hunters were reluctant to shoot more animals than they could use.

While unsupervised recreational hunting alone will not be effective in controlling invasive animals, it could be used as part of a multi-method approach if harnessed in an appropriate and effective way. This section examines the current barriers to recreational hunting. This section also considers the possible risks of any changes to reduce these barriers.

9.3.1 Firearm restrictions

As outlined in Chapter 4 of this report, recreational hunters are able to obtain category A and B longarms only. Category C licences (which allow semi-automatic rifles and shotguns and pump-action shotguns) may be obtained for primary production, professional hunting and clay-target shooting.¹⁰³⁶ Applicants must provide a sufficient explanation as to why a required task within these activities cannot be undertaken using a lower category firearm or other means.¹⁰³⁷ Category D licences (which permit higher-capacity firearms of the same type allowed for category C licences) may be obtained by professional animal controllers who can prove they could not perform the specified hunt with a firearm from another category.¹⁰³⁸

In its submission to the Committee, Firearms Owners United explained how these firearm restrictions reduced the capacity of recreational hunters to undertake effective invasive animal control:

The current Victorian Firearms Act makes things incredibly difficult for hunters and firearm licence holders in order to carry out effective culling of invasive species and implement hunting methods. For instance, the current restrictions on semi-automatic centrefire rifles, which are freely available to firearm licence holders in New Zealand, reduce the effectiveness of hunters in their ability to cull large numbers of invasive species. This is also the same with the absurd state of affairs of pump action shotguns being in a higher category than pump action rifles ...¹⁰³⁹

¹⁰³⁶ *Firearms Act 1996*, ss.3, 11

¹⁰³⁷ *Firearms Act 1996*, s.11(1)(b)

¹⁰³⁸ *Firearms Act 1996*, ss.3, 12

¹⁰³⁹ Firearm Owners United, *Submission 146*, p.3

Category C and D licenced firearms can facilitate killing larger numbers of animals, as they can be fired quickly, ensuring animals do not have as much time to scatter and escape. In his submission to this inquiry, Mr Bob Smith explained how semi-automatic rifles make hunting more effective and humane:

... these types of firearms are necessary for humanely dispatching of invasive species that are often in packs or groups (pigs and dogs) and require multiple shots to deal with rapidly and humanely including follow up shots to ensure a quick minimal pain death.¹⁰⁴⁰

Mr Cameron Skedd from the Vertebrate Pest Managers Association discussed the effectiveness of category D firearms in controlling large numbers of animals in a short space of time:

Our members, with the category D firearms, have been able to control 20 or 30 sambar deer in about a minute flat as they are running across an open reserve or when they are turning up now on the water catchment lands ... They are physically able to control a larger number of animals within a much smaller time frame with just a one or two-man team.¹⁰⁴¹

As discussed in Section 6.3 of this report, access to these types of firearms is one factor that currently provides an advantage to using paid professional shooters rather than recreational hunters.

Primary producers are eligible to apply for a category C licence if they are substantially engaged in the business of primary production.¹⁰⁴² Firearms obtained under this licence must only be used:

- on the property and for the purpose stated in the licence application
- for pest control on other properties where primary production is carried out
- on Crown land where pest hunting is permitted.¹⁰⁴³

The Sporting Shooters Council of Victoria recommended that self-loading firearms should also be made available for qualified association members involved in pest control projects.¹⁰⁴⁴ Another suggestion to the Committee was the creation of a new category of firearm licence which permits higher-category firearms for the purposes of pest control, with licence holders required to kill a minimum quota of invasive animals each year.¹⁰⁴⁵

The Committee notes the discrepancy in the eligibility to access and use category C firearms for pest hunting on Crown land between primary producers and recreational hunters. However, the Committee notes that firearm regulation is a complex matter in which it is necessary to balance the benefits to firearm

¹⁰⁴⁰ Bob Smith, *Submission 21*, p.1

¹⁰⁴¹ Cameron Skedd, President, Vertebrate Pest Managers Association, *Public Hearing*, 5 September 2016, p.3

¹⁰⁴² As an owner, lessee or manager of land used for primary production or if employed on a full-time basis in such a business – *Firearms Act 1996*, s.11(2)(a)

¹⁰⁴³ *Firearms Act 1996*, Schedule 2, Item 2

¹⁰⁴⁴ Sporting Shooters Council of Victoria, *Submission 202*, p.10; see also Robert Rosicka, *Submission 142*, p.2

¹⁰⁴⁵ Bob Smith, *Submission 21*, p.1

owners with broader concerns about public safety. The Committee considers that any changes to firearm restrictions would require more consideration than has been possible in this inquiry.

FINDING 55: Using category C and D firearms can assist in achieving greater efficiency in controlling invasive animals. While professional pest controllers are eligible to apply for category C and D firearms and primary producers may apply for category C firearms for pest control, recreational hunters are not eligible to access these categories.

RECOMMENDATION 16: That the Victorian Government consult with Victoria Police in relation to recreational hunters having access to category C and D firearms to facilitate greater invasive animal and pest control.

9.3.2 Noise suppressors

A noise suppressor, also referred to as a sound moderator or silencer, is a device that is attached to the barrel of a firearm to reduce the noise the firearm makes when discharging. Noise suppressors reduce the sound associated with shooting a hunting rifle by between 14 and 28 decibels.¹⁰⁴⁶ Mr Bob Gough explained that noise suppressors reduce noise from around 140 decibels to 110 decibels, effectively removing the echoing ‘boom’ of the gunshot.¹⁰⁴⁷ Noise suppressors do not remove the noise entirely.¹⁰⁴⁸

The Committee heard that noise suppressors make hunting more effective in the following ways:

- noise reduction prevents target animals from locating the shooter and reduces their tendency to scatter, increasing the capacity for a hunter to cull larger numbers¹⁰⁴⁹
- reduction in the perceived recoil results in faster recovery for the shooter and more accurate shot placement¹⁰⁵⁰
- increased shot placement accuracy results in improved animal welfare and more humane culling due to faster kills and a reduction of stress to the animals.¹⁰⁵¹

¹⁰⁴⁶ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), p.38 (included in Alvar Dalton, *Submission 10*)

¹⁰⁴⁷ Bob Gough, *Submission 67*, p.16; see also Firearm Owners United, *Submission 146*, p.3

¹⁰⁴⁸ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), p.55 (included in Alvar Dalton, *Submission 10*); Australian Deer Association, *Submission 168*, p.12; Bob Gough, *Submission 67*, p.16; Field & Game Australia, *Submission 207*, p.9

¹⁰⁴⁹ Bob Gough, *Submission 67*, p.17; Australian Deer Association, *Submission 168*, p.12; Field & Game Australia, *Submission 207*, p.9; Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.43-4 (included in Alvar Dalton, *Submission 10*)

¹⁰⁵⁰ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.42-3 (included in Alvar Dalton, *Submission 10*); Australian Deer Association, *Submission 168*, p.12

¹⁰⁵¹ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.46-7 (included in Alvar Dalton, *Submission 10*); Australian Deer Association, *Submission 168*, p.12; Bob Gough, *Submission 67*, p.16

Noise suppressors are commonly used by professional hunters.¹⁰⁵² Mr Andrew Cox of the Invasive Species Council explained that ‘Deer get very gun-shy very quickly, so it is actually an advantage to use a silencer.’¹⁰⁵³

Firearm Owners United’s submission to this inquiry categorised repeated exposure to firearm noise as a serious public health and safety issue.¹⁰⁵⁴ The reduction in noise from using a noise suppressor is argued to benefit the shooter, other hunters, other land users in the surrounding area and animals through:

- reduction in stock and other wildlife disturbance¹⁰⁵⁵
- prevention of hearing loss and tinnitus for shooters¹⁰⁵⁶
- reduction in noise pollution¹⁰⁵⁷
- greater communication capacity of the shooter with other people in the vicinity.¹⁰⁵⁸

Noise suppressors are regulated by the *Firearms Act 1996*. In Victoria, noise suppressors cannot be possessed, carried or used without a permit granted by the Chief Commissioner of Victoria Police.¹⁰⁵⁹ Victoria Police, on its website, advises that only employers or employees in one of the following fields are eligible:

- government department
- licensed firearms dealer
- manufacturer of silencers
- professional hunter
- person who works as subcontractor for a professional hunting organisation
- professional vermin control business
- theatrical armourer
- veterinarian
- wildlife shelter
- zoological employer.¹⁰⁶⁰

¹⁰⁵² Bob Gough, *Submission 67*, p.17

¹⁰⁵³ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.10

¹⁰⁵⁴ Firearm Owners United, *Submission 146*, p.3

¹⁰⁵⁵ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.43-4 (included in Alvar Dalton, *Submission 10*); Australian Deer Association, *Submission 168*, p.12

¹⁰⁵⁶ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.35-40 (included in Alvar Dalton, *Submission 10*); Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.12

¹⁰⁵⁷ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.12; Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.44-5 (included in Alvar Dalton, *Submission 10*)

¹⁰⁵⁸ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), p.46 (included in Alvar Dalton, *Submission 10*)

¹⁰⁵⁹ *Firearms Act 1996*, s.57

¹⁰⁶⁰ Victoria Police, *Frequently Asked Questions* <www.police.vic.gov.au/content.asp?Document_ID=34446#silencer>, viewed 6 January 2017

Victoria Police advises that each application for a silencer permit is considered on its merits.¹⁰⁶¹ A person applying for a silencer must provide a genuine reason to obtain it and ‘noise by itself’ is generally not considered by the Police to be sufficient.¹⁰⁶²

Several submissions to the Committee advocated for allowing recreational hunters to use noise suppressors.¹⁰⁶³ Mr Barry Howlett of the Australian Deer Association argued that there was no ‘logical reason for excluding us [hunters] from having moderators.’¹⁰⁶⁴ During a site visit to the Ryders’ farm in Mount Beauty, Mr Harry Ryder advised the Committee that permitting licenced primary producers to apply for a permit for a noise suppressor would make an ‘immediate and tangible difference’ to the cull results of invasive species on their property.¹⁰⁶⁵

Mr Bob Gough argued that noise suppressors should be available to hunters participating in co-ordinated volunteer hunting programs for the following reasons:

... volunteer hunters [in these programs] have been proven to be persons of good character by the police records checks in the firearm licensing process, have undertaken additional education and skills programs, and are operating in a controlled and government supervised hunting situation where government employees and contractors would be permitted to use this equipment, the Author feels that the benefit in animal welfare and efficient culling outweighs the risk of criminal misuse.¹⁰⁶⁶

Mr Robert Rosicka concurred with this opinion and advocated for changes that would allow ‘experienced and rigorously trained volunteers’ to have access to noise suppressors.¹⁰⁶⁷

A number of submissions discussed the accessibility to noise suppressors in other jurisdictions compared to Australia.¹⁰⁶⁸ Noise suppressors are more readily available in New Zealand, the United Kingdom, and in 38 states in the United States of America.¹⁰⁶⁹ Their availability is more restricted in Canada, Hong Kong, and some European countries.¹⁰⁷⁰ Mr David McNabb of Field & Game Australia

¹⁰⁶¹ Victoria Police, *Frequently Asked Questions* <www.police.vic.gov.au/content.asp?Document_ID=34446#silencer>, viewed 6 January 2017

¹⁰⁶² Superintendent Paul Millett, Victoria Police, *Public Hearing*, 5 December 2016, p.5

¹⁰⁶³ Bob Gough, *Submission 67*, p.16; Firearm Owners United, *Submission 146*, p.3; Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.4; Australian Deer Association, *Submission 168*, p.4; Shooting Sports Council of Victoria, *Submission 202*, p.10; Field & Game Australia, *Submission 207*, p.9

¹⁰⁶⁴ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.9

¹⁰⁶⁵ Harry Ryder, *Site Visit*, 19 October 2016

¹⁰⁶⁶ Bob Gough, *Submission 67*, p.17; see also Shooting Sports Council of Victoria, *Submission 202*, p.10

¹⁰⁶⁷ Robert Rosicka, *Public Hearing*, 20 October 2016, p.2

¹⁰⁶⁸ Trevor Dean, *Submission 15*, p.2; Firearm Owners United, *Submission 146*, p.3; Field & Game Australia, *Submission 207*, p.9

¹⁰⁶⁹ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.15-21 (included in Alvar Dalton, *Submission 10*)

¹⁰⁷⁰ Martin MacCarthy, Martin O’Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.14-15; 20-1 (included in Alvar Dalton, *Submission 10*)

discussed the approach to noise suppressors in Australia in comparison to overseas jurisdictions, noting the benefits the technology brings to invasive animal control:

... the current restrictions on the use of sound moderators ... These appear to be dealt with here in Australia by a perception, whereas in New Zealand they are readily available for use, and in the UK it is considered the norm. You have the opportunity to continue with the harvest of deer in the UK, for example, with the use of sound moderators in highly populated and high-density areas and you get the same outcomes. It enables the ability to control deer and other pest animals — foxes and the like — as well.¹⁰⁷¹

The main arguments raised against reducing the restrictions on noise suppressors are safety concerns for other land users and the risk that noise suppressors may be used in criminal activity if they were more readily available.¹⁰⁷² Noise suppressors reduce sound and disguise the direction of the shots fired, which may make it difficult for other land users to identify the location and direction of hunters.¹⁰⁷³ This difficulty in locating a shooter is also an important factor in relation to noise suppressors used in criminal activity.¹⁰⁷⁴ This concern was outlined by Assistant Commissioner Nugent when questioned about how common incidents involving suppressors in crime are:

Obviously it is a real concern if we have suppressors in the hands of criminals, and from a CT [counter terrorism] perspective it is a real challenge. There was an incident in recent times overseas where an active shooter had a suppressor. It was really challenging for responding police to not know where the shots were coming from, and it resulted in a number of police being killed. Separating the hunting from operational, organised crime and the CT area is a real concern for us in VicPol.¹⁰⁷⁵

In correspondence with the Committee, Ms Eileen Armato, Director, Public Support Services Department at Victoria Police, explained further:

Firearms ownership and the corresponding regulation are prefaced on community safety first and foremost. Victoria Police therefore assess all requests for a suppresser on a case by case basis. There is concern that allowing the use of suppressors in circumstances such as '*recreational hunting*' there will be an increase in their circulation and availability within the community. As these items are not registerable and therefore difficult to monitor this would make suppressors more accessible to the criminal element and be difficult for Victoria Police to ensure compliance. There is also potential risk to other shooters and persons within the area of the shooting activity when a suppressor is being utilised therefore impacting community safety

¹⁰⁷¹ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.5

¹⁰⁷² Lawyers for Animals, *Submission 208*, p.6; Martin MacCarthy, Martin O'Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), pp.53-7 (included in Alvar Dalton, *Submission 10*)

¹⁰⁷³ Lawyers for Animals, *Submission 208*, p.6

¹⁰⁷⁴ Martin MacCarthy, Martin O'Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), p.54-5 (included in Alvar Dalton, *Submission 10*)

¹⁰⁷⁵ Assistant Commissioner Rick Nugent, Licensing and Regulation Division, Victoria Police, *Public Hearing*, 5 December 2016, p.7

... allowing access to suppressors in the wider community increases the likelihood of theft and potential accessibility by organised crime groups or people who attempt to circumvent regulatory regime.¹⁰⁷⁶

On the other hand, it has also been argued that the addition of a noise suppressor onto a firearm will increase the length of the firearm making it more difficult to conceal.¹⁰⁷⁷ A longer firearm is more difficult to swing in dangerous proximity to others and requires greater care by the user.¹⁰⁷⁸

The Committee notes that noise suppressors offer a number of health benefits for the shooter and may improve the success of the hunting effort. As with access to firearms (see Section 9.3.1 of this chapter), the availability of noise suppressors is a complex issue which involves considerations beyond the scope of this inquiry. The Committee is of the view that Victoria Police should continue to determine the criteria required to obtain a noise suppressor and evaluate applications. However, the Committee believes consideration should be given to the eligibility of private landowners that are experiencing invasive animal problems and recreational hunters involved in co-ordinated control programs to obtain noise suppressors.

FINDING 56: The use of noise suppressors allows for an increase in shooting efficiency due to reduced recoil, more accurate shot placement and a reduction in animal disturbance. These factors increase the number of animals a shooter is able to cull in a shorter space of time. Noise suppressors reduce noise pollution, prevent hearing loss and increase hunters' capacity to communicate with others in the area.

RECOMMENDATION 17: That Victoria Police consider including recreational hunters participating in co-ordinated invasive animal control programs within the categories of people eligible to obtain noise suppressors.

9.3.3 Spotlighting

The hunting method of stalking involves hunters pursuing an animal on foot. According to the Vertebrate Pest Managers Association Australia's submission to this inquiry, 'stalking' is 'the least effective [hunting] method'.¹⁰⁷⁹ Spotlighting, which involves using a spotlight to locate animals, is an alternative method of hunting which is considered more effective for some species. A 'spotlight' includes any source of artificial light, infrared device, night-vision or thermo-imaging device.¹⁰⁸⁰ The use of spotlight technology allows hunters to better locate and track invasive species, therefore increasing their effectiveness in shooting larger numbers.

¹⁰⁷⁶ Eileen Armato, Director, Public Support Services Department, Victoria Police, correspondence received 6 April 2017

¹⁰⁷⁷ Bob Gough, *Submission 67*, p.16; Martin MacCarthy, Martin O'Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), p.46 (included in Alvar Dalton, *Submission 10*)

¹⁰⁷⁸ Martin MacCarthy, Martin O'Neil & Helen Cripps, *An Investigation into the Use of Sound Moderators on Firearms for Game and Feral Management in New South Wales* (2011), p.46 (included in Alvar Dalton, *Submission 10*)

¹⁰⁷⁹ Vertebrate Pest Managers Association Australia, *Submission 169*, p.3

¹⁰⁸⁰ Wildlife (Game) Regulations 2012, Regulation 5

Traditionally, white lights have been most commonly used in hunting. However, that technology is rapidly being superseded by advances in thermal imaging and infrared night-vision equipment.¹⁰⁸¹ Mr Bob Gough highlighted the benefits of using thermal devices over white-light technology with a description of the different methods used by Parks Victoria in their deer management programs:

PV [Parks Victoria] has procured hand held thermal imaging devices for use in management programs. This equipment has significantly improved engagement opportunities. For example, using white light a spotlighting team saw and shot four sambar in one night, and were unable to locate two of the shot sambar, even with a scenting dog. In comparison, a spotlighting team travelling the same route in similar conditions but using a handheld thermal device and thermal rifle scope saw 17 sambar at ranges out to 600 metres and killed four (animals sighted by thermal imagery are often obscured by vegetation, preventing a safe shot. This was a significant factor in the low kill to sighting rate, and this technology is now being used in the more open areas of the treatment zone to excellent effect). Once killed, all four animals were located quickly by their heat signature using the thermal camera.¹⁰⁸²

This indicates that thermal devices may facilitate more effective hunting, particularly when used in appropriate locations, by allowing easier identification of target animals. The results of Parks Victoria's Wilson's Promontory Hog Deer Trial indicated that night hunting with spotlights was the most productive hunting method.¹⁰⁸³ Mr Gough agreed that the use of infrared and thermal image devices and rifle-mounted spotlights in volunteer control programs had increased the effectiveness of hunters and had resulted in a higher cull rate.¹⁰⁸⁴

In Victoria, spotlights are generally not permitted in game hunting on public land (see Section 4.2.4 of this report for exemptions to this). The Game Management Authority highlights that using spotlight technology for hunting deer on public land is dangerous and unethical.¹⁰⁸⁵ Hunting game at night (between half an hour after sunset to half an hour before sunrise) is not permitted on public land.¹⁰⁸⁶ Being in possession of a spotlight and a firearm on public land at night in 'recognised deer habitat'¹⁰⁸⁷ is not permitted,¹⁰⁸⁸ making it impossible to utilise spotlight technology for hunting pest species in these areas.

Private landowners are permitted to spotlight for pest animals and species declared unprotected (for instance, deer), both on their property and within 250 metres of their boundary onto Crown land.¹⁰⁸⁹

¹⁰⁸¹ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.7

¹⁰⁸² Bob Gough, *Submission 67*, p.16

¹⁰⁸³ Game Management Authority, *Wilson's Promontory National Park Hog Deer Control Program* (2015), p.6

¹⁰⁸⁴ Bob Gough, *Submission 67*, p.15

¹⁰⁸⁵ Game Management Authority, *Possession and Use of Spotlights in Recognised Deer Habitat* (2014), p.1

¹⁰⁸⁶ Wildlife (Game) Regulations 2012, Regulation 47

¹⁰⁸⁷ 'Recognised deer habitat' is defined as all Crown land in specified municipal districts.

¹⁰⁸⁸ Wildlife (Game) Regulations 2012, Regulation 36

¹⁰⁸⁹ Wildlife (Game) Regulations 2012, Regulation 36(4)

In his submission to this inquiry, Mr David Howell argued that hunters should be allowed to spotlight for deer and pests in areas where hunting is permitted.¹⁰⁹⁰ He argued that the use of spotlights and nocturnal hunting would greatly increase the reduction of invasive animals by recreational hunters.¹⁰⁹¹

Safety concerns for other Crown land users, such as hikers and those camping, were raised in opposition to night hunting and allowing the use of spotlight technology.¹⁰⁹² Private landowners may also experience greater disruption as a result of nocturnal hunting, due to noise and high powered lights near their property.¹⁰⁹³

The Committee notes the effectiveness of spotlighting as a hunting method and acknowledges that the use of spotlights could assist in increasing the contribution of recreational hunting to invasive species control. However, the Committee notes that any changes to spotlight permissions should consider risk mitigation factors to ensure public safety and comfort. The Committee considers that spotlighting should be one of a suite of incentives to encourage recreational hunting in areas where it can have the greatest impact on invasive animal numbers (see Section 9.3.6 of this chapter).

FINDING 57: Spotlighting is a more effective hunting method than stalking. The use of spotlights in co-ordinated deer control trials has proven to increase the cull rate.

9.3.4 Hound hunting

Hound hunting involves scent-trailing hounds following the scent of an animal and alerting the hunter to its location. While ‘stalking’ is considered the least effective hunting method (see Section 9.3.3 of this chapter), hunting with hounds is often considered the most effective method for deer hunting.¹⁰⁹⁴ Mr Greg Hyams of the Game Management Authority stated that hound hunting is ‘a very effective way of hunting deer and taking large numbers within a very short space of time, and much more than an individual stalking through the bush can.’¹⁰⁹⁵

Submitters and witnesses to this inquiry advocated for greater use of hound hunting in Victoria, which is currently restricted to hunting sambar deer in areas specified in regulations between 1 April and 30 November each year.¹⁰⁹⁶ The benefits of using hound hunting include:

¹⁰⁹⁰ David Howell, *Submission 198*, p.3

¹⁰⁹¹ David Howell, *Submission 198*, p.4

¹⁰⁹² Lawyers for Animals, *Submission 208*, p.6

¹⁰⁹³ Name withheld, *Submission 30*, p.1

¹⁰⁹⁴ Jurgen Hemmerling, *Submission 4*, p.1; Alexandar Krstic, *Submission 24*, p.1; Victorian Hound Hunters, *Submission 81*, p.2; Tim Hajenko, *Submission 95*, p.2; Luke De Boer, *Submission 128*, p.1; Pro Cull Animal Services, *Submission 215*, p.1; Graham Stoney, Executive Officer, Mountain Cattlemen’s Association of Victoria, *Public Hearing*, 20 October 2016, p.4; see also Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.5

¹⁰⁹⁵ Greg Hyams, Chief Executive Officer, Game Management Authority, *Public Hearing*, 5 September 2016, p.5

¹⁰⁹⁶ Wildlife (Game) Regulations 2012, Regulation 72, Schedules 2, 3, 10

- larger animal numbers are able to be culled¹⁰⁹⁷
- hunters are less selective in which animals are targeted, resulting in larger numbers of females culled (see Section 6.8.3 of this report on this issue)¹⁰⁹⁸
- more remote areas and locations with dense bushland can be targeted, as hounds can flush animals out of these difficult-to-access places.¹⁰⁹⁹

To ensure hound hunting occurs in a safe and humane manner, regulations are in place that restrict where and when hound hunting occurs, the number of hunters and hounds allowed in one place and the breeds permitted (see Section 4.2.4 of this report). To participate in hound hunting, a hunter must pass the hound-hunting test (see Section 4.3.2). All dogs used in hound hunting must be registered with the Game Management Authority.¹¹⁰⁰ Mr Simon Toop from the Game Management Authority expressed to the Committee that the current regulations were sufficient, but that it was difficult to enforce compliance in hound hunting.¹¹⁰¹

Bushwalking Victoria opposed hunting with dogs in protected areas under any circumstances.¹¹⁰² Concerns relating to the use of hound hunting included:

- dogs being left behind in the bush and becoming wild¹¹⁰³
- dogs entering private property and disrupting stock¹¹⁰⁴
- hounds being disruptive and confrontational for other land users due to the noise of dogs barking and fear about unrestrained hounds running through the bush¹¹⁰⁵
- it potentially being inhumane and cruel, in that it can cause a large amount of stress for the target animal and hounds have been accidentally shot or injured.¹¹⁰⁶

Changes in regulations and advancements in technology have aimed to improve the safety, efficiency and effectiveness of hound hunting. Breed regulations and standards were introduced to ensure only dogs of a particular speed and stature were used in hound hunting.¹¹⁰⁷ The breeds of dogs used in hound hunting

¹⁰⁹⁷ Alexandar Krstic, *Submission 24*, p.1; Name withheld, *Submission 30*, p.2; Luke De Boer, *Public Hearing*, 7 October 2016, p.3

¹⁰⁹⁸ Alexandar Krstic, *Submission 24*, p.1; Luke De Boer, *Public Hearing*, 7 October 2016, p.3; Charlie Lovick, President, Mountain Cattlemen's Association of Victoria, *Public Hearing*, 20 October 2016, p.8

¹⁰⁹⁹ Name withheld, *Submission 148*, p.4; Luke De Boer, *Public Hearing*, 7 October 2016, p.4

¹¹⁰⁰ Wildlife (Game) Regulations 2012, Regulation 23

¹¹⁰¹ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.5. Animals Australia (*Submission 213*, p.7) contends that hunting dogs regularly attack wild pigs when being used to hunt them, even though this is not permitted.

¹¹⁰² Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.3

¹¹⁰³ Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.7

¹¹⁰⁴ Stuart Stagg, *Submission 186*, p.2

¹¹⁰⁵ Greg Hyams, Chief Executive Officer, Game Management Authority, *Public Hearing*, 5 September 2016, p.5; Charles Ablitt, Vice-President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.7

¹¹⁰⁶ Kerrie Allen, *Submission 190*, p.4; Animals Australia, *Submission 213*, p.7

¹¹⁰⁷ Game Management Authority, *Hunting Sambar Deer with Hounds in Victoria* <www.gma.vic.gov.au/hunting/deer/hunting-methods/hunting-with-dogs/hunting-sambar-deer-with-hounds-in-victoria>, viewed 11 January 2017

are required to instinctively hunt, be obedient, obey commands and ignore distractions.¹¹⁰⁸ All hounds must not show aggression and must not hold, drag, bite or attack any animal, including the target animal.¹¹⁰⁹

Technology advancements (for instance, the use of GPS trackers on dogs) have improved the ability of hunters to track and manage the areas hounds enter and have reduced the likelihood that dogs will be lost or left behind in the bush.¹¹¹⁰ Mr Luke De Boer explained:

In utilising GPS tracking systems, it is very rare that you will have a dog that is lost overnight. Whereas previously when I first started hunting you did not have tracking systems. You relied on basically an educated guess where your lost hound was, and then basically someone would be seconded to be waiting for the next day or so. You would be basically tracking roads, looking for dog tracks, trying to find your dog.

Now with the GPS tracking systems, at an end of a hunt if you have lost dogs, you just go to a high point and get on your tracker, and I have picked up dog signals within 10 kilometres away. It will give you a GPS-marked spot on an actual topographic map where it is. You can make the decision at that time: 'Have I got time to walk in and collect that dog before it is dark?'; or you can go in there in the morning and pick them up. On average, this year, for example, I think we have had one dog left that we had to pick up in the morning, and we knew exactly where it was at all times.¹¹¹¹

Hounds are valuable to their owners. Therefore hunters are motivated to ensure their safety and retrieval following a hunt.¹¹¹² The use of UHF radios has also improved the communication capacity of hunters, which has increased the safety to hounds and other land users.¹¹¹³

The Committee received evidence that hounds do still sometimes get lost in the bush.¹¹¹⁴ However, the Committee was also informed that stray hunting dogs were unlikely to become wild dogs in areas with established wild dog populations, as the established dogs would not tolerate a stray dog in their territory.¹¹¹⁵ The Committee received a number of recommendations for the expansion of hound hunting to improve the effectiveness of invasive animal control.¹¹¹⁶ It was suggested that an increase in hound hunting could be effectively achieved via the implementation of a ballot or booking system, whereby sections of the bush would be allocated to different hound hunting crews.¹¹¹⁷ This would negate the congestion of hounds and hunters in one area and enhance safety. It would also assist in focussing hunting efforts into certain areas of land which would improve

¹¹⁰⁸ Game Management Authority, *Victorian Hunting Guide* (2016), p.27

¹¹⁰⁹ Game Management Authority, *Victorian Hunting Guide* (2016), p.48

¹¹¹⁰ Luke De Boer, *Public Hearing*, 7 October 2016, p.4; Greg Hyams, Chief Executive Officer, Game Management Authority, *Public Hearing*, 5 September 2016, p.5; Alexander Krstic, *Submission 24*, p.2; Luke De Boer, *Submission 128*, p.1

¹¹¹¹ Luke De Boer, *Public Hearing*, 7 October 2016, pp.3-4

¹¹¹² Victorian Hound Hunters, *Submission 81*, p.2

¹¹¹³ Russell Sharman, *Public Hearing*, 7 October 2016, p.6; Name withheld, *Submission 30*, p.2

¹¹¹⁴ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.10

¹¹¹⁵ Dennis Keith, *Submission 11*, Attachment 1, p.4

¹¹¹⁶ Darryl Bastin, *Submission 40*, p.1; Victorian Hound Hunters, *Submission 81*, p.2; Tim Hajenko, *Submission 95*, p.2; Robert Strecker, *Submission 96*, p.1

¹¹¹⁷ Robert Strecker, *Submission 96*, p.1; Luke De Boer, *Public Hearing*, 7 October 2016, pp.9-10

hound hunting's usefulness as a means of invasive animal control.¹¹¹⁸ This system would allow hound hunting to be kept away from private property, which would reduce the likelihood that dogs would chase deer onto private land or enter private property themselves.¹¹¹⁹

The Committee acknowledges the effectiveness of hound hunting in invasive animal control and believes the use of hound hunting by recreational hunters could be expanded. The Committee notes the concept of creating a 'congestive style of hound hunting' suggested by Mr Luke De Boer which involves allocating blocks of public land to hound hunters.¹¹²⁰ The Committee believes this approach could effectively focus hunting efforts to areas where it would be most beneficial. The Committee also notes that technology advancements in recent years have produced improvements in the safety of hound hunting and this technology should be mandatory.

The Committee notes the use of hound hunting is currently being trialled in the Alpine National Park deer control trial (see Section 6.5.2 of this report) and considers the results from this trial should be used to inform future policy in this area. Hound hunting is a highly effective method of hunting and could be used to effectively focus recreational hunting efforts to target areas.

FINDING 58: Advancements in technology have improved the management and safety of hound hunting. In particular, technology such as GPS collars can reduce the likelihood of hunting dogs becoming lost in the bush.

RECOMMENDATION 18: That the Government promote the use of GPS collars by recreational hunters when hound hunting.

9.3.5 Use of the animal

Currently in Victoria, meat obtained through recreational hunting may be kept for personal use only. Mr Barry Howlett from the Australian Deer Association explained how this restriction reduces the effectiveness of recreational hunting in invasive animal control:

There are a number of regulatory constraints limiting the ability to sustainably use the carcasses of deer and other wildlife killed during control programs. Some of these programs are involved in numbers, as you might have heard, of up to 30 a year on private property. It is too much for a single hunter to just take home and process in their shed. The inability of hunters and land managers to have carcasses processed on commercial meat handling premises, either for human or animal consumption, can result in an unwillingness of volunteer hunters to be involved in 'shoot to waste' operations, as it is often repugnant to their personal values and ethics.¹¹²¹

¹¹¹⁸ Luke De Boer and Russell Sharman, *Public Hearing*, 7 October 2016, p.10

¹¹¹⁹ Note the concerns of Stuart Stagg, *Submission 186*, p.2

¹¹²⁰ Luke De Boer, *Public Hearing*, 7 October 2016, p.4

¹¹²¹ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.4

Similar concerns about not wasting meat also limit the number of deer shot through unsupervised recreational hunting (see Section 6.8.3 of this report). Nillumbik Shire Council also reported to the Committee that ‘The community is less likely to support an invasive species culling program if the target animals are left as wastage’.¹¹²² Wastage stemmed from two obstructions.

Firstly, hunters may limit their harvest due to a lack of facilities and assistance in butchering and preparing the carcasses. Mr Ken Slee highlighted this issue in his evidence to the Committee:

A lot of what is shot and dragged out of the bush is wasted, because there are not the facilities there to make the best use of the venison once it is brought out of the bush. That is something that I would like to see changed.¹¹²³

Secondly, the requirement that meat only be used for personal consumption limits hunters from removing high numbers of animals from the bush, as they do not have the capacity to utilise the meat. Mr Bob Gough highlighted how this restriction impacts recreational hunters:

The challenge we have now is on the private land, in all honesty, where we would go out and shoot 7 or 10 sambar in a night. It sickens you to waste the meat, but it is what you have got to do — we have only got so much freezer space, so we take what we can.¹¹²⁴

These issues and possible changes that could improve these are discussed in this section.

The government, in its *Sustainable Hunting Action Plan 2016-2020*, listed an action proposing to ‘Facilitate game meat processing — by investigating and reducing barriers to the processing of wild harvested game meat to allow optimal use of game harvest’.¹¹²⁵ The Committee notes that it is unclear whether this involves processing game meat for personal or commercial use.

Personal use of carcass

Under the *Meat Industry Act 1993*, wild deer are not prescribed as game and therefore may not be harvested and processed at a commercial facility.¹¹²⁶ Mr David McNabb of Field & Game Australia advocated for allowing ‘the commercial processing of wild food that is harvested through either game hunting or pest animal control into the commercial system for own use’.¹¹²⁷ The Australian Deer Association highlighted that a number of overseas jurisdictions allow hunters to have carcasses processed on commercial

¹¹²² Nillumbik Shire Council, *Submission 196*, p.6; Barry Howlett, Executive Officer, Australia Deer Association, *Public Hearing*, 5 September 2016, p.6

¹¹²³ Ken Slee, *Public Hearing*, 6 October 2016, p.7

¹¹²⁴ Bob Gough, *Public Hearing*, 19 October 2016, p.8

¹¹²⁵ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.14

¹¹²⁶ PrimeSafe, *Submission 214*, p.1; *Meat Industry Act 1993*, s.3

¹¹²⁷ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.5

premises.¹¹²⁸ The introduction of game butchers, which provide butchery and preparation services at a cost to recreational hunters, was raised as a means of encouraging more hunting by facilitating easier carcass preparation.¹¹²⁹ Mr Ken Slee explained how these game butchers or ‘meat packers’ work:

... in the United States and Canada, when you shoot a deer or an elk or a bear or whatever, you can take it to a meat packer ... For your own personal use. So you take the carcass in, you pay your money, they break the carcass down into various cuts, they vacuum-pack it and hand it back to you in an esky or whatever and you take it away. I think that is almost standard through North America and Canada.¹¹³⁰

The use of mobile chillers, which could be placed in hunting areas, would assist in facilitating safe storage of carcasses. Facilities for butchery and preparation of carcasses in strategically placed locations in the bush, similar to fish cleaning stations, is another option to increase the incentive for hunters to kill higher numbers of invasive animals by enabling them to better use the meat.

FINDING 59: The lack of infrastructure and assistance provided to recreational hunters to facilitate the personal use of carcasses is a deterrent for some hunters to hunt more. It may result in meat wastage or in fewer animals being harvested due to a reluctance to ‘kill to waste’.

RECOMMENDATION 19: That the Government explore amendments to the *Meat Industry Act 1993* that would allow wild deer to be processed at game and general meat-processing facilities for personal consumption.

Commercial use of the carcass

Permitting the commercial sale of wild game and pest meat for human or pet consumption was widely supported in the submissions and evidence provided to the Committee.¹¹³¹ Mr Simon Toop of the Game Management Authority discussed that by ‘removing some of those market barriers’ and allowing the commercial use of deer, the number of animals killed by hunters could increase.¹¹³² Mr Anthony Carroll identified that ‘We can only store maybe one deer in the freezer at a time. We need to develop safe, legal and accessible outlets for the venison.’¹¹³³

1128 Australian Deer Association, *Submission 168*, pp.12-13

1129 Bob Gough, *Public Hearing*, 19 October 2016, p.7; Darryl Bastin, *Submission 40*, p.1

1130 Ken Slee, *Public Hearing*, 6 October 2016, pp.7-8

1131 Yuna Rickard, *Submission 38*, p.1; Australian Deer Association, *Submission 168*, p.4; Harrietteville Community Forum, *Submission 204*, p.4; Field & Game Australia, *Submission 207*, p.11

1132 Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.6

1133 Anthony Carroll, *Submission 92*, p.1

The Committee received support for the commercial harvesting of game and pest meat to be used in programs to feed the homeless,¹¹³⁴ and for wider human or pet consumption.¹¹³⁵ Some submitters saw pest meat as an export opportunity for Australia.¹¹³⁶ In its submission to this inquiry, Pro-Cull Animal Services suggested a trial modelled on the New South Wales Department of Primary Industries program which allowed the processing of deer for pet food, fertilizer and skins.¹¹³⁷ In his submission to this inquiry, Mr David Howell explained how venison was utilised in other states and provided options for Victoria:

Revenue from the sale and distribution of venison (deer meat) could quite conceivably add another income stream. Tasmania has an expanding fallow deer population problem yet that state imports one tonne per month of fallow deer venison from South Australia, while Tasmanian fallow venison is used for dog food. Alternatively this healthy, organic meat from Victoria could be sold to charities to feed underprivileged people, supplied to restaurants and/or exported freshly frozen; even supplied to Tasmania!¹¹³⁸

Potential limitations and issues with the commercial use of hunted carcasses were raised with the Committee. Friends of the Gippsland Lakes Parks and Reserves argued that ‘Commercial harvesting and recreational hunting have been found to create incentives for the spreading of invasive species populations.’¹¹³⁹ It was also argued that placing a commercial value on carcasses may increase illegal hunting behaviours, such as spotlighting from roads and hunting on private property without permission.¹¹⁴⁰

Currently in Victoria, farmed deer can be slaughtered in an abattoir but wild deer cannot.¹¹⁴¹ Dr Brendan Tatham from PrimeSafe (Victoria’s meat, seafood and pet food regulator) explained to the Committee that any changes to meat regulations would require extensive planning:

If there was to be a new source, in my opinion it would require a bit of planning and investigation about how those different bits of legislation fit and work together so that it is successful. While there might be a short-term opportunity there just to make a few quick changes, in order for it to be a long-term, viable policy approach really some thinking and planning about how that is going to work is required.¹¹⁴²

Risk assessment and management are essential when considering changes to meat regulations. PrimeSafe provided the Committee with a *Review of the Diseases and Pathogens of Invasive Animals that may Present Food Safety and*

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- 1134 Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.6; Greg Hyams, Chief Executive Officer, Game Management Authority, *Public Hearing*, 5 September 2016, p.10; Bob Gough, *Public Hearing*, 19 October 2016, p.8; Darryl Bastin, *Submission 40*, p.1
- 1135 Sue Sullivan, *Submission 6*, p.1; Darryl Bastin, *Submission 40*, p.1; Mountain Cattlemen’s Association of Victoria, *Submission 87*, p.3; Anthony Carroll, *Submission 92*, p.1; Harrietville Community Forum, *Submission 204*, p.4
- 1136 Ordan Andreevski, *Submission 43*, p.2; Jennifer Li, *Submission 47*, p.1; Charlie Lovick, President, Mountain Cattlemen’s Association of Victoria, *Public Hearing*, 20 October 2016, p.9
- 1137 Pro-Cull Animal Services, *Submission 215*, p.2
- 1138 David Howell, *Submission 198*, p.5 (with sources)
- 1139 Friends of the Gippsland Lakes Parks and Reserves, *Submission 166*, p.2
- 1140 Ken Slee, *Public Hearing*, 6 October 2016, p.8; Bob Gough, *Public Hearing*, 19 October 2016, p.8
- 1141 PrimeSafe, *Submission 214*, p.1
- 1142 Brendan Tatham, Chief Executive Officer, PrimeSafe, *Public Hearing*, 10 October 2016, p.2

Human Health Risks conducted by the Chief Veterinary Officer's Unit. This review identified that invasive species in Australia carry pathogens and diseases which pose threats to food safety, human health and may present risks to wildlife and domestic animals.¹¹⁴³ PrimeSafe acknowledged that, if commercial harvesting of invasive animals were to be considered, further research into the diseases in Victoria's invasive species would be required to enable regulations that mitigate these risks to be developed.¹¹⁴⁴

To determine the viability of creating a commercial game and pest meat industry in Victoria, information about the supply and demand of the carcasses is required. The current game meat industry in Victoria is very small, with just one licensed game meat processing facility which processes rabbit, goat and pig for human consumption.¹¹⁴⁵ However, this may not reflect the demand for the meat in Victoria, as discussed in PrimeSafe's submission to this inquiry:

The industry estimates that about 50 ton of game meat is imported into Victoria each week for human consumption that comprises mostly kangaroo meat, with some wild pig and wild deer. These processed final products are imported into Victoria from South Australia and New South Wales.¹¹⁴⁶

There may be a number of practical concerns with the commercial use of wild deer, especially from unsupervised recreational hunting. Dr Tatham from PrimeSafe noted that existing game processing is demand-driven, whereas the processing of deer from unsupervised hunting is likely to be supply-driven:

The game meat processor would take orders from butchers and restaurants and other meat supply business and require a number — let's just pick a number; say, 200 rabbits — for the week. He would ring up his approved harvester and say, 'I need 200 rabbits', and then that person is charged with going and identifying where those rabbits are going to come from and supplying them — on, for example, a Tuesday morning — and then they process them during the day; there are three employees at that business. They would then package them, make sure the appropriate health and hygiene requirements are met and then go through the distribution business for delivery that week. So that is the way that works.

... that it is different from a supply-driven business; it is really a demand-driven business, and that is the bit that I think needs a bit of thinking, if there is some thinking with regard to policy changes about the supply of some of these invasive species — how does that align with an industry which is demand driven?¹¹⁴⁷

The Committee notes that the commercial use of wild venison in New Zealand is demand-driven as well.¹¹⁴⁸

¹¹⁴³ PrimeSafe, *Submission 214*, Attachment 1

¹¹⁴⁴ PrimeSafe, *Submission 214*, Attachment 1, p.12

¹¹⁴⁵ PrimeSafe, *Submission 214*, p.2

¹¹⁴⁶ PrimeSafe, *Submission 214*, p.2

¹¹⁴⁷ Brendan Tatham, Chief Executive Officer, PrimeSafe, *Public Hearing*, 10 October 2016, p.6

¹¹⁴⁸ Clare Veltman, Principal Science Advisor, New Zealand Department of Conservation, *Public Hearing*, 10 October 2016, p.5

The uncertainty meat processing facilities have in relation to the supply of meat by recreational hunters may create an obstacle in creating a viable commercial harvesting industry. Mr David Preece, the General Manager of Victorian Petfood Processors, explained that ‘VPP [Victorian Petfood Processors] would find it difficult to manage recreational shooters and receive random numbers of deer at random times of the day, at any of our sites. ie outside of normal trading hours.’¹¹⁴⁹

Mr Preece also noted the difficulty of transporting carcasses:

Removing shot deer from crown land could prove difficult due to the physical size of these animals and the local terrain. I suspect that the shooters would need to design their vehicles in a fashion that would enable suitable storage and handling. Just how many could be shot by an operator each night is unknown.¹¹⁵⁰

Mr Preece outlined issues with refrigeration of the carcass that hunters would face in relation to deer. As Dr Brendan Tatham from PrimeSafe explained, with kangaroos, it is required that the carcasses be refrigerated within two hours if harvested during the day or within two hours of sunrise if harvested at night.¹¹⁵¹ With respect to deer, Mr Preece explained:

The problem you will have with the deer is the recreational shooter. How does he get it from where he shoots it, get it gutted and then get it into a chiller? To start off with, with the size you have got two or three people trying to lift it or you have to set the chiller up with cranes and winches and things like that.

Then you have got security there. Who is looking after this chiller on a day-to-day basis to make sure the power does not go off and to make sure vandals do not get into it? There are a whole lot of what-ifs with a chiller, where currently chillers are on private land. The farmer or the person that is in charge of that chiller looks after that chiller, so you would need someone to look after that chiller, which is not impossible to do. You either find a like-minded farmer here that has three-phase power that is prepared to put it on and monitor it on a day-to-day basis.¹¹⁵²

Further difficulties may come if meat processing facilities are required to obtain information about the location and humaneness of the kill, the shooter and the transportation and refrigeration trail. Mr Preece highlighted this point when discussing the possible use of mobile freezers:

If we had some facility that had a 40-foot container there and you have got random shooters out there throughout the mountain ranges supplying deer into those chillers, there needs to be a document trail there of who has put them in because we will not have a clue.¹¹⁵³

1149 David Preece, *Submission 220*, p.1

1150 David Preece, *Submission 220*, p.1

1151 Brendan Tatham, Chief Executive Officer, PrimeSafe, *Public Hearing*, 10 October 2016, p.5

1152 David Preece, General Manager, Victorian Petfood Processors, *Public Hearing*, 30 November 2016, p.10

1153 David Preece, General Manager, Victorian Petfood Processors, *Public Hearing*, 30 November 2016, p.10

Wild deer are currently harvested in Queensland for commercial use by licenced game harvesters who are required to be accredited in 'Safe Food Production Queensland'.¹¹⁵⁴ The commercial harvesting of deer and pest species killed by recreational hunters in Victoria would require strong regulations and guidelines. Mr Preece proposed that any deer processing program would require a similar regulatory system to that of the Department of Environment, Land, Water and Planning's current kangaroo pet food trial:

Should the government implement such a program of deer control we would look at the possibilities of harvesting them similar to that of the kangaroo trial. Chiller location placements would be critical to the operation and access to these chillers by shooters would be needed. Special legislation may be needed to enable any shooting on crown land.

Should permits be given to recreational shooters overall control would be difficult to manage due to the fact that most shooting may well happen during weekends. Many of these persons may have little if any experience in the humane destruction of wildlife. The deer harvested by recreational shooters may not be close to chillers, causing other issues. Ideally a similar system to that of the current kangaroo trial would work best, that is preferred shooters that are trained to carry out the correct processes. Ensuring the deer are humanely shot, dressed and placed to chillers in a timely way. Time and temperature is critical for quality product.¹¹⁵⁵

The Committee explored the Department's trial, which allows the commercial use of kangaroo meat for pet food when shot by professional shooters undertaking authorised wildlife control activities on authorised private property.¹¹⁵⁶ Under this scheme, tags provide a record of the kangaroos processed and allow carcasses to be traced.¹¹⁵⁷ It is the responsibility of the processing facility to ensure they only accept carcasses from professional shooters appropriately trained in humane killing procedures and hygienic handling of pet food.¹¹⁵⁸ Processing facilities have been able to anticipate deliveries of kangaroos because they are able to arrange the cull with the designated shooter and prepare accordingly. The Committee notes the approach taken with the kangaroo pet food trial and recognises that a scheme for game and pest species using recreational hunters would differ from this program.

Another option to facilitate the use of the animal is to permit hunters to dispose of carcasses at knackeries for rendering and on-selling of the product. Mr Bob Gough outlined that a tagging system could be used to track the carcass back to the landowner in case of disease.¹¹⁵⁹

¹¹⁵⁴ Field & Game Australia, *Submission 207*, p.7. A pre-requisite for accreditation involves successful completion of a Wild Animal Field Harvesting TAFE course: TAFE Queensland, *Wild Animal Field Harvesting* <tafeqld.edu.au/course/14979/wild-animal-field-harvesting>, viewed 10 February 2017

¹¹⁵⁵ David Preece, *Submission 220*, p.7

¹¹⁵⁶ Department of Environment, Land, Water and Planning, *Kangaroos* <delwp.vic.gov.au/environment-and-wildlife/wildlife/kangaroos>, viewed 18 January 2017

¹¹⁵⁷ Department of Environment, Land, Water and Planning, *Kangaroo Pet Food Trial* <delwp.vic.gov.au/__data/assets/pdf_file/0017/351530/Kangaroo-Pet-Food-Trial-Overview-update-15-September-2016.pdf>, viewed 20 January 2017

¹¹⁵⁸ Department of Environment, Land, Water and Planning, *Kangaroo Pet Food Trial* <delwp.vic.gov.au/__data/assets/pdf_file/0017/351530/Kangaroo-Pet-Food-Trial-Overview-update-15-September-2016.pdf>, viewed 20 January 2017

¹¹⁵⁹ Bob Gough, *Public Hearing*, 19 October 2016, p.7; see also, Bob Gough, *Submission 67*, p.24

FINDING 60: Commercial harvesting of wild game and pest animals could provide recreational hunters with an incentive to shoot more animals and remove more carcasses. The disease and pathogen risks associated with wild animals would need to be examined and strictly managed if commercial sale of meat from wild species were permitted in Victoria.

RECOMMENDATION 20: That the Government examine ways commercial harvesting of game and pest animals could be facilitated during co-ordinated recreational hunting programs in limited areas during short time periods.

9.3.6 Removing barriers to focus recreational hunting

To encourage recreational hunters to be active in the areas and times where they can have the most impact on invasive animal control, the Committee recommends removing existing barriers that are preventing recreational hunters from removing more invasive animals.

Some of these actions would require expenditure by the government, such as building additional infrastructure. To justify any such expenditure, there must be a clear benefit to the community. If the government's intention with recreational hunting is to reduce the impacts of invasive animals, then this expenditure must actually reduce those impacts. Moreover, money spent on facilitating recreational hunting must have a bigger impact on invasive animal problems than spending that same money on other forms of animal control, such as baiting or hiring professional shooters.

Removing barriers in particular areas and at specific times may act as an incentive to facilitate a focussed, concentrated hunting effort. Barriers that could be reviewed include:

- access to vehicle tracks and track access to target areas
- access to mobile chillers in which harvested animals can be kept
- access to facilities to assist with butchering carcasses
- restrictions on methods that are currently limited, such as spotlighting and hound hunting
- restrictions on the use of carcasses, for instance for rendering, pet food or human consumption.

The Committee also notes the importance of allowing people to take trophies, which are an important motivator for some hunters.

It has been noted that some areas where recreational hunting may be most effective may be less attractive to recreational hunters than other areas. In particular, recreational hunting may be most effective in areas which have already been subject to other methods of control and where the population density is low (see Section 8.10 of this report). This may make these sites less

appealing than other hunting sites.¹¹⁶⁰ The use of incentives, such as bounties (see Section 9.5.1 of this chapter) and using the meat of the animal (see Section 9.3.5) may be important for counteracting such factors.

The need for a broad, strategic approach to invasive animal control (including recreational hunting and other methods) is discussed further in Chapter 10 of this report.

FINDING 61: For recreational hunting to be most effective at controlling invasive animals, it needs to be concentrated at certain times and places and co-ordinated with other forms of animal control. Incentives may be useful in focussing the efforts of recreational hunters at these times and places.

RECOMMENDATION 21: That, as part of invasive animal control programs, the Government identify times and places where recreational hunting can make a helpful contribution. The Government should then explore ways to reduce the barriers to hunting at those times and places.

9.4 Changes to hunting practices

Hunters' preferences have been cited as limitations to recreational hunters' contribution to the effective control of invasive species. These include the types and amount of animals they shoot (see Section 6.8.3 of this report). Mr Bob Gough highlighted the changes to hunting practices that he thinks would assist the control of invasive species:

I would like to improve hunter performance. I would like to challenge hunters to shoot more female deer, improve their skills and knowledge and attend hunter education courses, and to hunt more often and to shoot more deer.¹¹⁶¹

This section examines changes to hunting practices that may improve the contribution of recreational hunters to invasive animal control.

9.4.1 Target female animals

In order to reduce the population of a species, you need to target the female population to reduce their breeding capacity (see Section 6.8.3 of this report). Dr Clare Veltman from the New Zealand Department of Conservation stated that, 'If you are taking breeding females out you have an enormous effect on reducing deer densities.'¹¹⁶² Currently, there is a biased harvest towards stags,¹¹⁶³ as males are frequently targeted for their antlers which provide a trophy for the hunter.¹¹⁶⁴

¹¹⁶⁰ Andrew J. Bengsen & Jessica Sparkes, 'Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.304

¹¹⁶¹ Bob Gough, *Public Hearing*, 19 October 2016, p.5

¹¹⁶² Clare Veltman, Principal Science Advisor, New Zealand Department of Conservation, *Public Hearing*, 10 October 2016, p.8

¹¹⁶³ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.6

¹¹⁶⁴ Victorian National Parks Association, *Submission 191*, p.2; Invasive Species Council, *Submission 192*, pp.10, 11; Luke Mitchell, *Submission 165*, p.2

A number of suggestions were made to the Committee that aimed to promote the culling of females. Education for hunters was raised as a method that may influence hunters in targeting more females.¹¹⁶⁵ Mr Barry Howlett of the Australian Deer Association discussed an article they published 20 years ago titled ‘Shoot more hinds — take more female deer’, but acknowledged there had been no ‘coordinated, integrated approach’ targeting this concept.¹¹⁶⁶ Mr Bob Gough explained an initiative that he worked on with the Australian Deer Association involving the establishment of a ‘three-hind badge’ to encourage hunters to shoot more female deer.¹¹⁶⁷

Alternative approaches to encourage hunters to shoot females include bag limits for males, though such approaches may be difficult to monitor.¹¹⁶⁸ Parks Victoria’s *Greater Alpine National Parks Management Plan*, released in August 2016, proposed the consideration of ‘female only harvest areas’.¹¹⁶⁹ Mr Simon Toop from the Game Management Authority raised the option of an ‘antlerless harvest’ within a season as a method of deer management.¹¹⁷⁰

Mr Daryl Panther discussed a program he was involved in that required you to shoot ‘a hind before you shoot a stag’.¹¹⁷¹ He raised concern that these restrictions may result in a reduction of the overall numbers killed. He stated, ‘I saw five stags that week. I never saw a female at all, so I never got to have a shoot. I could have taken one of those stags, and it still would have been one deer out of the equation’.¹¹⁷² Mr David McNabb from Field & Game Australia supported ‘education over regulation’ as a more effective approach.¹¹⁷³

Another approach discussed with the Committee involves permitting the commercial harvest of female animals only, as this may provide more incentives for hunters to take females if they can make use of them.¹¹⁷⁴ The commercial sale of pest and game species in Victoria is currently prohibited. Options for change in relation to this are discussed in Section 9.3.5 of this chapter.

The Committee recognises the importance of targeting females in invasive species control and supports approaches that encourage hunters to do this. The Committee believes better hunter education on the importance of killing more females could also be implemented as this issue is currently not publicised by the Game Management Authority in their manual for responsible and sustainable hunting.

¹¹⁶⁵ Anthony Carroll, *Submission 92*, p.1; Luke Mitchell, *Submission 165*, p.2; Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.6

¹¹⁶⁶ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.10

¹¹⁶⁷ Bob Gough, *Public Hearing*, 19 October 2016, p.2

¹¹⁶⁸ Harrierville Community Forum, *Submission 204*, p.4; David Croft, Training and Programs Coordinator, Sporting Shooters Association of Australia (Victoria), *Public Hearing*, 5 September 2016, pp.5-6

¹¹⁶⁹ Parks Victoria, *Greater Alpine National Parks Management Plan, August 2016* (2016), p.41

¹¹⁷⁰ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.6

¹¹⁷¹ Daryl Panther, *Public Hearing*, 29 November 2016, p.7

¹¹⁷² Daryl Panther, *Public Hearing*, 29 November 2016, p.7

¹¹⁷³ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.9

¹¹⁷⁴ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.6; Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.10

FINDING 62: Targeting the female population of a species has the biggest influence on invasive animal control. However, recreational hunters, as a whole, disproportionately target males to get trophies.

9.4.2 Aim to cull

The goals of recreational hunters differ from those of paid professional shooters. There is a presumption that recreational hunters are motivated to maintain species population for future hunting opportunities (see Section 6.8.3 of this report) and therefore do not kill enough animals to effectively contribute to species control.¹¹⁷⁵ Year-long open seasons and no bag limits are currently in place for deer species (except hog deer) which facilitate high harvest numbers. However, the Committee believes that factors such as hunter attitude and concerns about animal wastage (discussed in Section 6.8.3 of this report) are limiting the number of animals shot by recreational hunters.

Mr Russell Sharman, a recreational hunter, explained the attitude change that is required in the recreational hunting community:

So there is a sort of culture, and it is still there, especially for stalkers, that they would not just slaughter a mob of deer just because they think they are doing the right thing for the environment in this context. I believe in New Zealand there is a little bit of a program to encourage people to shoot the females as well. I would not push it too far by encouraging everybody and saying it is now a cull, that it is not hunting. The respect still needs to be there for the deer, but we need just a little bit of a shift in the culture to assist in what we are now identifying as a bit of a looming problem.¹¹⁷⁶

To increase the effectiveness of recreational hunters' contribution to invasive species control, hunter attitudes should be addressed, which could be done through education.¹¹⁷⁷ Mr Anthony Carroll supported this approach:

I believe the Game Management Authority has a vital role to play in this respect, especially in starting to better educate the hunters — that would be via the Sporting Shooters Association of Australia, Field & Game and ADA [Australian Deer Association] — to take more meat animals and get them out.¹¹⁷⁸

The Committee concurs that education should be provided to recreational hunters via the Game Management Authority and hunting organisations to encourage hunters to hunt to cull invasive species. The Committee notes that incentives could also be used to encourage recreational hunters to contribute to invasive species control. This is discussed in Section 9.5 of this chapter.

FINDING 63: Some recreational hunters are reluctant to kill as many animals as possible due to a culture of not wasting animals.

¹¹⁷⁵ Invasive Species Council, *Submission 192*, p.11; Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.4

¹¹⁷⁶ Russell Sharman, *Public Hearing*, 7 October 2016, p.11

¹¹⁷⁷ Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, p.5

¹¹⁷⁸ Anthony Carroll, *Public Hearing*, 19 October 2016, p.3

RECOMMENDATION 22: That the Game Management Authority, in association with Victorian hunting organisations, educate and encourage recreational hunters to contribute to controlling invasive species through shooting larger numbers of animals and targeting females.

9.5 Incentives for hunters

Incentives may encourage and engage hunters to contribute more effectively to the control of invasive animals.¹¹⁷⁹ Mr Daryl Panther stated that, for hunters to ‘do it for nothing’, incentives were important.¹¹⁸⁰ Incentives for recreational hunters could range from personal use of the meat and antlers to financial incentives, such as the commercial sale of meat and fur (discussed in Section 9.3.5 of this chapter) or the provision of bounties. In its submission to this inquiry, the Mountain Cattlemen’s Association of Victoria discussed how financial incentives could attract experienced and proficient hunters:

Financial incentives to hunt and remove the carcasses is the key to attracting enough hunters. At present there is simply not enough incentive to attract more of the class and standard of hunter that is required (responsible and accountable). These incentives could include allowing the meat to be sold for pet food and /or human consumption using a similar system to Kangaroo culling in NSW.¹¹⁸¹

In addition to encouraging more hunting, incentives could be used to change hunter behaviour. For example, incentives could be provided only for female deer (see Section 9.4.1 of this chapter) or deer hunted in priority areas.

Carcass disposal was raised during this inquiry as a negative impact of recreational hunting. Concerns were raised that carcasses that are left to decompose may attract and feed wild animals, especially wild dogs and foxes (see Section 6.8.4 of this report).¹¹⁸² A number of submissions to the Committee advocated for the compulsory removal and correct disposal of all carcasses after a hunt,¹¹⁸³ although the Committee notes that this may not always be practicable.

Incentives that require the production of the carcass may be most effective in encouraging higher rates of carcass removal. The possible introduction of incentives, such as bounties, is considered in this section. Removing certain elements of the barriers outlined in Section 9.3 of this chapter may also assist in providing incentives to hunters to target certain areas at specific times.

¹¹⁷⁹ Graham’s Factree, *Submission 34*, p.3; Ordan Andreevski, *Submission 43*, p.3; Mountain Cattlemen’s Association of Victoria, *Submission 87*, p.3; Mark Chaplin, *Submission 104*, p.3

¹¹⁸⁰ Daryl Panther, *Public Hearing*, 29 November 2016, p.5

¹¹⁸¹ Mountain Cattlemen’s Association of Victoria, *Submission 87*, p.3

¹¹⁸² Bob Gough, *Submission 67*, p.24; Field & Game Australia, *Submission 207*, p.10

¹¹⁸³ Kathleen Whelan, *Submission 57*, p.1; Mary Jane Alloway, *Submission 157*, p.2; Snake Island Cattlemens Association, *Submission 167*, p.2

9.5.1 Bounties

Bounties provide hunters a financial incentive to shoot invasive animals. Bounties are currently in place in Victoria for foxes and wild dogs. The \$100 wild dog bounty that was offered in Victoria between 2011 and July 2015 resulted in 2,129 wild dogs being removed by recreational hunters.¹¹⁸⁴ The \$10 bounty offered for foxes since 2011 has seen over 410,000 foxes removed by recreational hunters.¹¹⁸⁵

The Committee received wide support for the use of bounties as an incentive for recreational hunters to assist in invasive animal control.¹¹⁸⁶ It was argued that bounties increase the number of hunters and motivate those hunters to shoot more animals.¹¹⁸⁷ Mr Anthony Evans from Warrnambool Field & Game stated that, ‘People feel they are getting something out of it’ when a bounty can be collected.¹¹⁸⁸

Mr Barry Tayler of the Gippsland Wild Dog Advisory Council explained the impact the termination of the dog bounty in 2015 had on hunters removing more wild dogs:

Well, they just do not bother now ... If you are a hunter and you are out there, whether you are a deerstalker or you are a hound hunter, \$100 is \$100. If you are deerstalker you might be there three or four days and not even see a deer or shoot a deer or whatever — but, ‘Oh, there’s a dog!’. You are shooting him. There is 100 bucks. You come back. There is \$100. It pays for the trip. It pays for the fuel. You are getting something. You are helping us [farmers].¹¹⁸⁹

Mr Dennis Keith argued that the price of the bounty should be increased to cover the costs of the hunt and the effort required to fulfil the bounty requirements:

The Victorian State Government previously offered a bounty of \$100.00 for killing a wild dog/dingo but this has been discontinued. In reality although \$100.00 sounds good but it doesn’t come anywhere near to covering costs let alone turn a profit for the shooter concerned. This bounty should not only be reinstated but increased in value to serious money levels due to the time and effort needed to shoot the wild dog/dingo and take the mandatory scalp/tail for identification by DELWP [Department of Environment, Land, Water and Planning] officers when collecting this bounty.¹¹⁹⁰

When the wild dog bounty was re-introduced from March 2017, it was increased to \$120.¹¹⁹¹ Others have suggested it should be \$150.¹¹⁹²

¹¹⁸⁴ Field & Game Australia, *Submission 207*, p.9

¹¹⁸⁵ Field & Game Australia, *Submission 207*, p.8

¹¹⁸⁶ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.4, Dennis Keith, *Public Hearing*, 19 October 2016, p.5; Scott Campbell-Smith, *Submission 13*, p.2; James Findlay, *Submission 14*, p.2; Graham’s Factree, *Submission 34*, p.3; Stuart Stagg, *Submission 186*, p.3

¹¹⁸⁷ Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, p.9

¹¹⁸⁸ Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, p.9

¹¹⁸⁹ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.7

¹¹⁹⁰ Dennis Keith, *Submission 11*, Attachment 1, p.7

¹¹⁹¹ Minister for Agriculture, ‘New Advisory Group On Wild Dogs, Bigger Bounty’ (media release), 26 October 2016

¹¹⁹² Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.8

Mr Keith also suggested increasing the number of collection centres and the hours they operate, so that more hunters could access the bounty.¹¹⁹³ Mr Keith proposed that, if the bounty were made more attractive and accessible, it would 'attract the serious, skilled, dedicated wild dog/dingo hunters'.¹¹⁹⁴

However, as discussed in Section 8.6.1 of this report, an evaluation of the fox bounty in Victoria in 2002-03 found that the bounty had been an ineffective means of broad-scale population control. Supporters of bounties point to the number of animals killed to claim bounties.¹¹⁹⁵ The Committee notes, though, that culling even a large number of animals may make no difference to the total population or the environmental impact if the number killed is less than a certain threshold (see Section 5.4.1). Bounties by themselves may not be able to meet those thresholds.

In addition, the evaluation found that shooters may have avoided killing breeding animals to maintain the population for future profit and may have acted fraudulently in the pursuit of the bounty (see Section 8.6.1 of this report).

It has also been argued that many of the animals for which bounties are claimed would have been shot by farmers or hunters anyway.¹¹⁹⁶ Whether or not bounties are in place, farmers need to shoot invasive animals to protect their businesses. Many recreational hunters are also motivated to shoot invasive animals even without bounties. Given these considerations, the actual number of animals shot because of a bounty may be significantly smaller than the total number for which bounties are claimed.

In some cases, recreational hunters are prevented from shooting more animals by a lack of time rather than a lack of incentive – bounties will not make any difference for these hunters.¹¹⁹⁷

The Invasive Species Council and others have concluded that the fox bounty did not 'effectively reduce the impacts of foxes as a pest species – rendering the public funds applied to the bounty scheme a dead loss to the public purse'.¹¹⁹⁸

Animals Australia also raised concerns that bounties result in inhumane hunting practices and are ineffective in invasive animal control:

Not surprisingly, Animals Australia strongly opposes the payment of bounties for the killing of invasive species, primarily because these practices encourage the participation of inexperienced and incompetent persons in the hunting/trapping of animals; provide a financial incentive that encourages attempts to kill the animal

¹¹⁹³ Dennis Keith, *Submission 11*, Attachment 1, p.7

¹¹⁹⁴ Dennis Keith, *Submission 11*, Attachment 1, p.7

¹¹⁹⁵ See, for example, Field & Game Australia, *Submission 207*, p.9

¹¹⁹⁶ Hassall & Associates, *Economic Evaluation of the Role of Bounties in Vertebrate Pest Management*, prepared for the Bureau of Resource Sciences (1998), p.43

¹¹⁹⁷ Graham Nugent & David Choquenot, 'Comparing Cost-Effectiveness of Commercial Harvesting, State-Funded Culling, and Recreational Deer Hunting in New Zealand' *Wildlife Society Bulletin* 32(2) (2004), p.489

¹¹⁹⁸ Invasive Species Council, *Submission 192*, p.7; see also Tim Bloomfield, *Submission 175*, p.4; Animals Australia, *Submission 213*, p.9

when the chances of a ‘clean’ kill may be low, and may inadvertently cause the ‘pest’ animal to be seen as a money-making resource that needs to be ‘conserved’, in much the same way that game animals are currently viewed.¹¹⁹⁹

The Committee accepts that bounties can motivate recreational hunters to shoot larger numbers of invasive animals. However, there are questions around how many additional animals are shot as a result of bounties and how effective they are at reducing the number of invasive animals or their impact. Bounties may be useful if targeted to particular places and times as part of broader programs but this would be a different approach to the current untargeted bounties.

The Committee notes the government’s intention to evaluate the use of the wild dog bounty after one year.¹²⁰⁰ The Committee believes that the fox bounty should also be evaluated. The Committee highlights that these evaluations need to consider not just the number of animals removed but also how many of these animals would have been killed without the bounty. It will also be important to evaluate the contribution that has been made to the environment and agricultural production by the removal of these animals. Ultimately, the evaluations should determine whether the bounties are the best use of money or whether the same funds could have been more effectively applied to other methods of animal control. The Committee notes the public interest in the effective use of funding in this area and therefore believes the results of these evaluations should be made publically available.

FINDING 64: Many hunters support bounties as a way to increase hunting effort and compensate recreational hunters for their work. However, an evaluation of an earlier fox bounty scheme in Victoria suggested that bounties may not be effective in reducing the impact of invasive animals.

RECOMMENDATION 23: That the Government implement an ongoing evaluation program of the current wild dog and fox bounty systems which evaluates whether the bounties are providing value for money or whether the money would be more effectively spent on alternative invasive animal control methods.

RECOMMENDATION 24: That the Government publicly release the results of any evaluations of the bounty system.

9.6 Research and knowledge

Research and understanding of the habits, populations, movement and distribution of invasive species can assist recreational hunters to effectively target their hunting efforts. In its submission to this inquiry, the Sporting Shooters Association of Australia (Victoria) stated that ‘The effective management of any animal species is dependent on knowledge and understanding.’¹²⁰¹

¹¹⁹⁹ Animals Australia, *Submission 213*, p.9

¹²⁰⁰ Hon. Jaala Pulford MLC, Minister for Agriculture, ‘New Advisory Group On Wild Dogs, Bigger Bounty’ (media release), 26 October 2016

¹²⁰¹ Sporting Shooters Association of Australia (Victoria), *Submission 150*, p.13

It was argued that information about the animals' locations, behaviours and habits would help improve the effectiveness of recreational hunters as it may help inform and guide their hunt. The Sporting Shooters Association of Australia (Victoria) advocated for an improved understanding of deer and their movements:

In terms of research, if the ultimate objective is deer control, then we need to have knowledge about it. We think there is a dearth of worthwhile research and information about deer: the population density, biology and the behavioural drivers underlying their breeding and migration. So there is a lot more that we can learn in relation to deer specifically.¹²⁰²

... deer, in my experience with them, are very elusive. It is very difficult to work out what they are doing and why. I suppose probably the key point to deer is that whilst we seem to spend an inordinate amount of time hunting them without success, that is due to their very nature and the fact that they have no natural predators in Victoria, whereas they come from Asiatic countries where tigers and leopards will hunt them ad hoc. They are very elusive and have a keen sense of smell, hearing and sight, and so we need to understand what they do and why they do it. I think that probably once we get that sort of knowledge, yes, it will turn the tables a little bit on the huntability of them. It will give us an insight into what they are doing and why.¹²⁰³

In his submission to this inquiry, Mr Scott Campbell-Smith explained that this knowledge may improve the effectiveness of control methods:

Some serious scientific, biological research needs to go into deer. We know next to nothing about them. I tend to think that tracing their movements would be a great start. I suspect that if we knew where they move then we could remove large numbers efficiently, by shooting and trapping.¹²⁰⁴

Mr Roger Bilney (a former fisheries and wildlife officer and a representative of two environmental groups) similarly stated:

This sambar problem is that we do not know what we are managing. We do not even know the basic science. We do not even know the home range. How can we conduct any programs like the alpine sphagnum bog wallowing by sambar when we do not even know where they are coming from and where they are moving to — very basic information? We just do not know.¹²⁰⁵

The Committee supports research into the populations, behaviour and movements of invasive species, in particular deer. The Committee believes this research will help inform Government-initiated invasive species management plans and may improve the effectiveness of recreational hunting.

¹²⁰² Jack Wegman, Chief Executive Officer, Sporting Shooters Association of Australia (Victoria), *Public Hearing*, 5 September 2016, p.3

¹²⁰³ David Croft, Training and Programs Coordinator, Sporting Shooters Association of Australia (Victoria), *Public Hearing*, 5 September 2016, p.5

¹²⁰⁴ Scott Campbell-Smith, *Submission 13*, p.2

¹²⁰⁵ Roger Bilney, Gippsland Environment Group and Environment East Gippsland, *Public Hearing*, 6 October 2016, p.9

FINDING 65: Understanding the habits, motivations and movements of a species can assist in its effective management. However, the Committee was told that there is a lack of data available in relation to the behaviour, populations, movement and distribution of invasive species, particularly deer, in Victoria.

RECOMMENDATION 25: That the Government conduct research into the location, numbers, behaviour and movements of invasive species in Victoria. Key insights from this research that could assist hunters should be communicated to the hunting community.

10 Invasive animal control – going forward

10.1 Introduction

As noted in Section 8.10 of this report, an effective animal control strategy involves the use of multiple techniques. The most appropriate mix of techniques will vary from one place to another, depending on the animals, the environment and a range of other factors (as discussed in Section 5.3). In some cases, the mix may include co-ordinated recreational hunting. In other circumstances, recreational hunting may provide little benefit or even hinder other control activities.

A number of submitters and witnesses called for a strategic approach to invasive animal control, which is based around co-ordinated, evidence-based actions directed towards clear goals. Although this approach has been incorporated into government policies, submitters and witnesses to this inquiry identified that in practice this has not been evident. This is discussed in this chapter.

In addition to adopting a strategic approach, it is essential to have structures in place that facilitate effective programs, establish clear responsibility and enable accountability for invasive animal control. The Committee heard that there is an urgent need for better collaboration and consultation between the many individuals and organisations involved with invasive animal control, including those on the ground at the grassroots level. There were calls for improved channels of communication between the public and government bodies. Concerns were also raised about the monitoring, evaluation and reporting arrangements currently in place. The Committee considers that these matters could best be addressed by designating one government body with overall responsibility and accountability for invasive animal control in Victoria.

This chapter concludes with an overview of the role that co-ordinated recreational hunting might play in invasive animal control.

10.2 A strategic approach

A significant amount of research has been conducted into what makes animal control programs effective. A key element is a need to adopt a strategic approach – that is, an approach that ‘promotes coordinated action that aims to reduce the damage caused by pests to an acceptable level in order to achieve a desired outcome (eg improved agricultural production or to conserve biodiversity).’¹²⁰⁶

¹²⁰⁶ PestSmart, *Principles of Pest Animal Management* (2014), p.1

PestSmart has identified seven key principles that underlie a strategic approach:

1. A pest is a human-defined idea – what is defined as a pest will vary depending on circumstances and on different people’s perspectives
2. Key stakeholders need to be actively engaged and consulted
3. Pests are rarely eradicated – it is therefore important to focus on preventing new pests entering a region and removing individuals in new areas before a population is established
4. Most pest management needs to focus on the outcome, not just killing pests
5. A whole-of-system approach is required for managing pest damage
6. Most pest management occurs in ecosystems of which our knowledge is incomplete – this means that it is difficult to predict how an ecosystem will respond to an intervention and it is therefore important to monitor effectiveness and be ready to adapt programs in response to results
7. An effective monitoring and evaluation strategy is essential for all management action – this is necessary to ensure that actions are producing the desired outcomes.¹²⁰⁷

Many of these principles were noted by submitters and witnesses to this inquiry and are discussed throughout this report.¹²⁰⁸

In relation to Victoria, the Committee considers that there is a need for a comprehensive, overarching invasive and pest animal strategy. The overarching strategy’s goal would be to maximise effectiveness and value for money from animal control activities. To achieve this, the strategy would identify the areas where control programs are most needed and direct land managers towards the most effective techniques.

Given the need to manage ecosystems as a whole, the Committee considers that both invasive animals and native pests need to be included within this strategy and that all land types should be included within the one plan.

As noted in Section 3.7.2 of this report, the *Invasive Plants and Animals Policy Framework* was developed in 2010 by the Victorian Government of the day. It was intended as an overarching framework for all invasive species across public land, private land and aquatic environments.¹²⁰⁹ The ‘Weeds and Vertebrate Pests’ module outlines 58 high-level actions that were planned in relation to invasive animals.¹²¹⁰

¹²⁰⁷ PestSmart, *Principles of Pest Animal Management* (2014), pp.1-3

¹²⁰⁸ Some submitters provided their own lists of criteria, such as Nancy McMurray, *Submission 164*, p.3; Friends of the Gippsland Lakes Parks and Reserves, *Submission 166*, p.3; Australian Deer Association, *Submission 168*, p.4; Invasive Species Council, *Submission 192*, p.12; Nillumbik Shire Council, *Submission 196*, pp.2-3.

¹²⁰⁹ Department of Primary Industries, *Invasive Plants and Animals Policy Framework* (2010), p.7 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 10)

¹²¹⁰ Department of Primary Industries, *Weeds and Vertebrate Pests, Module 1 within the Invasive Plants and Animals Policy Framework* (2010), pp.2-4 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 11)

The Framework incorporates the seven key principles outlined by PestSmart.

The Government released *Protecting Victoria's Environment – Biodiversity 2037* in April 2017. This plan is intended to be 'the start of a long-term pathway for the overall improvement of biodiversity, while sustaining the state's strong economy.'¹²¹¹ It notes the impact of invasive animals on biodiversity:

Introduced plants and animals are a primary cause of biodiversity decline in all Victorian environments. Although Victoria has implemented some successful programs to control introduced species, more consistent, sustained and strategic management approaches are needed, along with better planning for biosecurity responses to new and emerging threats.¹²¹²

The plan identifies 'preventing the spread and reducing the impact of weeds and pest animals' as part of providing a healthy natural environment¹²¹³ and includes targets to control for pest animals at priority locations.¹²¹⁴

It is beyond the scope of this inquiry to evaluate the *Invasive Plants and Animals Policy Framework*¹²¹⁵ or *Protecting Victoria's Environment – Biodiversity 2037*. However, a number of relevant concerns were raised during this inquiry in relation to current animal control practices. This section sets out the key areas where the Committee sees a need for change.

FINDING 66: To ensure ecosystem health, all species that are causing issues must be addressed across both public and private land.

RECOMMENDATION 26: That the Government include both invasive animals and native pests within one strategy that applies across all land types.

10.2.1 The need to incorporate deer

Despite the growing scale of the deer problem in Victoria (see Chapter 2 of this report), the *Invasive Plants and Animals Policy Framework* does not appear to have facilitated an overall response to the problem. At a public hearing, the Committee asked Ms Nina Cullen, Executive Director of the Biodiversity Division at the Department of Environment, Land, Water and Planning, about current sambar deer management policy:

Mr RAMSAY — So what is the policy on sambar deer — from the department's management?

¹²¹¹ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.4

¹²¹² Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.47

¹²¹³ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.14

¹²¹⁴ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.20

¹²¹⁵ The Committee notes the concerns indicated by the Victorian Farmers Federation (*Submission 184*, pp.8, 12).

Ms CULLEN — Sambar deer is an emerging and relatively new — newer than others — invasive animal issue, and I guess it is fair to say at this point in time that the government recognises that it is an issue, it is an emerging issue and we are working collaboratively with all the different government agencies to look at what needs to be done for sambar and other deer populations.

Mr RAMSAY — So there is not a policy as such in managing —

Ms CULLEN — Not specifically for sambar at this point in time, but it is recognised as an emerging and necessarily invasive animal to be considered and looked at from a pest management or animal management perspective.¹²¹⁶

This was raised as a point of concern by Mr Andrew Cox of the Invasive Species Council. Noting that the range of sambar deer is still increasing (see Section 2.3.1 of this report), he stated:

More broadly, with deer I would actually put a containment strategy in. The state does not have a containment strategy for deer — not as an overarching strategy. Where are the small, isolated populations that we can remove? Where is the edge of the deer? How are they going to stop them spreading?¹²¹⁷

This is a cause of some concern to the Committee. As indicated by the generalised invasion curve (see Sections 2.2.3 and 3.7.2 of this report), intervening to contain the deer population before it spreads further will provide better returns on government funds than allowing the population to spread and then attempting to manage it.

The government’s *Sustainable Hunting Action Plan 2016-2020* (released in December 2016) includes among its actions, ‘Develop a deer management strategy – that sets a strategic plan to maintain sustainable hunting opportunities while reducing the impact of deer on biodiversity on all land tenures in the state.’¹²¹⁸

The Committee considers it important that a containment strategy be part of that plan.

FINDING 67: Acting now to contain deer populations before they spread further will provide better financial returns than funding work to manage populations after they have been allowed to grow and expand.

RECOMMENDATION 27: That, as part of the planned deer management strategy, the Government develop an explicit strategy to contain deer within their current range and limit the spread of deer to new parts of Victoria.

¹²¹⁶ Simon Ramsay MLC, member of the Committee, and Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.6

¹²¹⁷ Andrew Cox, Chief Executive Officer, Invasive Species Council, *Public Hearing*, 5 September 2016, p.11

¹²¹⁸ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.17

10.2.2 The need for long-term planning and funding

A key point made by a number of individuals and organisations is that invasive animal control generally requires a long-term approach to actually make a difference. As noted in Section 5.4.1 of this report, most invasive species in Victoria are able to reproduce quickly and programs that do not provide a significant degree of pressure over a prolonged period may have little or no impact beyond the immediate term.

The importance of long-term funding as part of a long-term strategy was highlighted by a number of submitters and witnesses. For example:

Many pest species have high fecundity, and even one years lapse in funding can mean you are back to where you commenced. If we are to maintain what we have left in our natural world, we must have well budgeted and continuing programs on invasive species.¹²¹⁹

All parties (not just the one currently in power) need to agree to keep funding for a well coordinated feral animal plans which once they start [become a] waste of tax payers money if they are abandoned or are done in dribs and drabs. It is possible to achieve success when well formulated plans are adhered to over many years.¹²²⁰

However, the Victorian Auditor-General's Office found that a lack of long-term funding was a problem in Victoria in 2010:

There is broad agreement across the sector that the treatment of invasive species, an ongoing challenge, requires long-term programs to be most effective. Assessments that PV [Parks Victoria] have undertaken demonstrate that the effectiveness in reducing invasive species impacts increases when the program is ongoing. This is particularly true of invasive species that have become established and require containment.

Over the last decade, the incidence of short-term, initiative program funding has risen, while at the same time PV has reduced the proportion of recurrent funding it spends on invasive species. The result is that 84 per cent of natural values management (NVM) funds in 2009–10 are tied to initiatives of one to four years' durations, with recurrent funding for NVM expected to remain constant over the next five years. This raises uncertainty at the park and regional level about the resourcing of invasive species management and compromises long-term planning.¹²²¹

The Committee received evidence suggesting that this is still a problem. A number of witnesses stated that they had been involved with programs that were making a difference but had been discontinued, losing the gains achieved by the programs.¹²²² More generally, the Committee was told:

¹²¹⁹ Gippsland Environment Group, *Submission 172*, p.3

¹²²⁰ Rena Gaborov, *Submission 182*, p.1

¹²²¹ Victorian Auditor-General's Office, *Control of Invasive Plants and Animal in Victoria's Parks* (2010), p.20

¹²²² Daryl Panther, Victorian Wildlife Management, *Public Hearing*, 29 November 2016, p.3; Roger Bilney, Gippsland Environment Group and Environment East Gippsland, *Public Hearing*, 6 October 2016, pp.7-8

Wimmera CMA [Catchment Management Authority] has observed that agencies are challenged to make meaningful long term impacts on many invasive animals as a result of uncertainty in long term funding and resources. The fickle nature of this funding from one year to the next, combined with the many competing priorities that crown land managers face, makes it very challenging to plan and implement effective invasive animal programs. Improved resourcing of compliance activities should also be considered to prevent the introduction of invasive species to crown land.¹²²³

The VFF [Victorian Farmers Federation] is concerned that the decrease in, and difficulty to achieve, recurrent funding for management of invasive animal species on public land will compromise the ability to minimise the environmental, social and economic impact of this critical issue.¹²²⁴

Mr Phil Ingamells of the Victorian National Parks Association and Mr Peter Campbell from Bushwalking Victoria similarly attributed the failure to provide ongoing support for animal control programs to a lack of funding for Parks Victoria.¹²²⁵ Several other submitters and witnesses also believed that Parks Victoria received insufficient funding to undertake an appropriate level of animal control.

The Nillumbik Shire Council similarly stated that, ‘There is currently very limited and sporadic funding for Invasive animal control programs.’ The Council argued that, as a consequence:

Invasive animal control is unlikely to achieve long-term success without long-term committed funding that covers the administration and implementation of on-ground cross-tenure animal monitoring and control works. Half-baked programs are more likely to waste funding and have the potential to set back community support for invasive animal control due to poor levels of community consultation and an increased perception that no meaningful long-term gains are being achieved.

... Minimal funding and infrequent invasive animal control programs translates to a loss of opportunity to recruit new people into the field of professional invasive animal control. As a result it is likely that collective knowledge and skills in this field are likely to be lost.¹²²⁶

Protecting Victoria’s Environment – Biodiversity 2037 is intended to be a longer-term strategy. The joint submission to this inquiry from government bodies (which was submitted before the final plan was released) noted that the draft of the plan:

... identified the need to reform Victoria’s conservation planning and investment framework to better focus on biodiversity conservation priorities and promote regional partnerships and consistent reporting. Preliminary conversations with stakeholders, during the development of the *Protecting Victoria’s Environment – Biodiversity 2036* plan, identified support for a 5-year regional strategy and annual

1223 Wimmera Catchment Management Authority, *Submission 99*, p.2

1224 Victorian Farmers Federation, *Submission 184*, p.4

1225 Peter Campbell, President, Bushwalking Victoria, *Public Hearing*, 5 September 2016, p.3; Phil Ingamells, Victorian National Parks Association, *Public Hearing*, 5 December 2016, p.5

1226 Nillumbik Shire Council, *Submission 196*, p.6

implementation plan and investment prospectus. Importantly, these documents would consider and inform agency and community based planning, such as conservation action planning.¹²²⁷

The final plan includes a 50-year target to double the overall suitable habitat for threatened species, with a number of less ambitious 20-year targets. It also details a number of contributing targets (including pest animal control) to be reviewed every five years.¹²²⁸ The plan recognises the need for this work to be ongoing, stating that ‘If effort slows or stops [on the contributing targets], in some cases even for a short time, the gains made over the preceding years of hard work can be lost.’¹²²⁹

The Committee recognises the need for long-term funding for invasive animal management. While *Protecting Victoria’s Environment – Biodiversity 2037* includes ‘establish sustained funding for biodiversity’ as a priority,¹²³⁰ it is not clear what this will mean in practice.

The Committee encourages the government to commit long-term recurrent funding for invasive animal control. The Committee also considers it important that individual programs are funded for long enough to have a long-lasting impact (where possible).

FINDING 68: Recurrent funding is needed for invasive animal control, as short-term programs do little to limit invasive species damage overall.

RECOMMENDATION 28: That, as part of *Protecting Victoria’s Environment – Biodiversity 2037*, the Government guarantee long-term recurrent funding for invasive animal control.

10.2.3 Collaboration

Many submitters and witnesses noted the importance of collaboration between different land managers and different groups involved with invasive animal control. A critical part of this is a ‘tenure-blind’ approach, that co-ordinates action across both private and public land. The Committee notes that collaboration and co-operation is also important between state and federal governments in relation to invasive species control.

¹²²⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.18

¹²²⁸ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), pp.19-20

¹²²⁹ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.21

¹²³⁰ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.35

Private and public land managers

The Committee was told that a tenure-blind approach had been important in some successful programs. For example, in relation to the St Helens Flora Reserve (see Section 6.6.2 of this report), the Committee was told:

So we have worked with the farms and the forestry plantations to control foxes using 1080 baits, and cats by direct intervention once they have been observed on the bandicoot cameras. The evidence of the bandicoots on the private land has enabled us to gain control of foxes in the adjoining plantations, as the management companies are very supportive of our program and it enables them to lay baits under their community pest control derogation. The fox bounty and awareness raising of the bandicoots has also encouraged more locals to hunt foxes than perhaps they were prior to the monitoring and baiting occurred. Many people said the foxes harbour in the plantations, so getting action on that has helped bring greater sense of community pulling together than would have occurred if we had just baited in the Parks Victoria reserves.¹²³¹

Similarly, the West Gippsland Catchment Management Authority cited a cross-tenure approach as an important part of a successful fox control program in the Corner Inlet area:

Together with Landcare, Greening Australia and other community bodies like that, we worked closely in terms of engaging not just any landholder throughout the region but those immediately adjacent to the sites to increase the effectiveness of controlling foxes on those barrier islands, which is critical to protect the migratory and shorebird populations along there. That is sort of the background and the approach that we have taken. Landcare was critical in terms of that role of engaging and working closely with those landholders in terms of their program, which was in line with the Parks Victoria's program on public land. That was the approach, and it has worked really, really well.¹²³²

Others noted the importance of collaborative animal control approaches to manage potential secondary effects of control activities (see Section 5.4.2). For example, the Kara Kara Conservation Management Network told the Committee:

The introduction of guard animals on farms has reduced the need for fox control activities by landholders, but is likely to have increased fox predation on native wildlife. This increases the need for government action on crown land and also possibly by offering incentives for landholder control actions.¹²³³

The importance of successful partnerships between different land owners was recognised in the Weeds and Vertebrate Pests module of the *Invasive Plants and Animals Policy Framework*. The actions specified within this module include:

- working with local government
- implementing effective cross-agency partnerships

¹²³¹ Basalt to Bay Landcare Network, *Submission 188*, p.2; see also Lisette Mill, 'No Safe Harbour for Foxes at St Helens' *Victorian Landcare and Catchment Management* 66 (2016), p.13

¹²³² Dan Garlick, Planning and Delivery Manager, West Gippsland Catchment Management Authority, *Public Hearing*, 7 October 2016, p.4

¹²³³ Kara Kara Conservation Management Network, *Submission 160*, p.1

- facilitating networks at local, regional and state-wide levels.¹²³⁴

The government has also established the Good Neighbour Program, which is intended to prioritise government action in areas where private landholders are taking action (see Section 3.8.5 of this report).

However, the Committee heard from a number of people about problems experienced when attempting to work together with government bodies in co-ordinated actions.

A number of submitters and witnesses indicated that efforts to control invasive animals on private land had been undermined by a failure to control the animals on nearby public land. The Surf Coast Rabbit Action Network, for example, stated that:

1. Private Land Managers have been continually and repeatedly re-treating re-infestations which predominantly have come from neighbouring public land
2. Benefits from investment in rabbit control by Private Landholders is reduced in a short time (less than a year) due to the lack of commitment and coordination by managers of public land
3. The benefits from investment in other environmental improvements is being jeopardised by failure to control rabbits¹²³⁵

Mr Richard Hodgens from Moyne Shire Council explained the difficulties the Council had encountered when trying to co-ordinate action with Parks Victoria:

Mr HODGENS — ... I am aware that Parks Victoria does some baiting in some areas. There have been times when we have gone, ‘Okay, we’ll try and partner up, and we’ll do our control at the same time as you do, or you let us know when you’re starting and we’ll come on board as well’, or vice versa, and for some reason the communication lines just get blurred and it does not happen.

There was one year that Parks Victoria went, ‘We’re not even doing a program this year’, and we had already set ours up to align with what theirs was in the previous year, and they pulled out. There was another instance, I think it was last year, when we were doing works in Southcombe Park in Port Fairy. When Parks Victoria needed work done, we would use the same contractor; they would come and do works for us on the way to do parks’ or on the way back. At the last minute, Parks Victoria went, ‘No, we’re not proceeding’. That meant that our program had to be reduced because the costs were going to be extra.

The ACTING CHAIR — Are their reasons that parks are giving you for going back on that? Is it a cost factor, for example?

Mr HODGENS — Yes, they always say it is insufficient budget. It just wears thin after a while. I mean, I do not have an awful lot of budget either, but we somehow manage to get something done. They just struggle to get anything done.¹²³⁶

¹²³⁴ Department of Primary Industries, *Weeds and Vertebrate Pests*, Module 1 within the *Invasive Plants and Animals Policy Framework* (2010), p.3 (included in Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, Attachment 11)

¹²³⁵ Surf Coast Rabbit Action Network, *Submission 103*, pp.4, 5

¹²³⁶ Richard Hodgens, Environment Officer, Moyne Shire Council and Daniel Young MLC, Acting Chair of the Environment, Natural Resources and Regional Development Committee, *Public Hearing*, 29 November 2016, p.5

Other participants in this inquiry had experienced difficulties getting required action from government bodies. In relation to wild dog problems, Mr Barry Tayler (from the Gippsland Wild Dog Advisory Group) detailed some of the problems he had experienced¹²³⁷ and stated that, ‘The general information from all my farmers is that they have given up with the department. They tell them the stories and they tell them where the problem is, and it falls on deaf ears.’¹²³⁸ He called for more consultation with farmers, noting the experience that farmers have in dealing with wild dog problems.¹²³⁹ A number of other submitters and witnesses also noted difficulties getting help in relation to wild dogs.¹²⁴⁰

Mr Anthony Evans from Warrnambool Field & Game noted that pest control activities on private land can sometimes be hampered by hunting restrictions on neighbouring Crown land:

A lot of our shooters are involved in vermin groups ... They shoot every weekend, and probably the biggest issue they have is when they are shooting around farmers’ land, private farms, and they are driving foxes when they come up and, as Richard said, when you come up to a block of Crown land the foxes just scoot straight into it. If we had permission to be able to go onto that, we could finish it off, because in some places it is totally surrounded.¹²⁴¹

However, he indicated that getting permission to shoot on Crown land can be difficult and called for:

... an easier way to contact the department and say, ‘This weekend we’re shooting up at Caramut. In the middle of the four farms we’re shooting, and on this location there’s a reserve. How do we get permission to go through there? Do we have to advertise? Can we go in there first, make sure there’s no-one there and then, if we’re all around it, go in and get the foxes out of it basically?’. We need an easier way to do that, like just a quick approval system. And there are not many, but some of them are fairly large.¹²⁴²

Similarly, Ms Lisette Mill, from the Basalt to Bay Landcare Network, indicated that her organisation had experienced problems getting permission to use the latest pest control methods from Parks Victoria.¹²⁴³ Ms Jenni Reside from Wildlife Unlimited told the Committee about difficulties she had experienced in relation to the use of 1080-poisoned grain.¹²⁴⁴

The Snake Island Cattlemens Association also suggested that there had been a failure to adequately consult stakeholders when deciding to trial hog deer hunting on Snake Island:

¹²³⁷ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, pp.5, 9

¹²³⁸ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.9

¹²³⁹ Gippsland Wild Dog Advisory Group, *Submission 26*, p.1

¹²⁴⁰ Cathy Roberts, *Submission 20*, pp.2-3; Brendan Mahoney, *Submission 108*, p.2; Harvey Benton, *Submission 109*, p.2; Luke Mitchell, *Submission 165*, p.4; Name withheld, *Submission 174*, p.2; Geoff and Janette Bussell, *Submission 199*, p.2

¹²⁴¹ Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, p.3

¹²⁴² Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, p.6

¹²⁴³ Lisette Mill, Landcare Network Facilitator, Basalt to Bay Landcare Network, *Public Hearing*, 29 November 2016, p.4

¹²⁴⁴ Jenni Reside, Co-director, Wildlife Unlimited, *Public Hearing*, 6 October 2016, p.2

The problem in particular with balloted hunting was that it came out as a ministerial announcement. There had been no stakeholder consultation. There are a number of tour operators that actually use that and have a licence to operate with Parks Victoria. One of those operators has been operating down there for over 20 years, and he runs outdoor adventure type activities — kayaking, camping and those sorts of things. He runs that for schools — school programs — and he takes groups of 20 students over there and they camp and then paddle along that inland side of the island, because it is really safe. It is a safe place to do that. He also runs programs for at-risk youth, so he takes at-risk youth over there. They camp over there, and obviously a lot of that is developing life skills and team skills. So he runs those programs. There has been no communication with him or his business even now. There has been no official communication through Parks Victoria with him, and he is responsible for over 2500 visitation days onto the island. He is a major user of the island, but there has been no consultation.

There has been no consultation with the Victorian kayakers club. I would say that kayaking is an emerging recreational activity, because I think it is here and it is here to stay. There are lots of kayakers. This region is a really safe place for those people to come and enjoy the environment. That is 5000 visitation days by those tour operators. That is organised days, and what is being proposed here with balloted hunting is eight people on eight occasions for five days. That is 320 visitation days maximum.

We are not talking informal, because the island is also available to anybody as well as it is for the bushwalkers. They will hire a boat and drop it on one side of the island and then walk to the other side of the island. That is what they commonly do. Kayakers will camp. They will take three or four days to paddle around the island. They will camp at various places around the island. So those are the sorts of things that I believe the minister has failed to take into consideration when she made that statement ...¹²⁴⁵

The Committee notes these various concerns about working with state government bodies, including difficulties co-ordinating activities, difficulties getting required action, difficulties getting permission to undertake activities on Crown land and problems with consultation.

The Committee considers that these difficulties may be partly addressed by creating a single point of responsibility for invasive and pest animal management, which can also act as a single point of contact to facilitate communication between groups, government bodies and private landholders. This is discussed further in Section 10.3 of this chapter.

FINDING 69: Government policy acknowledges the importance of partnerships in successful animal control programs. However, the evidence received suggests that this policy has not been implemented in practice, with individual landholders, organisations and local government experiencing difficulties co-ordinating their animal control programs with state government programs or getting required actions/permissions from government bodies.

¹²⁴⁵ Paul Hamlett, Member, Snake Island Cattlemens Association, *Public Hearing*, 7 October 2016, p.8

RECOMMENDATION 29: That the Government investigate barriers preventing proper consultation and collaboration between individuals, organisations and other bodies in relation to animal control and implement measures to ensure that this occurs in the future.

Paid professional pest controllers

As outlined in Sections 6.3 and 10.4 of this report, paid professional pest controllers are highly skilled and have excellent knowledge and experience in relation to invasive animals and methods to control them. The Committee is of the view that professional pest controllers should play a key role in invasive species control. However, Mr Cameron Skedd, President of the Vertebrate Pest Managers Association Australia, told the Committee that little consultation had occurred with his organisation in relation to the co-ordinated recreational hunting programs.¹²⁴⁶

The Committee considers that consultation and collaboration between government departments implementing co-ordinated recreational hunting programs and professional pest controllers would assist these programs to achieve more effective results.

FINDING 70: Paid professional pest controllers have extensive experience and knowledge of invasive species, areas of land and methods of control. Consultation and collaboration with professional pest controllers could provide benefits to any invasive animal control program.

RECOMMENDATION 30: That the Government engage paid professional pest controllers in an advisory role when designing and implementing invasive species control strategies and programs.

National approach

Victorian strategies, policies and legislation operate under a number of national agreements and laws. As discussed above, invasive species do not recognise land borders. Hence, a tenure-blind approach to their control is required. Animals also do not recognise state boundaries and therefore national collaboration in this area is important.

Victoria is a signatory to both the *Intergovernmental Agreement on Biosecurity* and the *National Environmental Biosecurity Response Agreement*, which facilitate responses to threats to biosecurity at federal and state levels.¹²⁴⁷

¹²⁴⁶ Cameron Skedd, President, Vertebrate Pest Managers Association Australia, *Public Hearing*, 5 September 2016, p.10

¹²⁴⁷ Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria, *Submission 210*, p.7

The Committee believes the principles of collaboration discussed above between different land managers should also apply between state and federal governments. For instance, Victoria can learn from the New South Wales and South Australian pest control programs (outlined in Section 6.7 of this report) and apply their findings to future control programs.

There is a need for greater research in this area, including the spread and distribution of invasive species and the most effective control methods (see Section 10.2.5 of this chapter). The Committee recognises the importance of this research being a collaborative process, undertaken nationally, rather than by just one state.

FINDING 71: Invasive animals do not recognise or obey any land boundaries, including state borders. Effective collaboration and co-operation, particularly in relation to research and knowledge about invasive animals, at both federal and state level, is important for informing decisions.

RECOMMENDATION 31: That the Government raise the issue of research into controlling deer with the Council of Australian Governments and request the Federal Government initiate comprehensive research into control methods.

10.2.4 Adaptability

Adaptability is a key element of successful animal control programs. There are two main reasons for this.

Firstly, the complexity of ecosystems and our incomplete knowledge mean that it is difficult to predict how an ecosystem will respond to a human intervention. Regular monitoring is therefore essential and a control program must be ready to adapt based on what is or is not working in a particular situation.¹²⁴⁸

Secondly, better results may be possible if an animal control program can take advantage of unexpected opportunities that arise. For example, helicopter shooting of deer in the High Country may be more effective if done following bushfires, when there is less foliage.¹²⁴⁹ Similarly, undertaking rabbit control activities at the same time as the new K5 rabbit virus is released (see Section 8.2 of this report) has the potential to increase the impact on rabbit populations for the longer term.¹²⁵⁰

Adaptability requires both a flow of information about what is happening and a capacity for management to change or initiate actions in response.

¹²⁴⁸ PestSmart, *Principles of Pest Animal Management* (2014), p.3

¹²⁴⁹ Bob Gough, *Public Hearing*, 19 October 2016, p.3

¹²⁵⁰ Tim Bloomfield, 'Beating Rabbits – the Recipe for Success' *Victorian Landcare and Catchment Management* 66 (2016), p.4. This approach was adopted successfully in South Australia, where intensive rabbit control was undertaken following release of the rabbit haemorrhagic disease in 1995 – Government of South Australia, *Bounceback: Celebrating 20 Years* (2014), p.12

Protecting Victoria's Environment – Biodiversity 2037 notes (in relation to biodiversity programs generally) that, 'Planning and actions need to be flexible to address changes and emerging issues, including natural and emergency events (such as drought, fire and flood), new threats or rapid species decline.'¹²⁵¹ It includes as a priority 'Increase the collection of targeted data for evidence-based decision making and make all data more accessible.'¹²⁵²

The Committee heard from a number of submitters and witnesses about limitations in government bodies' capacity to be adaptable. Concerns about some existing monitoring processes are discussed in Chapter 6 of this report and in Section 10.3.2 of this chapter. The Committee was also told that bureaucratic processes can slow down actions by government bodies. The Surf Coast Rabbit Action Network, for example, noted that, 'Public land manager's funding cycles often don't align with needs – sometimes requiring 12 months notice rather than being able to provide a rapid response to outbreaks in hotspots'.¹²⁵³

Mr David McNabb from Field & Game Australia detailed one of his experiences:

As a hunter I cannot access Johnson Swamp state game reserve out of Kerang outside of the prescribed hunting season — a fabulous bit of country. Earlier this year we saw it in a drying regime, and the birdlife on there was absolutely incredible. It was a fairly isolated oasis by definition because of limited water provided there and not throughout that natural system. So you have got great waterbird and waterfowl concentrations there. No doubt you will have foxes and all the other bits and bobs running around there. I cannot do anything about it. I cannot shoot foxes while I am on there. I cannot mobilise our local branch and our members to go and shoot foxes on there. And certainly outside of a 12-week hunting season, I cannot go in there in July or August and run fox drives on there without going through some bureaucratic programs and having to make sure we have got memorandums in place between ourselves and Parks and all the rest of it.

To be quite fair, Parks are very, very favourable to these approaches, but we have got to build a systemised approach. We were just having, earlier, conversations again. Now we have got to go through and redesign and redo memorandums of cooperation and run those out through their network. We have got members sitting there ready to go with great skills in this as well.¹²⁵⁴

The Committee recognises the need for government bodies to regulate animal control activities on public land, especially those involving shooting. However, it is also important for processes to be rapid enough and flexible enough to allow opportunities to be taken advantage of.

The Committee believes that adaptability should be built into any individual animal control program, as recommended in PestSmart's key principles for pest animal management (see above). In relation to the system as a whole, the

¹²⁵¹ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.40

¹²⁵² Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.22

¹²⁵³ Surf Coast Rabbit Action Network, *Submission 103*, p.5

¹²⁵⁴ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.12

Committee considers that adaptability would be facilitated by a single point of responsibility and a single point of contact, as recommended in Section 10.3.1 of this chapter.

FINDING 72: Adaptability is a key element of an effective animal control program. Bureaucratic processes need to be flexible and rapid enough to enable land managers to change approach when required and to take advantage of opportunities when they arise.

10.2.5 Research

Chapter 5 of this report outlined the importance of measuring and evaluating control methods and programs in achieving their outcomes. A number of submitters and witnesses also indicated that there is a need for more research to improve our understanding of invasive animals and their impacts in Victoria in order to identify the best means of control. An improved understanding of invasive animals and their impact can help planners make better decisions about when and where to intervene. A deeper understanding about the effectiveness of different control techniques (and different combinations of techniques) can help land managers to get the best value from animal control expenditure.

A lack of scientific data about the effectiveness of some control methods, especially recreational hunting, was noted by multiple participants in this inquiry. For example, Mr Barry Howlett from the Australian Deer Association noted the following conclusion from a 2016 paper on recreational hunting:

Reliable information derived from scientific investigation of real-world situations is urgently needed to support the establishment of rational, agreed, and achievable management objectives. Until such information begins to become available, debate over the roles of recreational hunting as a means of pest management on public lands will continue to be dominated by untested hypotheses, selective half-truths and logical fallacies.¹²⁵⁵

Further research to better understand the effectiveness of recreational hunting and other control methods was called for by a number of participants. This would help land managers to make more informed decisions about what actions to take and can potentially lead to more successful and efficient programs.

Research also has the potential to improve the effectiveness of particular control methods. The benefits for hunters of research into deer behaviour, populations, movement and distribution are discussed in Section 9.6 of this report. There have also been calls for research into potential new techniques for controlling invasive animals (especially deer, as discussed in Section 8.9.3).

¹²⁵⁵ Andrew J. Bengsen & Jessica Sparkes, 'Can Recreational Hunting Contribute to Pest Mammal Control on Public Land in Australia?' *Mammal Review* 46 (2016), p.306; quoted by Barry Howlett, Executive Officer, Australian Deer Association, *Public Hearing*, 5 September 2016, pp.2-3

Research may also be needed to identify appropriate targets for animal control. In many jurisdictions, animal control is evaluated against target densities of the problem species. Target densities reflect the point at which the level of damage to the environment or agriculture by a species is acceptable. However, it is not clear what this density would be for deer in Victoria:

There are some large knowledge gaps about the impacts of deer in Victoria, in particular how they impact on native biodiversity. There have been diet studies. There have been some observational studies of deer, or what is attributed to deer, and browse on various plant species. There are observations of trampling in waterways and that type of thing, but in terms of having enough solid information, if you like, to be able to develop target densities for the various deer species, I think most researchers and managers would say we do not have enough information at the moment.¹²⁵⁶

Similar points were also made in relation to other invasive animals.¹²⁵⁷

More generally, a systematic review of deer management in Australia in 2016 identified a number of knowledge gaps and recommended six topics as priorities for further research:

- long-term changes in plant populations and communities as a result of deer (including identifying plant populations and communities most vulnerable to deer impacts)
- the direct and indirect interactions of deer with native fauna
- the impacts of deer on water quality
- the economic impacts of deer on agriculture
- cost-effective ways to manage deer impacts
- changes in the distribution and abundance of deer (including the factors which limit or enable range expansion), to anticipate and prevent the spread of deer and eradicate new populations where possible.¹²⁵⁸

The recent supplementary pest control trials in New South Wales (see Section 6.7.1 of this report) and the current trials in the Alpine National Park (see Section 6.5.2) should help to fill in some of the gaps in our knowledge.

The *Sustainable Hunting Action Plan 2016-2020* also indicates that the government will undertake further research into game, including ‘developing a game species research strategy to better understand the distribution, abundance and recruitment of game species and the impact of hunting activity’.¹²⁵⁹ More generally, *Protecting Victoria’s Environment – Biodiversity 2037* notes that:

¹²⁵⁶ Dave Forsyth, *Public Hearing*, 10 October 2016, p.3

¹²⁵⁷ For example, dogs (Dennis Keith, *Submission 11*, Attachment 1, pp.4, 8) and horses (Australian Brumby Alliance, *Submission 159*, p.2)

¹²⁵⁸ Naomi E. Davis, Ami Bennett, David M. Forsyth, David M. J. S. Bowman, Edward C. Lefroy, Samuel W. Wood, Andrew P. Woolnough, Peter West, Jordan O. Hampton & Christopher N. Johnson, ‘A Systematic Review of the Impacts and Management of Introduced Deer (Family Cervidae) in Australia’ *Wildlife Research* 43 (2016), pp.526-7

¹²⁵⁹ Department of Economic Development, Jobs, Transport and Resources, *Sustainable Hunting Action Plan 2016-2020* (2016), p.16

To enable decision makers to implement planning to benefit the maximum number of species, we need to be able to understand and compare the relative benefits that can be expected for different species from this increasingly wide range of interventions. For example, for a given amount of investment, how many species receive greater benefits from an area of revegetation compared to, say, from an area of invasive species control? Similarly, will a species translocation be more beneficial than the creation of a captive population?¹²⁶⁰

The plan includes increased data collection and a better understanding of key threats (including pest animals) among its initiatives.¹²⁶¹

Research must continue to be part of invasive animal management going forward, so that decisions about programs and strategies can be made with a strong evidence base.

FINDING 73: There was some debate during this inquiry about the importance of research and whether funds are best spent on research or on executing control programs. Ongoing research is essential to better understand invasive animal management, including the relative effectiveness of different control methods, potential new methods, appropriate targets for animal control and the impacts of invasive animals on the environment and agriculture.

10.2.6 Education and awareness about animal control

To successfully control invasive animals, community understanding is also important. This includes helping private landholders to understand their obligations and explaining why government bodies have adopted particular strategies in relation to invasive animals. Where recreational hunting is a part of a program, it is important for people to understand the benefits that are expected to come from this approach.

The Peri Urban Group of Rural Councils noted the importance of public information campaigns about the need to manage invasive animals, especially for new residents who have moved from urban areas.¹²⁶² Mr Barry Tayler, from the Gippsland Wild Dog Advisory Group, also emphasised the importance of educating new landowners:

There is another major problem that is happening in our area, and it is that larger farms are being cut up into hobby farms and 10-acre blocks and 20-acre blocks, and those people come down on weekends to their new property. They buy a few sheep, goats, whatever. They put them on there. They come down each weekend to make sure it is still there, and then all of a sudden after a period of time the novelty wears off the place and they might come once a month or whatever and they come back and they are missing livestock. They do not know where they go; they do not know that we have a dog problem. They are actually helping the situation by having their stock there unattended and the dogs feasting on them. So that is another problem

¹²⁶⁰ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.19

¹²⁶¹ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), pp.22, 48

¹²⁶² Peri Urban Group of Rural Councils, *Submission 149*, p.5

that is going to increase. One of my things with the department was that we need to get some information out to these people to let them know that there is a problem and that if they do have a problem, to get in touch with someone, because they do not know. They are newcomers to the area; they have got no idea.¹²⁶³

It was suggested by a number of submitters and witnesses that there was also a need to raise awareness about the importance of government animal control programs. It was argued that some people are not aware of how much damage is caused by invasive animals to biodiversity and agriculture and that there was less support for management programs as a result. One submitter suggested creating an ‘Invasive Animals Day’, based on a similar model to ‘Clean Up Australia Day’ or ‘National Tree Day’.¹²⁶⁴

Several people and organisations also suggested educating people about the value of recreational hunting. Australia has a relatively cautious approach to firearms and hunting is an activity that only a small proportion of the community participates in (see Section 1.1 of this report). As a result, recreational hunting can cause significant concern to some members of the community. Public information may allay some of these concerns.

The Committee agrees that, where recreational hunting is to be used as part of animal control, there is a need for government bodies to help the local community and other potential land users to understand why and to allay concerns. This could include the rationale for using recreational hunting, the expected benefits, how animal welfare will be protected and what measures will be put in place for community safety.¹²⁶⁵ It may also be helpful to educate people in these areas about what to do if they encounter irresponsible or illegal hunters (see Section 4.7 of this report).

Protecting Victoria’s Environment – Biodiversity 2037 includes initiatives to raise awareness about Victoria’s natural environment.¹²⁶⁶ Information about invasive animals and the damage they cause could potentially be incorporated into those initiatives.

FINDING 74: An understanding about the need to control invasive animals and the rationale for government programs is important for community support.

RECOMMENDATION 32: That the Government develop initiatives to educate the public on the invasive species problem in Victoria.

¹²⁶³ Barry Tayler, Gippsland Wild Dog Advisory Group, *Public Hearing*, 6 October 2016, p.9

¹²⁶⁴ Stephen Koci, *Submission 201*, p.2

¹²⁶⁵ Peri Urban Group of Rural Councils, *Submission 149*, p.5

¹²⁶⁶ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.24

10.3 Responsibility and accountability for invasive and pest animal management

10.3.1 Current arrangements

As discussed in Chapter 3 of this report, multiple government and non-government bodies share responsibility for managing invasive animals in Victoria. The Victorian Auditor-General's Office identified this as a problem in 2010, when it conducted an audit into the control of invasive plants and animals in Victoria's parks, finding that:

Unnecessarily complicated governance arrangements have hindered coordination and control of invasive species ... The governance arrangements in place to manage invasive species are unnecessarily complex and do not clearly assign accountability for success or failure ... there are multiple stakeholders, with multiple roles and limited integration.¹²⁶⁷

Furthermore, the Auditor-General's report found that:

A landscape scale approach is not being used to manage invasive species throughout the state – largely because various agencies continue to adhere to traditional management approaches that are not coordinated. No single agency was responsible for coordinating local and regional issues with state management priorities. All the agencies involved in managing invasive species have a different focus:

PV [Parks Victoria] is responsible for managing parks only, and does not routinely consider invasive plant and animal issues occurring outside the park boundary

CMAs [catchment management authorities] have a regional, or catchment, focus

DSE [Department of Sustainability and Environment] and DPI [Department of Primary Industries] have a statewide focus.¹²⁶⁸

The Committee notes that a number of machinery-of-government changes have occurred since that report was released. The *Invasive Plants and Animals Policy Framework* was finalised after the audit, which was expected by the Secretary of the Department of Sustainability and Environment at the time to address some of the Auditor-General's concerns.¹²⁶⁹

However, the Victorian Farmers Federation told the Committee that problems still remain. The organisation noted the Auditor-General's finding that 'There is no single point of focus for oversight or for the responsibility of success or failure'.¹²⁷⁰ The organisation considered that this remains a valid conclusion, highlighting that 'plans and activities are still undertaken on a catchment by

¹²⁶⁷ Victorian Auditor-General's Office, *Control of Invasive Plants and Animals in Victoria's Parks* (2010), p.8

¹²⁶⁸ Victorian Auditor-General's Office, *Control of Invasive Plants and Animals in Victoria's Parks* (2010), p.10

¹²⁶⁹ Victorian Auditor-General's Office, *Control of Invasive Plants and Animals in Victoria's Parks* (2010), pp.xi-xiii

¹²⁷⁰ Victorian Auditor-General's Office, *Control of Invasive Plants and Animals in Victoria's Parks* (2010), p.vii; Victorian Farmers Federation, *Submission 184*, p.9

catchment basis with poor linkages to crown land management policy, plans or budget processes.¹²⁷¹ It also believed that there remained ‘blurred accountability’ as a result of the complex governance arrangements.¹²⁷²

Mr Gerry Leach from the Victorian Farmers Federation further explained:

The VFF [Victorian Farmers Federation] believes that many issues identified by the Victorian Auditor-General in 2010 are still relevant today. The VFF believes that the system still lacks an overarching sense of purpose and direction to guide all agency activities. Where there is an attempt to undertake coordinated planning at a landscape scale, the basis of the model does not allow for the consideration of the cost of invasive pests on agricultural production. Farmers do not know who to contact to raise issues of invasive pest animals residing in nearby public land and do not have certainty that this will be given serious consideration. Ensuring effective programs to eradicate all invasive pest animals within public land will have both environmental and economic outcomes.¹²⁷³

A 2016 audit of Ramsar wetland by the Victorian Auditor-General’s Office also suggested that some of the problems identified in 2010 continue:

... while there are a number of effective on-ground management outcomes [in relation to Ramsar sites], these are not clearly linked to management plan actions or risks. Overall, the governance, coordination and oversight of the management of Ramsar sites must improve for Victoria to effectively meet its obligations under the Ramsar Convention.

Monitoring of Ramsar sites also requires improvement. Some short-term output-focused monitoring takes place, but there is limited ongoing monitoring with a focus on outcomes. As a result, management effectiveness is not systematically monitored, reviewed or evaluated. Failing to maintain the ecological character of these sites risks breaching Australia’s international obligations under the Ramsar Convention.

Some of the issues in this audit have been highlighted in previous performance audits in the environment and natural resource management area. These audits have also found complicated and poorly coordinated governance arrangements, a lack of oversight and accountability and poor evaluation, compromised by limitations in data. These systemic issues still need addressing, and all environmental or natural resource management agencies should have close regard to these recurring issues.¹²⁷⁴

The Committee sought to understand some of the different government bodies’ responsibilities from Ms Nina Cullen (Department of Environment, Land, Water and Planning) at a public hearing:

The CHAIR — ... what are the lines of demarcation or responsibility between the various departments? In a previous inquiry one of the issues that came up was that everyone had responsibilities but no-one took responsibility and there was this constant sort of buck passing. I am not saying that you are doing that, but how does it sort of work in terms of the areas of responsibility?

1271 Victorian Farmers Federation, *Submission 184*, p.9

1272 Victorian Farmers Federation, *Submission 184*, p.9

1273 Gerry Leach, Chair, Land Management Committee, Victorian Farmers Federation, *Public Hearing*, 10 October 2016, p.3

1274 Victorian Auditor-General’s Office, *Meeting Obligations to Protect Ramsar Wetlands* (2016), p.vii

Ms CULLEN — Parks Victoria is responsible for the operational management of threats and biodiversity outcomes on the parks and nature conservation estate, and they therefore lead, develop and manage a raft of programs on the parks estate and conservation estate with respect to invasive animal control. DELWP [the Department of Environment, Land, Water and Planning] is the portfolio agency, and it has a financial relationship with Parks Victoria. Parks Victoria has responsibility and takes a very strong lead in managing invasive animal matters on the parks estate. DELWP certainly is responsible for managing invasive species on the state forest estate and various other parts of Crown land.

The CHAIR — So is it one plan, one program, or —

Ms CULLEN — That depends on the area, the place and the issue — the actual animal that is causing the issue. There are a number of programs that have been run, and many of those are across tenure. Some of them are shared between Parks Victoria and DELWP. Some of them are Parks Victoria led. Some of them are Parks Victoria and other parts of the community et cetera. It depends a little bit on the plant or the animal that is being protected and where it is located. It might purely be on a national park or something like that or it may be across different tenures, and at those times a program is worked up that is going to be best suited to manage that invasive animal or to best protect that value that has been identified as most vulnerable.

The CHAIR — Okay, and then when it gets onto the private land or that interface — I think that we have had a number of submissions where landholders are saying that the problem is in the state park or the Crown land or whatever it is, and then it sort of flows out onto their property. Is that again managed in a sort of an overall way or is it in bits?

Ms CULLEN — Again it does depend on the particular program and the pest that is causing the impact. There are processes and protocols and standing operating procedures that work across the different tenures. In some circumstances they are more agency specific.¹²⁷⁵

This conversation illustrates the dispersed nature of responsibility for invasive animal management. The Committee notes that this conversation did not include the role of the Department of Economic Development, Jobs, Transport and Resources, catchment management authorities, the Game Management Authority, local councils, the Commonwealth Government or other groups (see further details in Chapter 3 of this report).

The Committee found it difficult to make sense of the convoluted arrangements of responsibility and notes that this complexity is likely to make effective action and accountability more difficult. Some of the difficulties regarding collaboration, responsiveness of government bodies and adaptability (see Sections 10.2.3 and 10.2.4 of this chapter) may be a result of these complex arrangements. This was acknowledged (in relation to biodiversity policy more generally) by the Government in the draft of *Protecting Victoria's Environment – Biodiversity 2037*:

¹²⁷⁵ Bronwyn Halfpenny MP, former Chair of the Environment, Natural Resources and Regional Development Committee, and Nina Cullen, Executive Director, Biodiversity Division, Department of Environment, Land, Water and Planning, *Public Hearing*, 5 September 2016, p.4

Victoria’s conservation planning and investment approach is dated, inconsistent, complex and fragmented. To achieve the biodiversity goals described in Chapter 3 [‘to encourage more Victorians to value nature’ and ‘to ensure that Victoria’s natural environment is healthy’], we need to update our approach and ensure that there is integration across public and private land, as well as different environments (terrestrial, marine and freshwater). We also need to be more agile in responding to new issues, and leverage new funding into biodiversity. We need a clear accountability framework that includes targets, and enables adaptive management and timely decision-making.¹²⁷⁶

As part of the final plan, the government has committed to regularly evaluating the mechanisms for co-ordinating the actions of government bodies and other organisations.¹²⁷⁷

FINDING 75: There are too many government agencies, departments and bodies that have ad hoc funding and multiple overlapping responsibilities for the control of invasive animals and pests in Victoria.

A single point of responsibility and contact

The Committee believes that current arrangements may be improved by giving one state government body overall responsibility for invasive and pest animal management in Victoria.

This would mean responsibility and accountability for invasive and pest animals would be clear and the return on government funding put into animal control could be maximised.

Having a single point of responsibility would also mean there would be a single point of contact in relation to invasive and pest animal control. This could assist with and encourage communication between different people and groups engaged in land management. In particular, private landowners and community groups wanting to co-ordinate animal management activities with government would be able to contact the body, which could then facilitate communication to establish effective collaboration. Individuals or groups identifying a particular need or opportunity in relation to invasive animal control could also contact the body, which could then work with the relevant government department or agency to respond as appropriate.

A recent report on institutional changes required for effective citizen-led action on invasive species suggested that:

There are many demands on the citizens who participate in invasive species control, particularly those leading coordinated management. The work consumes resources, and can be frustrating and difficult to sustain. The conclusion from the Discussion

¹²⁷⁶ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2036: Draft* (2016), p.84; compare Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.39

¹²⁷⁷ Department of Environment, Land, Water and Planning, *Protecting Victoria’s Environment – Biodiversity 2037* (2017), p.52

Paper that government agencies must begin to see citizens involved in invasive species management as ‘clients’, and for systems to become client focused, is consistent with what we found from community consultation.¹²⁷⁸

Establishing a single point of contact for the community could help to create this client focus and could address some of the concerns about collaboration and adaptability noted in this inquiry (see Sections 10.2.3 and 10.2.4 of this chapter).

The Committee was also told that there are many recreational hunters who would be interested in shooting deer (or other invasive animals) on private land.¹²⁷⁹ At the same time, there are farmers with invasive animal problems who struggle to find time to manage the problems. It was therefore suggested that a government body should bring together farmers with invasive animal problems who would be willing to let recreational hunters shoot on their land with recreational hunters interested in volunteering for such activities.¹²⁸⁰ This could be another function undertaken by the body with overall responsibility for invasive and pest animal control.

As part of this process, the government body could seek feedback on the conduct of recreational hunters, so that only those who have acted responsibly would be recommended in future. This may allay some of the concerns that the Committee heard from farmers about irresponsible recreational hunters.

FINDING 76: Having multiple government departments, agencies, community groups and private landholders involved with animal management can make it difficult for parties to collaborate and for programs to be sufficiently adaptable to take advantage of opportunities.

RECOMMENDATION 33: That the Government designate one government body to be a single point of contact for private landowners, local government and community groups, that has overall responsibility and accountability for invasive and pest animal control in Victoria. This body’s responsibilities should include:

- developing an overarching plan for invasive and pest animals, including identifying priority actions
- ensuring that programs take place in accordance with the plan
- monitoring landowners’ compliance with their legal responsibilities in relation to pest animals
- promoting best practice among people undertaking animal control programs
- facilitating collaborative efforts involving different government bodies, community groups and private landholders
- publicly reporting on the effectiveness of animal control programs each year.

¹²⁷⁸ Paul Martin & Darryl Low Choy, *Recommendations for the Reform of Invasive Species Management Institutions* (2016), pp.11-12

¹²⁷⁹ In response to a survey of over 7,000 Australia recreational hunters (mostly members of hunting organisations), 99.3 per cent indicated that they would be willing to assist landholders to control pest species – Neal Finch, Peter Murray, Julia Hoy & Greg Baxter, ‘Expenditure and Motivation of Australian Recreational Hunters’ *Wildlife Research* 41 (2014), p.79.

¹²⁸⁰ For example, see David Howell, *Submission 198*, p.3; Robert Rosicka, *Public Hearing*, 20 October 2016, p.2; Anthony Evans, Secretary, Warrnambool Field & Game, *Public Hearing*, 29 November 2016, pp.7-8

10.3.2 Monitoring, evaluation and reporting

The importance of monitoring, evaluating and reporting on management activities was emphasised by a large number of submitters and witnesses to this inquiry. Monitoring and evaluation are important to understand whether or not a control program is actually providing the anticipated benefits and whether or not it is delivering good value for money. If well designed, monitoring can also identify unintended secondary effects, such as reducing one invasive species leading to increases in another species (see Section 5.4.2 of this report). Reporting is important to provide transparency and accountability.

Chapter 5 of this report outlines the key factors in better-practice monitoring and evaluation of animal control programs. In particular, it notes the importance of measuring changes in the impacts of the target animals or changes in the relative abundance of the species rather than the number of animals culled. Mr Simon Toop from the Game Management Authority summarised this position:

The critical thing in this whole argument is not how many deer are taken out of the system; it is how many remain behind and what the densities are and what the impact on the environment is. So you have to understand the state that you are trying to achieve, understand the density targets that you are looking for to achieve that state, and critically in all of that is conducting research and monitoring. That is very expensive and time consuming, but in order to say that we are actually achieving what we want to we really need to have that understanding.¹²⁸¹

The Victorian Auditor-General's Office's 2010 report on the control of invasive plants and animals in Victoria's parks found limitations in the monitoring, evaluation and reporting framework at the time:

There were few examples where the effectiveness of on-ground management activities had been rigorously monitored and impacts evaluated. As a consequence, there is little assurance that the investment to manage invasive species represents reasonable value-for-money.¹²⁸²

The Committee heard from a number of groups and organisations that there was still scope for improvement in monitoring and evaluation of some animal control trials. For instance, according to the Friends of the Helmeted Honeyeater, the Yellingbo deer control program (see Section 6.5.3 of this report) lacks 'a rigorous and well resourced monitoring framework to measure success against biological indicators.'¹²⁸³ The Wilsons Promontory trials, to date, have outlined the number of deer removed from the park, but have not detailed changes in environmental impacts (see Section 6.5.1).

In addition to monitoring the effectiveness of programs, it is also essential to monitor what funds were spent to achieve those results. This enables decision-makers to consider whether those funds might be more effectively spent on other methods of invasive animal management. For instance, could a larger number of deer be removed by professional hunters for the same amount spent

¹²⁸¹ Simon Toop, Director, Game, Game Management Authority, *Public Hearing*, 5 September 2016, p.11

¹²⁸² Victorian Auditor-General's Office, *Control of Invasive Plants and Animals in Victoria's Parks* (2010), p.26

¹²⁸³ Friends of the Helmeted Honeyeater, *Submission 158*, p.4

on co-ordinating and supervising recreational hunters? Alternatively, might the same number be removed by recreational hunters at less cost by using incentives rather than direct co-ordination?

The Committee notes that a more robust monitoring framework (including both environmental impacts and costs) is planned for the Alpine National Park deer control trial (see Section 6.5.2). The government is also undertaking work to integrate ‘environmental-economic accounting’ into reporting, decision-making and evaluation in Victoria. This approach includes standardised measures of the condition of environment assets.¹²⁸⁴

The Victorian Farmers Federation also noted the importance of measuring changes in the impacts of invasive animals on agriculture. As discussed in Section 2.6 of this report, invasive animals (including those living on Crown land) have a significant impact on agriculture and the need to reduce this impact is one of the reasons for control programs. However, Mr Gerry Leach from the Victorian Farmers Federation told the Committee that:

We are concerned that the cost-benefit analysis model seemingly focuses on biodiversity outcomes rather than the full range of statutory considerations under legislation, including those under the Catchment and Land Protection Act. VFF [Victorian Farmers Federation] members are concerned with the impacts of pest animals on production and their livelihood.¹²⁸⁵

As well as establishing a robust and appropriate monitoring and evaluation framework, it is also essential that the results of the evaluations be publicly reported. Reporting provides for accountability by giving the Parliament and the community information about the effectiveness of programs, so that they can better understand whether funds are being used most effectively.

Many submitters and witnesses indicated to the Committee that they believed that insufficient funding was provided for managing invasive species. Reporting on a robust framework will help stakeholders to understand whether the invasive animal situation is getting better or worse and to form a view on whether sufficient funding is being provided.

In addition, if private landholders can see that government programs in their areas are making a difference, they may also be more inclined to undertake their own animal control programs.

A Monitoring, Evaluation and Reporting Framework will accompany *Protecting Victoria's Environment – Biodiversity 2037*. This framework is intended to support decision-making, enable adaptive management and provide a basis for reporting.¹²⁸⁶ The plan states that:

¹²⁸⁴ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2036: Draft* (2016), p.46; Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.30

¹²⁸⁵ Gerry Leach, Chair, Land Management Committee, Victorian Farmers Federation, *Public Hearing*, 10 October 2016, p.2

¹²⁸⁶ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.21

To ensure that resources are spent well and wisely, all biodiversity management programs should allocate part of the available funding to data gathering, monitoring and evaluation. For all government biodiversity programs, at least five per cent of the total budget will be used for the monitoring requirements of the Plan, consistent with the *Monitoring, Evaluation and Reporting Framework*.¹²⁸⁷

Those contributing to delivering the actions under the plan will be required to report annually using standardised measures.¹²⁸⁸ The government intends to evaluate the plan as a whole every five years, with two-yearly interim reports.¹²⁸⁹

The Commissioner for Environmental Sustainability Victoria also produces five-yearly reports on the state of the environment, which include some information about invasive animals (along with many other considerations).

FINDING 77: Monitoring, evaluation and reporting are critical to ensure that appropriate actions are taking place to control invasive and pest animals and that funds are being spent in the most effective manner.

10.4 The role of co-ordinated recreational hunting

As discussed in Section 8.10 of this report, shooting has an important role to play in invasive animal control. However, there is not currently enough completed research, data or evaluation in this area to fully inform the Committee on shooting's role.

The extent of this role will vary depending on the target species, the environment and a number of other circumstances. Shooting by itself (particularly unsupervised recreational hunting), though, will rarely be able to achieve effective, long-term animal control.

To achieve long-term benefits, shooting needs to be integrated into a broader program involving multiple control methods in an appropriate sequence. Shooting also needs to be focussed on particular times and places. This can be achieved in a number of different ways:

- recreational hunters can be co-ordinated by land managers through hunting organisations (see Chapter 6)
- professional pest controllers can be hired to undertake shooting (see Section 6.3 of this report)
- incentives can be provided and barriers removed to encourage unsupervised recreational hunting to take place in target areas at specific times (see Chapter 9).

¹²⁸⁷ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.22

¹²⁸⁸ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), pp.20, 40-1, 51

¹²⁸⁹ Department of Environment, Land, Water and Planning, *Protecting Victoria's Environment – Biodiversity 2037* (2017), p.52

There are a range of advantages and disadvantages to each of these types of shooting, as discussed in Chapters 6, 7 and 8. Differences in the cost between these methods were seen by some as particularly significant. Animal control is often limited by funding constraints. It was therefore argued that recreational hunters (who are willing to assist with animal control on a voluntary basis) provide a way to remove more animals with limited funding. For example:

It should also be noted that experienced contractors are in high demand, and will naturally prefer high volume and high paying contracts, whereas volunteers are usually keen to take on most projects, so the choice between using contractors or volunteers may come down to annual project funding and volume of work.¹²⁹⁰

... one thing I have learnt over many years is you can sign off on a project, but you have got to sign off on the funding as well. So it does not mean just because a project gets signed up as a good idea that you have got the funding to do it. That is where that balance of multiple management tools — including recreational hunters complementing professional hunters, complementing some trapping and removal, whatever poisons, all those sorts of things — might be the suite of tools that are used.¹²⁹¹

However, as discussed in Section 6.9 of this report, co-ordinated recreational hunting involves a number of costs for the government bodies co-ordinating the programs and may not be cheaper (in terms of a cost per animal killed) than professional shooters. The trials in the Alpine National Park are expected to provide more data about the relative costs of professional and recreational hunters, which will better clarify the extent to which savings might (or might not) be made by using recreational hunters (see Section 6.5.2). The Committee also considers that the use of incentives rather than direct co-ordination may be a way to focus recreational hunters at a lower cost (see Chapter 9).

Ultimately, the Committee considers that there is an important role for recreational hunting within invasive animal control programs, though further research is required to determine the exact nature and extent of this role. The trials currently underway in the Alpine National Park and the recent Supplementary Pest Control program in New South Wales will help to clarify this role, as will ongoing monitoring, evaluating and reporting of animal control programs.

However, the Committee considers that the use of recreational hunting should not come at the expense of professional pest controllers. Professionals play a vital role in animal management and are able to offer a range of services in addition to shooting. They have access to more training and better equipment than recreational hunters and can kill more humanely than some recreational hunters. They are able to kill larger numbers in shorter periods of time, which can have advantages for other park users and businesses dependent on other park users. These matters are discussed further in Section 6.3 of this report.

¹²⁹⁰ Bob Gough, *Submission 67*, p.18

¹²⁹¹ David McNabb, General Manager, Field & Game Australia, *Public Hearing*, 10 October 2016, p.13

In some cases, there may be benefits to using both professional and recreational shooters at different stages of an animal control program (see Section 8.9.2). It may be more appropriate to see professional and recreational shooting as complementary methods rather than as alternatives.

Invasive animal policy should make use of both professional and recreational shooting, using each where it can achieve the best outcomes in the circumstances. The current levels of expenditure on professional pest control should be maintained, with support for recreational hunting being an addition rather than a substitute for professional activities.

Overall, the trials currently underway in the Alpine National Park have the potential to clarify the circumstances best suited to recreational or professional shooting, as well as the costs and benefits of co-ordinated recreational hunting more generally. If done well, these trials have the potential to form the basis for more informed evidence-based policy in the future and to improve the outcomes for invasive animal control in Victoria. It will be important for invasive animal control policy to be reconsidered once the results of these trials have been analysed.

Appendix 1

Submissions

Submission no.	Name
1	Bernadette Williams
2	John Gibbins
3	Richard Den
4	Jurgen Hemmerling
5	Paul Fleming
6	Sue Sullivan
7	J D O Enden
8	Jim Charalambous
9	Allan Marsland
10	Alvar Dalton
11	Dennis Keith
12	Roger Clements
13	Scott Campbell-Smith
14	James Findlay
15	Trevor Dean
16	Confidential
17	Daniel Grixti
18	Stephen Robins
19	Sean Kennedy
20	Cathy Roberts
21	Bob Smith
22	Iain King
23	Demetre Charalambous
24	Alexandar Krstic
25	Mark Freeman
26	Gippsland Wild Dog Advisory Group
27	David Waldock
28	Colin Curtis
29	Keryn McNeill
30	Name withheld
31	Jane Reid
32	Doug Read
33	Lincoln George
34	Graham's Factree
35	Glenelg Shire Council
36	Sean Kilkenny
37	Confidential
38	Yuna Rickard

Submission no.	Name
39	Robert Michalski
40	Darryl Bastin
41	Iain Atkin
42	Frank Gigliotti
43	Ordan Andreevski
44	Russell Sharman
45	Trevor Dennis
46	Western Port Biosphere Reserve
47	Jennifer Li
48	Chips Boucher
49	Bend of Islands Conservation Association
50	Malcolm Thompson
51	Tim Coffet
52	Ararat Rural City Council
53	RSPCA Victoria
54	Darren Horkings
55	John Bowman
56	Peter Mc Donell
57	Kathleen Whelan
58	Ross Scott
59	Garry Breadon
60	Mt Toolebewong & District Landcare
61	Moyne Shire Council
62	Bill Curren
63	Deerstalkers Club
64	Phillip Paton
65	Artur Muchow
66	Stephen Stepic
67	Bob Gough
68-69	Confidential
70	Helen McCarthy
71	Michael Johnston
72	Howard Reddish
73	Barbara Young
74	Moorabool Shire Council
75	Barbara Smith
76	Ken Farmer
77	Ken Slee
78	Zac Forster
79	Piers Jansen
80	Samantha Guyett
81	Victorian Hound Hunters
82	Linden Gillbank
83	Victorian Auditor-General's Office

Submission no.	Name
84	Victorian Deer Association
85	Michael Callipari
86	William Morris
87	Mountain Cattlemen's Association of Victoria
88	Sally Buckingham
89	Australian Bowhunters Association
90	Graeme Norman
91	Norman Wilkinson
92	Anthony Carroll
93	John Dol
94	Judith Cardwell
95	Tim Hajenko
96	Robert Strecker
97	Federation of Hunting Clubs
98	Edith Flanders
99	Wimmera Catchment Management Authority
100	Salv Spitaleri
101	June-Alice Dewhirst
102	Leila Huebner OAM
103	Surf Coast Rabbit Action Network
104	Mark Chaplin
105	Southern Dandenongs Landcare Group
106	Yarra Ranges Council
107	Victorian Farmers Federation - Omeo Branch
108	Brendan Mahoney
109	Harvey Benton
110	Elizabeth Frazer
111	Ken Pearce
112	Ewan Withers
113	Confidential
114	Gregory Morrissy
115	Tambo Bluff Landcare Coastcare
116	Peter Lynch
117	Gerard Brereton
118	James Boland
119	Name Withheld
120	Hugh and Nola Skey
121	Michael Feller
122	Ian Cohn
123	Simon Parkinson
124	People for the Ethical Treatment of Animals
125	Mitchell Shire Council
126	Neil Gillies
127	Evie Jones

Submission no.	Name
128	Luke De Boer
129	Warrnambool Field & Game
130	Confidential
131	Bushwalking Victoria
132	Alfredo Mercuri
133	Margaret Sietsma
134	Robert Ashworth
135	Christiane Jaeger
136	Robert Flower
137	Simon Attard
138	North East Catchment Management Authority
139	Alpine Shire Council
140	Andrew McCormack
141	Mount Sugarloaf Hunt Club
142	Robert Rosicka
143	N. Cauchi
144	Mary Klein
145	Goulburn Broken Catchment Management Authority
146	Firearm Owners United
147	Millgrove Residents' Action Group
148	Name withheld
149	Peri Urban Group of Rural Councils
150	Sporting Shooters Association of Australia (Victoria)
151	Samantha Bradley
152	The Australian Centre for Agriculture and Law
153	Game Management Council of Victoria
154	West Gippsland Catchment Management Authority
155	Murrindindi Shire Council
156	Kate Baselier
157	Mary Jane Alloway
158	Friends of the Helmeted Honeyeater
159	Australian Brumby Alliance
160	Kara Kara Conservation Management Network
161	Catherine and Clive Carlyle
162	Mary Wilkins
163	Nina Earl
164	Nancy McMurray
165	Luke Mitchell
166	Friends of the Gippsland Lakes Parks and Reserves
167	Snake Island Cattlemens Association
168	Australian Deer Association
169	Vertebrate Pest Managers Association Australia
170	East Gippsland Rainforest Conservation Management Network
171	Ian Smith

Submission no.	Name
172	Gippsland Environment Group
173	John Hermans
174	Name withheld
175	Tim Bloomfield
176	Bumpy Favell
177	Melissa Lord
178	Yarra Ranges Landcare Network
179	Wildlife Unlimited
180	Friends of the Prom
181	Tim Thomas
182	Rena Gaborov
183	Mansfield Shire Council
184	Victorian Farmers Federation
185	Louise Crisp
186	Stuart Stagg
187	Annette Lambert
188	Basalt to Bay Landcare Network
189	Maureen Halit
190	Kerrie Allen
191	Victorian National Parks Association
192	Invasive Species Council
193	Matt Pierce
194	Environment East Gippsland
195	Cardinia Catchment Landcare Group
196	Nillumbik Shire Council
197	Steve Garlick
198	David Howell
199	Geoff and Janette Bussell
200	Bruce Bowden
201	Stephen Koci
202	Shooting Sports Council of Victoria
203	Euan Moore
204	Harrietville Community Forum
205	Kirk Stone
206	Harry Ryder
207	Field & Game Australia
208	Lawyers for Animals
209	Mike Harrison
210	Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; and Parks Victoria
211	Name withheld
212	Peter Morison
213	Animals Australia
214	PrimeSafe

Submission no.	Name
215	Pro-Cull Animal Services
216	Dingley Dell Safaris
217	Stuart Robertson
218	Lesley and Graeme Butler
219	Kahn and Julie Franke
220	Victorian Petfood Processors

Appendix 2

Public hearings

Monday 5 September 2016, Melbourne

Name	Position	Organisation
Greg Hyams	Chief Executive Officer	Game Management Authority
Simon Toop	Director, Game	
Andrew Cox	Chief Executive Officer	Invasive Species Council
Nina Cullen	Executive Director, Biodiversity Division	Department of Environment, Land, Water and Planning
Kate McArthur	Senior Policy Officer, Biodiversity Division	
Barry Howlett	Executive Officer	Australian Deer Association
Jack Wegman	Chief Executive Officer	Sporting Shooters Association of Australia (Victoria)
David Croft	Training and Programs Coordinator	
Cameron Skedd	President	Vertebrate Pest Managers Association Australia
Kevin Grise	Secretary	
Peter Campbell	President	Bushwalking Victoria
Charles Ablitt	Vice President	
Mhairi Roberts	Animal Welfare Policy Manager	RSPCA Victoria

Thursday 6 October 2016, Sale

Name	Position	Organisation
Barry Tayler		Gippsland Wild Dog Advisory Group
Ken Slee		
Jenny Reside	Co-director	Wildlife Unlimited
Jim Reside	Co-director	
Roger Bilney		Gippsland Environment Group; and Environment East Gippsland
Nancy McMurray		Friends of the Gippsland Lakes Parks and Reserves
Tom Crook	Programs Manager	East Gippsland Rainforest Conservation Management Network
Paul Hamlett	Member	Snake Island Cattlemens Association

Friday 7 October 2016, Sale

Name	Position	Organisation
Luke De Boer		
Russell Sharman		
Dan Garlick	Planning and Delivery Manager	West Gippsland Catchment Management Authority
Shane Heywood	Land Team Leader	
Bill Hansen	Secretary	Friends of the Prom
Paul Hamlett	Member	Snake Island Cattlemens Association
Jenny Bland	Secretary	

Monday 10 October 2016, Melbourne

Name	Position	Organisation
Brendan Tatham	Chief Executive Officer	PrimeSafe
Gerry Leach	Chair, Land Management Committee	Victorian Farmers Federation
Lisa Gervasoni	Senior Policy Advisor, Land Management and Planning	
Mark Norman	Chief Conservation Scientist	Parks Victoria
Ben Fahey	State Leader of Invasive Species	
Roger Fenwick	Regional Director, Eastern Victoria	
Dave Forsyth		
Clare Veltman	Principal Science Advisor	New Zealand Department of Conservation
David McNabb	General Manager	Field & Game Australia

Wednesday 19 October 2016, Bright

Name	Position	Organisation
Bob Gough		
Dennis Keith		
Steven Tucker	Project Officer (Environment)	Alpine Shire Council
Anthony Carroll		
Neil McCarthy	Chief Executive Officer	North East Catchment Management Authority
Lachlan Campbell	Regional Landcare Coordinator - Agriculture - Kiewa	
John Atkins	Chair	Harrietville Community Forum
Eleanor Hoy		
Phillip Paton		
Ben Teek		
Colin Teek		
Peter Panozzo		
Peter Jacobs		

Name	Position	Organisation
Peter O'Donnell		Upper Ovens Valley Landcare Group
Greg Mirabella		Victorian Farmers Federation
Barry Mapley		
Michael Weston		
Paula Hall		
Paul Ivone		

Thursday 20 October 2016, Mansfield

Name	Position	Organisation
Charlie Lovick	President	Mountain Cattlemen's Association of Victoria
Graeme Stoney	Executive Officer	
Alex Green	Chief Executive Officer	Mansfield Shire Council
Judy Dixon	Acting Tourism and Economic Development Manager	
Michael Watson		Watson's Mountain Country Trail Rides
Brendan Mahoney		
James Findlay		
Robert Rosicka		

Tuesday 29 November 2016, Dunkeld

Name	Position	Organisation
Richard Hodgens	Environment Officer	Moyne Shire Council
Anthony Evans	Secretary	Warrnambool Field & Game
Lisette Mill	Landcare Network Facilitator	Basalt to Bay Landcare Network
Daryl Panther		Victorian Wildlife Management

Wednesday 30 November 2016, Dunkeld

Name	Position	Organisation
David Preece	General Manager	Victorian Petfood Processors
David Brennan	Chief Executive Officer	Wimmera Catchment Management Authority
Tony Baker	Statutory and Strategy Manager	
Clive Carlyle		

Monday 5 December 2016, Melbourne

Name	Position	Organisation
Rick Nugent	Assistant Commissioner	
Eileen Armato	Director, Public Support Services Department	Victoria Police
Paul Millett	Superintendent, Licencing and Regulation Division	
Phil Ingamells	Park Protection	Victorian National Parks Association

A2