



INQUIRY INTO MANAGEMENT OF OVERABUNDANT AND PEST SPECIES

Third Report of the Fifty-Fourth Parliament
OF THE
NATURAL RESOURCES COMMITTEE

Tabled in the House of Assembly and ordered to be published 2nd July 2019

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PRESIDING MEMBER'S FOREWORD

The Natural Resources Committee initiated an Inquiry into the Management of Overabundant and Pest Species in 2018 within the context of a significant review of the Natural Resources Management framework in South Australia. Numerous previous Parliamentary Inquiries and fact-finding visits have revealed ongoing concerns with multiple overabundant and pest species in South Australia.

The current inquiry has sought to gauge the efficacy of current legislative, policy and partnering approaches used to manage overabundant and pest species, and to understand whether any other approaches may provide more effective alternatives.

The Committee sought information about the costs of managing overabundant and pest species and their impacts within South Australia, for example, their effects on agricultural outputs, environmental values, tourism, road safety and amenity.

The Inquiry received 41 submissions and heard evidence from 12 witnesses.

The Committee heard evidence that there is presently an abundant animal problem that is causing an imminent threat to our state's biodiversity, among other impacts. The overabundance of several species was caused by changes to the landscape, including by the clearing of native vegetation. Further, the Committee heard that unless we act to manage the problem by culling abundant animals, there will not be a lot of other biodiversity in the state.

Evidence presented to the Committee recommended that action to manage abundant species must be Government led, and managed by local stakeholders including landholders, National Parks services, Aboriginal communities, and local management authorities such as Landscape Boards and Councils.

In addition to an overhaul of the permit system, management actions must include community education and industry development. In relation to community education, the Committee heard that there is a genuine reluctance to communicate with the public

about culling, as some community stakeholders find the concept of culling an abhorrent approach in managing overabundant species.

The Committee thanks those stakeholders who responded to the Terms of Reference and contributed to this robust Inquiry.

I thank all those who gave their time to assist the Committee with this inquiry. I commend the members of the Committee, Mr David Basham MP, Dr Susan Close MP, Hon John Darley MLC, Mr Nick McBride MP, Hon Terry Stephens MLC and Hon Russell Wortley MLC for their contributions to this report. I also thank Mr Philip Frensham and Dr Monika Stasiak for their assistance throughout.

A handwritten signature in grey ink, appearing to read 'Mr Josh Teague', written over a horizontal line.

Mr Josh Teague MP
Presiding Member
2nd July 2019

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EXECUTIVE SUMMARY

In conducting its Inquiry into the Management of Overabundant and Pest Species, the Natural Resources Committee considered evidence from submissions, witness statements and published literature. The Committee visited the Meningie and Coorong region, sought verbal evidence from 12 witnesses (listed in Appendix B) and received 44 submissions (see Appendix C). The Committee's recommendations are listed on page xiii and discussed in detail at page 66 of this Report. The recommendations aim to address the challenges and issues raised by stakeholders' responses to the Terms of Reference for the Inquiry.

Impacts of overabundant and pest species

At the national level, recent research proposes that invasive pests are *the most significant threat* to Australia's at-risk species. That is, the impacts of invasive species for Australian wildlife are likely to be higher than the impacts of climate change, land clearing or energy production. One exotic vertebrate species establishes in Australia every five years, while approximately 10 invasive plant species establish *every year*.¹ Chief Executive of the Invasive Species Council, Mr Andrew Cox, comments that, 'invasives are the major driver of species loss...'²

Submissions received in response to the Terms of Reference reflected on the impacts of overabundant and pest species, including effects on agricultural outcomes, ecosystems, animal welfare, communities and social amenity at the state level. Responses to the inquiry revealed problematic impacts occurring over a wide range of areas from specific species impacts, and cumulative impacts from multiple species. The Committee has sought to respond to the issues raised by identifying the commonalities across these and developing recommendations that are suitable for broad and specific use according to the nature of each species' impacts.

The Alinytjara Wilurara NRM Board submission refers to specific impacts for Aboriginal communities, such as:

¹ Ibid.

² Graham Readfern. 'We are losing the fight: scientists sound alarm over invasive species', *The Guardian*, 21 January 2019.

- Damage or fouling of significant cultural heritage sites
- Prevention of hunting and other traditional uses of land and subsequent reduced opportunities to transmit knowledge to young people
- Reduced opportunities to pursue novel or developing industries, for example carbon sequestration.

These issues also emerged in the Committee's interactions with Ngarrandjeri elders at Meningie, where the Ngarrandjeri expressed their distress at the destruction of the Coorong environment, particularly, the impacts of seals. The Committee is expressly interested in facilitating further involvement by Aboriginal stakeholders in the management of overabundant and pest species. It has therefore recommended more active involvement for Aboriginal people in policy development and implementation measures.

Some of the evidence provided to the inquiry about the impacts of overabundant and pest species is anecdotal and therefore difficult to quantify. Nevertheless, it demonstrates awareness of impacts and issues among stakeholders, and supports a case for further data collection and research.

Efficacy of management approaches to overabundant and pest species

Management approaches to overabundant and pest species must balance multiple complex issues. Natural resource management principles facilitate the stewardship of natural assets for short- and long- term sustainability and productivity. Management of species that are impacting on a resource is an important part of ensuring the ongoing health of that resource. The inquiry has revealed thematic challenges in formulating successful management approaches. These challenges include:

- Divergent opinions among stakeholders about how overabundant and pest species should be best managed
- Varying levels of understanding about the roles and responsibilities of parties involved in managing overabundant and pest species
- Limitations in resourcing to manage overabundant and pest species
- A need for more research into best practice management approaches.

A lack of evidence about best practice management of overabundant species, a lack of management options for urban and peri-urban environments, and a limited understanding of options beyond destruction, contribute to the limited effectiveness of existing management approaches.

Varying opinions among community stakeholders about management of overabundant and pest species suggests that communication and education is an important element of threat management and decision making. Variances in understanding about the responsibilities of parties within the current management system are also apparent: stakeholders assume and expect that government(s) will manage overabundant species and enforce compliance.

The South Australian Arid Lands Natural Resources Management (NRM) Board highlights additional concerns that may affect regional areas, such as:

- A lack of clear aims or objectives for control measures
- Land managers working in isolation allowing for re-infestation from neighbouring properties
- The large scale of pest problems
- Actions being taken based on pest management rather than impact management
- Actions being taken on perceived rather than actual impacts
- Sporadic control measures being taken 'as needed' with little follow up.

The South Australian regulatory framework differentiates between the management of overabundant population volumes of species that are indigenous to Australia, and the management of invasive pests that originate from other locations. This distinction results in the management of overabundant and pest species in South Australia being undertaken across multiple programs by many parties and agencies in accordance with numerous legislative and policy frameworks. It also results in the costs of managing overabundant and pest species populations being difficult to quantify.

Stakeholders' evidence to the Inquiry reveals that management of overabundant and pest species continues to be a significant concern across South Australia. The

evidence highlights that certain species pose potentially intractable challenges, particularly macropods and Little Corellas. In relation to macropods, the Committee heard that a dire population situation is currently occurring that may require a substantial population reduction using both short- and long- term management measures. A weight of evidence presented to the inquiry reveals the complexity of macropod management, whereby commercial harvesting quotas are responsive to market factors and are not directed at population management outcomes. To marry population management outcomes with commercial market development will require urgent consideration of industry challenges and opportunities. Modification of the parameters of the non-commercial harvesting system may also be required, particularly the investigation of potential carcass use and the efficacy of the permit system. The macropod challenge also highlights the differing management approaches operative on Crown land sites and those on privately-held land. In the Committee's view, responses to overabundance and invasiveness should not differentiate between Crown landholders and private landholders. Responses should be formulated according to impact and risk, regardless of land ownership.

Better clarity of roles among the agencies and levels of government involved in management could be a focus in improving state-based management approaches. With the revision of the natural resources management legislative framework in South Australia, the inquiry highlighted that a desire among stakeholders that state-based, coordinated management options are adopted wherever practical. These should be supported by issue-specific guidelines and or codes of practice developed by relevant stakeholders, such as appropriate agencies, local authorities, relevant experts, and Aboriginal community representatives. Where extraordinary or urgent circumstances arise, the South Australian Government should have the capacity to respond.

An opportunity also exists to re-align management approaches with research into best practice. Evidence shows that innovative tools are being developed. These are worthy of more detailed consideration and application. Sustained and long-term management approaches could deliver better outcomes, supported by increased resourcing where applicable.

Stakeholders' responses also reflect the need to balance varying interests in any management approaches adopted. For example, certain overabundant species have iconic status or tourism benefits, while others can be a food source or companion animals. Greater communication and community education would facilitate increased understanding of issues related to overabundant and pest species management. Specific engagement with Aboriginal stakeholders would enable the recognition of cultural impacts in the management of overabundant and pest species.

Costs of overabundant and pest species

Noting the distinction between overabundant native species and those species managed as non-endemic 'pests' in South Australia, Biosecurity SA reports that \$15.7 million was invested in *pest management* programs in 2017-2018, comprising:

- Commonwealth funds of \$4.4 million
- \$1 million from industry
- \$10.3 million from NRM levy and SA Government
- \$0.8 million from other sources

A 2016 Pestsmart survey determined that the annual economic impact of pest animals could be as high as \$797 million. This includes control costs, loss of production, damage to infrastructure, and research and development costs³.

As a percentage of total funding, the South East NRM Board spends 37% of the NRM levy raised in that region on the management and control of pest species⁴. Several of the responses received as part of the Inquiry quantified spending on specific species, for example Little Corellas. These costs are listed in the relevant parts of this Report, where applicable.

³ Murray Darling Basin NRM Board, *Submission 9*, p. 8.

⁴ South East NRM Board, *Submission 33*, p. 1.

SUMMARY OF RECOMMENDATIONS

The Natural Resources Committee makes the following recommendations in response to the Terms of Reference for the Inquiry.

In relation to Term of Reference 1 *Efficacy of existing or novel regulatory, policy, and partnering frameworks used to manage overabundant and pest species*, the Committee recommends that:

1. The Minister for Environment and Water should be able to declare a species as 'overabundant', for the purposes of managing its population impacts.
2. The Minister for Environment and Water should consider immediate declarations in relation to western grey kangaroos, little corellas, long-nosed fur seals, and koalas where populations are having a deleterious impact on an identified landscape.
3. The South Australian Government should apply a risk-based and impact-based approach to both native and invasive impact-causing species alike, and to both Crown land and privately-held land.
4. The South Australian Government expedites the development of integrated strategies for priority species where these are not already in place. Integrated strategies should include identification of populations and incorporate short- and long-term measures, whether or not a species is presently declared abundant.
5. The South Australian Government should develop policy and codes of practice for the management of species in partnership with Landscape Boards, Councils, communities including landholders, local Aboriginal communities, industries, and relevant experts.
6. The South Australian Government should seek engagement with and advice from local Aboriginal communities in developing management approaches.
7. The South Australian Government should continue to monitor research to provide an evidence base for effective management responses and greater understanding of best practices.

In relation to Term of Reference 2 *Costs of managing overabundant and pest species*, the Committee recommends that:

8. The Minister for Environment and Water ensures that the Landscapes South Australia framework should provide appropriate resourcing of Landscape regions to continue the local management of overabundant and pest species.
9. The South Australian Government should ensure that it participates in negotiation among the states and Commonwealth for longer-term funding, and funding of prevention-based approaches.

In relation to Term of Reference 3 *Impacts of overabundant and pest species on agricultural outputs, environmental values, tourism, road safety, and amenity*, the Committee recommends that:

10. The South Australian Government should provide more education and information to the community about environmental management practices, including the rationale for decisions made in relation to overabundant and pest species.

In relation to Term of Reference 4 *Any other relevant matters*, the Committee recommends that the South Australian Government:

11. Takes urgent action to establish and develop markets for abundant species, particularly kangaroos, including by consulting with industry with the objective of avoiding waste. Measures should include further use of carcasses, broadening the range of areas in which commercial harvesting can be undertaken, allowing harvesting trials in non-commercial zones, and reviewing fee structures associated with harvesting activities.
12. Initiate further inquiry to examine the structures, processes and challenges that prevent the development of a more robust commercial kangaroo products industry.
13. Investigate the potential for mining carp within the River Murray system.

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Figure 1 Generalised Invasion Curve: 8

Figure 2 Commercial Harvesting Zones in South Australia:26

THE NATURAL RESOURCES COMMITTEE

The Natural Resources Committee was established pursuant to the *Parliamentary Committees Act 1991* on 3 December 2003.

Its membership for the duration of this inquiry was:

Mr Josh Teague MP
Mr David Basham MP (Deputy Presiding Member)
Dr Susan Close MP
Hon John Darley MLC
Mr Nick McBride MP
Hon Terry Stephens MLC
Hon Russell Wortley MLC

Parliamentary Officer to the Committee:
Mr Philip Frensham

Research Officer to the Committee:
Dr Monika Stasiak

FUNCTIONS OF THE COMMITTEE

Pursuant to section 15L of the *Parliamentary Committees Act 1991*, the functions of the Committee are:

- (a) to take an interest in and keep under review—
 - (i) the protection, improvement and enhancement of the natural resources of the State; and
 - (ii) the extent to which it is possible to adopt an integrated approach to the use and management of the natural resources of the State that accords with principles of ecologically sustainable use, development and protection; and
 - (iii) the operation of any Act that is relevant to the use, protection, management or enhancement of the natural resources of the State; and
 - (iv) without limiting the operation of a preceding subparagraph—the extent to which the objects of the *Natural Resources Management Act 2004* are being achieved; and
 - (b) without limiting the operation of paragraph (a), with respect to the River Murray—
 - (i) to consider the extent to which the *Objectives for a Healthy River Murray* are being achieved under the *River Murray Act 2003*; and
 - (ii) to consider and report on each review of the *River Murray Act 2003* undertaken under section 11 of that Act by the Minister to whom the administration of that Act has been committed; and
 - (iii) to consider the interaction between the *River Murray Act 2003* and other Acts and, in particular, to consider the report in each annual report under that Act on the referral of matters under related operational Acts to the Minister under that Act; and
 - (c) to perform such other functions as are imposed on the Committee under this or any other Act or by resolution of both Houses.
- (2) In this section—
- natural resources** includes—
- (a) soil;
 - (b) water resources;
 - (c) geological features and landscapes;
 - (d) native vegetation, native animals and other native organisms;
 - (e) ecosystems.

REFERRAL PROCESS

Pursuant to section 16(1) of the Act, any matter that is relevant to the functions of the Committee may be referred to it in the following ways:

- (a) by resolution of the Committee's appointing House or Houses, or either of the Committee's appointing Houses;
- (b) by the Governor, or by notice published in the Gazette;
or
- (c) of the Committee's own motion.

TERMS OF REFERENCE

Pursuant to section 16(1) (c) of the *Parliamentary Committees Act 1991*, the Committee is inquiring into the management of overabundant and pest species in South Australia, with particular reference to:

1. Efficacy of existing or novel regulatory, policy and partnering frameworks used to manage overabundant and pest species;
2. Costs of managing overabundant and pest species;
3. Impacts of overabundant and pest species on agricultural outputs, environmental values, tourism, road safety, and amenity; and
4. Any other relevant matters.

INTRODUCTION

Rationale for the Inquiry

The Natural Resources Committee initiated an Inquiry into the Management of Overabundant and Pest Species in August 2018. Many years of sustained efforts have gone into managing overabundant and pest species in South Australia. Yet, the Committee recognises that overabundant and pest species continue to impact on South Australian agricultural outputs, environments, tourism, road safety, amenity and other values. The Department for Environment and Water anticipates that populations of overabundant and pest species will increase, as will the number of species causing impacts in South Australia.⁵ The Department also expects that the social, environmental and economic impacts of overabundant and pest species will increase. The costs of managing these impacts are therefore also expected to grow.

The relationships between communities and overabundant and or pest species are highly complex. The dimensions of these relationships include both positive and negative elements. Overabundant and pest species pose threats to agricultural outputs and have impacts on urban lifestyles. They cause ecological imbalances but can also occupy the position of necessary apex predators. For food and tourism industries, certain species can present opportunities for new markets or fulfil roles as icons. Some species may be regarded as cultural totems within Aboriginal cultures.

In view of the significant reforms being implemented within the natural resource management system in South Australia, this inquiry provides the opportunity to consider how overabundant and pest species should be managed into the future. The inquiry investigated the extent to which current approaches have been successful, and to seek evidence about any novel approaches that may warrant consideration. The Terms of Reference incorporated considerations about the efficacy of arrangements at a state and state-national level and sought to understand whether current management strategies facilitate short- and longer-term outcomes.

During the last decade, the South Australian Parliament has conducted several investigations into the impacts of certain abundant plant and animal species in South Australia through the Natural Resources Committee and Environment, Resources and Development Committee.

⁵ Department for Environment and Water, *Submission 44*, p.9.

Stakeholders regularly discuss overabundant and pest species when the Natural Resources Committee conducts fact-finding visits to Natural Resources Management (NRM) regions.

Previously tabled reports on related issues include the following:

- Natural Resources Committee: *Fact-finding visit SA Arid Lands NRM Region*, tabled March 2011
- Natural Resources Committee: *Inquiry into Invasive Species*, tabled July 2011
- Natural Resources Committee: *Inquiry into Little Penguins*, tabled September 2011
- Natural Resources Committee: *Report on Foxes*, tabled September 2013
- Natural Resources Committee: *Fact-finding visit Kangaroo Island NRM Region*, tabled November 2014
- Environment, Resources and Development Committee: *Inquiry into Biodiversity*, tabled March 2017
- Natural Resources Committee: *Fact-finding visit to the Fleurieu and Kangaroo Island NRM regions*, tabled June 2017
- Natural Resources Committee: *Fact-finding visit Northern and Yorke NRM Region*, tabled October 2017
- Natural Resources Committee: *Fact-finding visit SA Arid Lands NRM Region*, tabled October 2018.

What are overabundant and pest species?

The Department for Environment and Water explained that ‘overabundant’ species are native species that are occurring in population volumes significantly greater than would occur in natural environmental conditions, and ‘pest species’ are invasive species that are not endemic to South Australia.⁶ The Department for Environment and Water also distinguishes between species that occur in overabundant population volumes across the state, and those it considers as ‘impact causing’. Impact causing species pose an impact for a particular industry or geographical location, and thus may warrant specific management or intervention responses.

Scope of the report

This report addresses overabundant and pest species issues raised in submissions and evidence presented to the Inquiry. The Committee heard evidence in relation to several species and has adopted a case study approach in using these specific species as illustrative of principles that can be applied to a broad management approach. It has derived recommendations that can be applied to specific species, and more broadly to emerging challenges.

⁶ Department for Environment and Water, *Committee Hansard*, 10 December 2018, p.3.

Disclosure of evidence

The Committee resolved on 2 August 2018 that evidence received would be published on the Committee's website as soon as practicable following receipt of the evidence. This report will also be made available on the Committee's website upon tabling in the Houses.

Conduct of the inquiry

The Committee considered evidence presented through submissions, witness statements and published literature. The Committee heard from 12 witnesses (listed in Appendix A), received 44 submissions (see Appendix B) and visited the Meningie Coorong area.

All views expressed by the Committee in this report are based on the evidence presented before it.

CURRENT MANAGEMENT FRAMEWORKS

Explanation of current regulatory and policy frameworks for managing overabundant and pest species in South Australia

Several pieces of legislation comprise the framework for managing overabundant and pest species populations in South Australia, including:

Natural Resources Management Act 2004 (Department for Environment and Water)

National Parks and Wildlife Act 1972 (Department for Environment and Water)

Fisheries Management Act 2007 (Primary Industries and Regions SA)

Plant Health Act 2009 (Primary Industries and Regions SA)

Dog Fence Act 1946 (Primary Industries and Regions SA)

Animal Welfare Act 1985 (Department for Environment and Water)

Livestock Act 1987 (Primary Industries and Regions SA)

Biological Control Act 1986 (Primary Industries and Regions SA)

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* also applies in South Australia.

Multiple agencies are involved in the implementation of this framework, which has the following aims:

- Protect public health, public safety and social amenity where these are affected by invasive species
- Protection of environment, tourism, ecosystem services and public values
- Minimise productivity losses and reduce operating costs for stakeholders who are managing pest species
- Maintain domestic and international market access for agricultural commodities.⁷

The role of each Act in the management of overabundant and pest species is explained below. The Committee notes that the *Landscapes South Australia Act 2019* will supersede the Natural Resources Management Act when it comes into operation.

Natural Resources Management Act

The NRM Act is the key piece of legislation governing the management of natural resources in South Australia. It is committed to the Minister for Environment and Water.

Section 7(1)(e) of the NRM Act specifies that one of the objects of the Act is to provide the statutory structure for managing pest species:

⁷ Biosecurity SA, *Committee Hansard* 10 December 2018

Provide for the prevention of control of impacts caused by pest species⁸ of animals and plants that may have adverse effect on the environment, primary production or the community...

In accordance with section 10 of the NRM Act, the Minister is responsible for preparing and maintaining the State Natural Resources Management (NRM) Plan, and for ensuring that regional NRM plans and policies are consistent with the State NRM Plan. The State *Natural Resources Management Plan 2012 – 2017* included a Guiding Target related to the management of pest animals:

Limit the establishment of pests and diseases and reduce the impacts of existing pests.

The Minister has further responsibility for developing or coordinating policies relating to NRM, including policies for the control of animals and plants, for the purposes of protecting public health and safety, and managing the natural environment, and primary production.

Section 29 provides that the regional Natural Resource Management (NRM) Boards must prepare and implement a regional NRM Plan. Each NRM Board operates in accordance with the Plan for its region, which explains how the objects of the NRM Act are promoted and fulfilled in that region. Each regional plan includes information on the social, economic and practical considerations relating to the use, management, conservation, protection, improvement and rehabilitation of the region's natural resources. The regional NRM Plan must specifically include information relating to the management of pest animals and plants, including:

- *An assessment of the risks posed to natural resources within the region from pest species, and a ranking of these risks according to priorities*
- *A description of the projects that are being undertaken or are proposed, to address or manage the risks or impacts posed by the pest species*
- *A description of any projects being undertaken or proposed to address or manage the risks or impacts posed by the pest species*
- *A description of any projects being undertaken or proposed to address or prevent the presence of pest species within the Region.*

The NRM Boards are also required to take an active role in the management of natural resources within each region, including promoting public awareness and understanding of NRM management within the region, undertaking or supporting educational initiatives, and providing support mechanisms to residents in each region for undertaking NRM-related programs. Regional NRM staff support the development of new management strategies and implement management strategies where applicable. The Murray Darling Basin NRM Board submission observed that:

⁸ It should be noted that in this context, 'pest species' refers to introduced species.

...the Board has a strong role in ensuring that local communities have a clear understanding of the associated risks of priority pests that may affect agricultural production, social or ecological systems.⁹

Section 9(1) of the NRM Act provides a general duty that applies to any person involved in natural resource management. It requires the person to 'act reasonably in relation to the management of natural resources within the state.' In practical terms, this means that landholders have responsibilities for some natural resource management issues on private land. Landholders have an important role in managing overabundant and pest species on their land. Each NRM Board provides landholders with support in managing overabundant species on their land by ensuring that control measures are effective and compliant with relevant legislation.

Chapter 8 of the Act provides specific provisions in relation to declared plants and animals. Conditions can be applied to keeping, transporting, selling, releasing, controlling or destroying declared species.

At the time of writing, the Landscapes South Australia Bill is progressing through Parliament. The Bill proposes that a State Landscape Strategy and regional landscape plans be prepared, in Parts 3 and 4, respectively. The Bill contemplates control provisions for animals and plants in Part 9, including a specific Ministerial declaration for controls in clause 183.

National Parks and Wildlife (NPW) Act

In relation to pest species, the National Parks and Wildlife Act establishes objectives for the management of noxious weeds and exotic plants, and control of vermin and exotic animals within reserves (section 7).

In relation to native species populations, the NPW Act establishes the system of permits for taking protected animals (section 53), regulation of processors (section 58), and the commercial harvest system for kangaroo and euro (section 60). It also lists species that may be taken without a permit, in Schedule 10.

To manage protected animals under the National Parks and Wildlife Act, landowners and wildlife managers can apply for permits to destroy wildlife. The Department for Environment

⁹ Murray Darling Basin NRM Board, *Submission 9*, p.2.

and Water provides permits with certain conditions on the number of animals which can be destroyed, and guides applicants to manage wildlife in line with the relevant code of practice. For unprotected species, no permit is required to destroy those animals by shooting, but destruction using trapping and gassing requires a permit. Destruction of unprotected species must also be undertaken in compliance with the relevant code of conduct.

Fisheries Management Act

The Fisheries Management Act provides the legislative framework for managing fish, invertebrates and algae. It includes provisions relating to the destruction of exotic and noxious species (section 83) and controls on actions involving exotic and noxious species (section 78).

Plant Health Act

The Plant Health Act provides a framework for declaring, reporting and responding to pests that affect plants and plant-related products.

Dog Fence Act

The Dog Fence Act regulates the operation of the Dog Fence in South Australia, which is aimed at managing populations of wild dogs by excluding their range in pastoral areas.

Livestock Act

The Livestock Act regulates matters relating to farmed or managed livestock, which also includes bees and fish.

Animal Welfare Act

The Animal Welfare Act promote animal welfare standards in the state. Actions taken to manage overabundant and pest species under other Acts, for example the National Parks and Wildlife Act, must be undertaken in accordance with the standards set through the Animal Welfare Act. The Committee heard that, 'adhering to the Animal Welfare Act is a critical role in maintaining the social and political licence to manage impact-causing wildlife.'¹⁰

¹⁰ Department for Environment and Water, *Committee Hansard*, 10 December 2018, p. 4.

Biosecurity SA risk management and policy framework for managing pest and invasive species

Biosecurity SA has developed a risk management framework for invasive species, which informs regional NRM plans and statewide policy. A risk-based approach recognises that species move between regions and have differing levels of abundance at different locations. The framework develops priority responses by comparing the risk of each invasive species with the feasibility of controlling it. The Biosecurity SA policies for priority species are developed with extensive consultation and stakeholder engagement, to ensure that they align with State and Federal legislative instruments, and that there is wide stakeholder acceptance and compliance¹¹.

The biosecurity management continuum underpins management approaches at both state and national levels. The Biosecurity Victoria Generalised Invasion Curve¹², below, shows management approaches according to species abundance and the risks associated with pervasiveness, in addition to the impacts of invasive species and the effectiveness of varying responses in economic terms. Early intervention and prevention provide the best return on public investment.

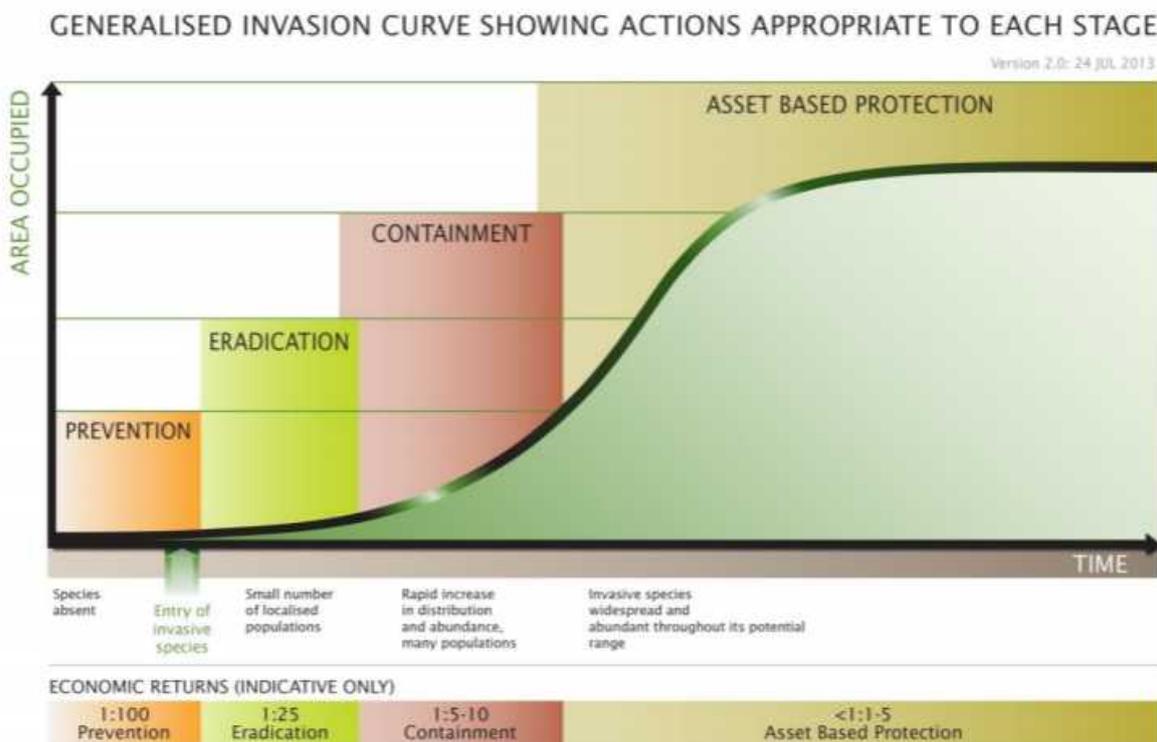


Figure 1: Generalised invasion curve

¹¹ Murray Darling Basin NRM Board, *Submission 9*, p. 2.

¹² <http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/protecting-victoria>

State-National policy and partnerships

The South Australian system exists within the context of state-national partnerships. Biosecurity SA is an active participant in intergovernmental forums. The national framework requires that each jurisdiction has systems in place for prevention, detection, eradication, containment and ongoing management of priority pests and diseases.

The key documents at the federal level provide national strategic planning goals for specific species and arrangements for intergovernmental co-operation. They include:

- *Australian Pest Animal Strategy 2017-2027*
- *Australian Weeds Strategy 2017-2027*
- *Marine Pest Plan 2018-2023*
- *Established Pests and Diseases of National Significance*
- *Intergovernmental Agreement on Biosecurity*
- *National Environmental Biosecurity Response Agreement*

It should be noted that at the time of writing this report, the *Intergovernmental Agreement on Biosecurity* is under review. It is anticipated that a new Intergovernmental Agreement on Biosecurity will be signed in 2019. The *National Environmental Biosecurity Response Agreement* is also being updated; this Agreement outlines the relevant cost-sharing arrangements.

All states are also subject to the requirements of the Environment Protection and Biodiversity Conservation Act, which provides a national framework for regulating matters of national environmental significance. One of the objects of the Act is to control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife. For South Australia, the export of kangaroo products is a key issue. Kangaroos are discussed in further detail in at pp. 23 - 28 of this Report.

The Established Pests and Diseases of National Significance policy framework provides a strategic, consistent, scientific and risk-based approach for managing the impacts of Established Pests and Diseases of National Significance (EPDNS). It advises that governments should invest in prevention and early intervention, and facilitates:

- Management activities being undertaken by the most appropriate party
- Prioritising established pests and diseases based on risk
- Targeting efforts to achieve the greatest biosecurity outcomes in the national interest
- Optimising of investment returns
- Adopting national investment principles that involve the beneficiaries and risk creators

- Minimising regulatory burdens associated with containing established pests and diseases¹³.

Funding arrangements

A large part of the state-federal relationship in the management of overabundant and pest species is states' dependence on federal funding. Longer term funding would assist in accessing management strategies of pest species at a landscape scale. Current funding is provided for 12 months, which does not provide scope for longitudinal data collection that is commensurate with environmental change.

¹³ <http://www.agriculture.gov.au/biosecurity/partnerships/nbc/intergovernmental-agreement-on-biosecurity/national-framework>

TERM OF REFERENCE 3: IMPACTS OF OVERABUNDANT AND PEST SPECIES ON AGRICULTURAL OUTPUTS, ENVIRONMENTAL VALUES, TOURISM, ROAD SAFETY, AND AMENITY

Impacts on agriculture

Multiple submissions to the inquiry discussed the impacts of overabundant and pest species on agricultural practices and outputs.

The Department for Environment and Water reported increased kangaroo movement in 2018 as animals searched for water¹⁴. The Murray Darling Basin NRM Board submission notes anecdotally high numbers of kangaroos in heavily overgrazed parts of the Murray Darling Basin NRM Region, including pastoral land north of the River Murray, areas of the Eastern Mount Lofty Ranges and floodplain wetlands of the River Murray like Chowilla and Katarapko¹⁵. The Livestock SA submission reports that 75 per cent of respondents to a weekly survey list kangaroos as having a significant impact on their properties during recent dry seasonal conditions¹⁶.

Leigh Jennings' submission reports that the local impacts of kangaroos in Willunga Hill include costly damage to fencing and subsequent straying of animals, and competition for stock feed resources where the kangaroos occur in large numbers¹⁷. The District Council of Grant submission also includes reports from local landholders about damage to fencing, straying of animals, and competition for resources with stock¹⁸. The South Australian Arid Lands NRM Board submission comments that kangaroos are a key competitor for food and water resources in that region¹⁹. The Parawa Agricultural Bureau submission describes the main impacts of kangaroo abundance as destruction of hay and silage, and increased incidence of kangaroo-vehicle collisions²⁰. Leigh Jennings' submission also reports two collisions between cars and kangaroos that caused vehicle damage²¹. The District Council of Grant submission reports that Mount Gambier has been a 'hot spot' for vehicle-animal collisions in the years 2014-2016²².

¹⁴ https://www.environment.sa.gov.au/topics/plants-and-animals/Abundant_species/kangaroo-conservation-and-management

¹⁵ Murray Darling Basin NRM Board, *Submission 9*, p. 5.

¹⁶ Livestock SA, *Submission 31*, p. 2.

¹⁷ Leigh Jennings, *Submission 2*, p. 1.

¹⁸ District Council of Grant, *Submission 41*, pp. 3-7.

¹⁹ South Australian Arid Lands NRM Board, *Submission 28*, p. 5.

²⁰ Parawa Agricultural Bureau, *Submission 6*, p. 2.

²¹ Leigh Jennings, *Submission 2*, p. 1.

²² District Council of Grant, *Submission 41*, p. 2.

James Darling's submission discussed the impact of feral deer²³. He expressed concerns that feral deer carry diseases, which could spread to domestic stock. Deer can also damage native vegetation and forestry plantations through browsing. Other impacts listed in Mr Darling's submission include the destruction of young trees planted by landholders, destruction of malleefowl mounds, decreased effectiveness of Farm Biosecurity Plans, and high costs to taxpayers associated with control activities. Lee Williams' submission states that deer can contribute to spreading weeds²⁴.

The Southern Fishermen's Association submission²⁵ describes the economic impacts of seal activity for the Coorong fishery. The Southern Fishermen's Association is concerned that the fishery has five or fewer years of productive use if no action is taken to address the seals' activities. Loss of catch and damage to gear are a key impact, with flow on effects including loss of jobs and market opportunities through disruption of supply. Declining industry bases in regional areas lead to fewer services being located in these areas. The submission further comments that the gillnet fishery in the Coorong has had to modify its practices from a set net fishery where nets are set and left for up to a day, to a set net fishery with much shorter soak times of a few hours or even a few minutes. The much shorter times for nets being left in the water has also led to less efficient use of gear and lower than permitted use of gear. The Save Granite Island penguins submission affirms the points made by the Southern Fishermen's Association in relation to the impacts of long-nosed fur seals on local fisheries. It notes that impacts are also being observed on Kangaroo Island, where seals interfere with fishers, disturb farmed tuna aquaculture pens and prey on little penguins²⁶.

Matt Farrell's submission on bees theorises that any increase in honeybee numbers would significantly impact on agricultural outputs. While it is estimated that approximately 65 per cent of Australian crops are pollinated by honeybees and that they add \$4-6 billion to the Australian economy through pollination services among both managed and feral populations, an unmanaged overabundance of honeybees contributes to total pressures on resources²⁷.

The Ranges to Rivers submission²⁸ discusses the localised issue of one landholder who hosts approximately one-third to one-half of the world's Cape Barren Goose population on his property each year, with a substantial loss of income as a consequence (estimated at

²³ James Darling, *Submission 14a*.

²⁴ Leeanne Williams, *Submission 16*.

²⁵ Southern Fishermen's Association, *Submission 36*.

²⁶ Save Granite Island Penguins, *Submission 42*, p. 1.

²⁷ Matt Farrell, *Submission 12B*.

²⁸ Ranges to Rivers, *Submission 35*.

\$100,000 per annum). The landholder's preferred management strategy would be to access additional water to irrigate his property in a way that mitigates the impacts of pasture consumed by the geese, rather than culling them. The submission reports that the landholder cannot access additional water because environmental water holdings are used for protecting and restoring the environmental assets of the Murray-Darling Basin. The Committee suggests that this matter be referred to the relevant regulator.

The Apple and Pear Growers' Association and Cherry Growers' Association made a joint submission to the Inquiry²⁹. The submission notes that apple, pear, and cherry crops are highly susceptible to multiple overabundant species, including Grey-headed flying foxes, kangaroos, birds, deer, and hares. The impacts of overabundant species on apple, pear and cherry crops include destruction of fruit, and the destruction of future crops through the decimation of fruit buds. The Association estimates that up to 50% of a season's total crop can be destroyed in a high-pressure season if no mitigating actions are undertaken. Kangaroos, deer, and hares are responsible for damage to and death of trees through chewing leaves and buds. Interstate evidence demonstrates that grey-headed flying foxes are capable of destroying entire crops. The population of Grey-headed flying foxes in Adelaide is approximately 17,000 as at January 2019³⁰.

The Adelaide Hills Wine submission makes similar points to those raised by the Apple and Pear Growers' and Cherry Growers' Associations. The submission reports that grape growing provides an ideal food source for a range of wildlife, particularly in the February to May period when other food sources may be scarce. This increases the quantum of loss and damage suffered by grape growers³¹. One locally significant impact of Little Corellas in the Barossa Region is the destruction of new growth shoots on vines³².

The Livestock SA submission states that 'wild dog predation' is classed as a key issue by 20 per cent of all South Australian members who responded to the 2018 annual survey conducted by the peak body. This rises to 46 per cent of members in pastoral regions³³.

The Livestock SA submission also notes wombat impacts, which include damage to fencing that prevents the fencing from operating effectively, and contributions to total grazing pressure³⁴.

²⁹ Apple and Pear Growers and Cherry Growers Associations, *Submission 4*.

³⁰ <https://www.naturalresources.sa.gov.au/adelaidentloftyranges/plants-and-animals/native-plants-animals-and-biodiversity/native-animals/mammals/grey-headed-flying-fox/grey-headed-flying-foxes-south-aust>

³¹ Adelaide Hills Wine, *Submission 20*.

³² <https://www.barossa.sa.gov.au/sections/community-cultural-services/animal-management/little-corellas>

³³ Livestock SA, *Submission 31*, p. 2.

³⁴ Livestock SA, *Submission 31*, p. 4.

Biosecurity SA lists the following potential impacts from pest plants:

- Competition with crops, pasture and native species
- Contamination of crops and seeds
- Degradation of production resources
- Degradation of environmental conditions
- Potential human health impacts³⁵

Impacts on ecosystems

In addition to impacts on agricultural and other industries, the Committee heard that overabundant and pest species impact on ecosystem structures and systems.

Kangaroos

The Adelaide Mount Lofty Ranges NRM Board submission contends that, ‘kangaroos are the main issue facing landscape scale ecosystem recovery’ within the Region, and that, ‘overabundant kangaroos pose possibly the largest risk to remnant vegetation across the region at present...’³⁶ Associate Professor David Paton told the Committee that macropod overabundance is an ‘imminent threat’ in an already ‘dire situation for this state’s biodiversity’³⁷. Associate Professor Paton warned that the state ‘may not have a lot of the other biodiversity in this state if you don’t manage those kangaroos going forward.’³⁸

Matt Farrell’s submission discusses overgrazing by western grey kangaroos in the Mount Lofty Ranges. Farrell suggests that kangaroo numbers are overabundant within reserves in the Mount Lofty Ranges because water and food supplies are plentiful, predators are controlled within protected areas, more active management of kangaroos occurs on agricultural land so that kangaroos move away from potential threats, and kangaroos are viewed as iconic species so this may influence management approaches³⁹.

Mr Farrell’s submission identifies key issues including overgrazing of understorey vegetation in reserves and a further decline in resources in an already cleared landscape. Overgrazed plants have been shown to have lower plant survival and reduced pollen availability and seed

³⁵ http://www.pir.sa.gov.au/biosecurity/weeds_and_pest_animals

³⁶ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 5.

³⁷ *Committee Hansard*, 4 April 2019, p. 59.

³⁸ *Committee Hansard*, 4 April 2019, p. 61.

³⁹ Matt Farrell, *Submission 12A*, p.5.

set. This reduces the available resources for birds, insects and other mammals. Overgrazing also changes the structure of the vegetation, which reduces its appeal as a bird habitat. A reduction in habitat is likely to cause a reduction in pollination and seed supply leading to declining flora numbers, and the potential for extinction of both flora and fauna in the long term. Kangaroos can range over a wide area so that the impacts of overgrazing will impact on birds and other biota over a large spatial range. Associate Professor David Paton affirmed that he has been working in the Mount Lofty Ranges over the past 40 years and has observed the impacts described in Mr Farrell's submission⁴⁰. Specifically, Associate Professor Paton told the Committee that his observations of damage to biodiversity caused by overabundant kangaroo populations have included organisms including reptiles, invertebrates and birds. He listed bird species of concern: red-browed firetail, diamond firetail, and beautiful firetail finches. Associate Professor Paton explained that kangaroos graze on grasses, and also on shrubs. They appear to favour fresh shoots, which results in a 'bonsai' effect whereby the plants are shrunken in size, struggle to flower, and eventually die⁴¹.

The Murray Darling Basin NRM Board submission reports that grazing from kangaroos is the main threat within many conservation parks in that region, due to the condition, flowering and seed production of native vegetation. Kangaroo grazing contributes to reduced condition and regeneration of native vegetation, which can lead to reduced habitat quality for other native fauna⁴². Recent research contends that the ecosystem impacts of overabundant kangaroo populations are exacerbated during drought conditions⁴³.

Seals

The Southern Fishermen's Association submission contends that seals have produced significant ecosystem impacts in the Coorong. Traditional owner Darrell Sumner told the Committee that the seals are not featured in any dreaming stories, and no evidence of their presence has been found in archaeological surveys. This suggests that the seals are a recent migrant to the area and may have replaced pelicans as the apex predator within the ecosystem⁴⁴. This is likely to impact on the structure and functioning of the ecosystem⁴⁵. At its meeting in Meningie on 30 November 2018, the Committee heard evidence from the Ngarrindjeri Elders living in the area, who expressed psychological distress at the destruction of the Coorong environment. Mr Daryl Sumner, Ngarrindjeri Elder, reported that the Coorong

⁴⁰ *Committee Hansard*, 4 April 2019, p. 60.

⁴¹ *Committee Hansard*, 4 April 2019, p. 60.

⁴² Murray Darling Basin NRM Board, *Submission 9*, p. 5.

⁴³ <https://publications.rzsns.w.gov.au/doi/abs/10.7882/AZ.2018.043>

⁴⁴ Mr Darrell Sumner, meeting with Southern Fishermen's Association 30 November 2018.

⁴⁵ Southern Fishermen's Association, *Submission 11*, p. 11.

system is 90 per cent damaged from its original pristine state pre-European settlement. This can be attributed to multiple causes including the impacts of overabundant species.

Fish

The Southern Fishermen's Association submission discusses non-native fish species, including carp, gambusia and redfin perch. The submission explains that carp are bottom feeders, which contribute to turbidity. Carp also prey on native species. The submission contends that non-native fish species negatively impact on numbers of native species, including Golden Perch, catfish and Murray Cod.

Honeybees

Matt Farrell's submission discusses the main impact of the European honeybee as competition with other fauna, including birds, insects, native bees and other species. Feral bees are present year-round and take a high percentage of available pollen and nectar. Honeybees use a wide variety of native plants and their resource use overlaps with many native fauna. Honeybees forage earlier in the day than other species so are the first species to avail themselves of available resources. Honeybees are also less effective pollinators of some species. Mr Farrell submitted that the long-term impacts of honeybees are potential species loss among native species both floral and fauna, and a decline in the population of management honeybees, who depend on natural vegetation between agricultural seasons. This would have a flow-on negative impact on agricultural productivity⁴⁶.

Marine Pests

The Kangaroo Island NRM Board submission discusses the Board's concerns with marine pests, particularly the European Fan Worm and European Sea Squirt. These species colonise rapidly, have no known predators, and are a nuisance and competitor to native species within the marine environment. These species are not regulated under the current statutory framework⁴⁷.

Pest Plants

The Parawa Agricultural Bureau submission discusses pest plants affecting the Fleurieu Peninsula landscape, which include pine trees, gorse, blackberries, Cape Tulip, Salvation

⁴⁶ Matt Farrell, *Submission 12B*

⁴⁷ Kangaroo Island NRM Board, *Submission 37*, p. 8.

Jane, Wild Rose, Bridal Creeper, Garlic, Olives, and Montpellier Broom⁴⁸. The Port Augusta Council submission discusses pest plants affecting that area, including Buffel Grass, Cacti Cylindropuntia, Cacti Opuntia, Caltrop, Onion weed, and White Spined Hudson Pear. It reports that White Spined Hudson Pear is spreading along the rail corridor between Port Augusta and Whyalla. Buffel Grass is prevalent on the outskirts of Port Augusta and seems to move along transport corridors including the Augusta Highway and railway corridors. The submission reports that Council is concerned about the potential for further spreading of pest plants along access routes arising from renewable energy projects being undertaken across the Upper Spencer Gulf Region adjacent the Port Augusta Council area⁴⁹.

Animal welfare impacts

The Sporting Shooters' Association: Conservation and Wildlife Management submission contends that drought conditions are producing higher numbers of kangaroos dying from thirst and starvation in the Ikara-Flinders Ranges National Park and in the Adelaide Hills. Recent research affirms these observations. Wilson and Edwards state that 'very dry seasonal conditions' will produce a substantial decline in the macropod population. They quantify this as 'deaths of millions of kangaroos', noting that this poses 'considerable animal welfare concern'⁵⁰. A recent movie *Australia's Hidden Shame – the True Roo Story* shows graphic footage of kangaroos starving in drought conditions⁵¹.

Impacts on communities and amenity values

The Committee heard about a range of amenity and community impacts arising from overabundant and pest species.

Little Corellas were a focus for amenity- and community- related impacts. The Light Regional Council submission stated that the main impacts of Little Corellas include noise that hampers tourism and local amenity values, and destruction of objects such as aerials, wiring, roofing, window seals, structures, installations, and trees. Little Corellas are curious and exploratory of items in their environment, and also use suitable surfaces to sharpen their beaks⁵². The LGA submission adds impacts such as large numbers of birds defecating in public places, and contamination of water sources⁵³. The SA Arid Lands NRM Board submission comments that

⁴⁸ Parawa Agricultural Bureau, *Submission 6*, p. 1.

⁴⁹ Port Augusta Council, *Submission 27*, p. 5.

⁵⁰ <https://doi.org/10.7882/AZ.2018.043>

⁵¹ <https://vimeo.com/317189198>

⁵² Light Regional Council, *Submission 10*, p. 1.

⁵³ Local Government Association, *Submission 25*, p. 8.

Little Corellas damage amenity plantings and eucalypts around water sources⁵⁴. The Sporting Shooters' Association of South Australia submission lists impacts including the defoliation of trees, parks and playing fields⁵⁵. The Light Regional Council notes the impacts on 'community assets', such as damage to lawn bowls greens, cricket playing surfaces, golf courses, ovals, tennis courts, roofing, guttering, solar panels and cabling on lighting towers⁵⁶.

The District Council of Grant submission includes a report from the Port Macdonnell Golf Course relating to damage to the course caused by kangaroo populations. While the Golf Course could obtain a permit to undertake culling, the carcasses must be left to lie as they cannot be harvested. This would create an unpleasant visual amenity issue for golf course patrons⁵⁷. Similar unpleasant visual amenity issues arise where dead animals are sighted on roadways following vehicle collisions. This can operate to undermine the positive impacts arising from an iconic species such as kangaroos. Associate Professor David Paton told the Committee that macropod impacts on biodiversity also have flow-on impacts for tourism. He stated that:

...this state's tourism is going to depend on actually having good natural resources⁵⁸.

The City of Charles Sturt submitted that an overabundant population of white Ibis within the Council area has increased from a population of approximately 20 individuals to 150 since 2013. Reported impacts include noise, smell, damage to vegetation and unsightliness⁵⁹. The Local Government Association submission affirmed the points made by Charles Sturt in relation to the impacts of ibis populations and noted that certain populations pose additional risks. For example, a population of ibis that is abundant in the Parafield Airport area posed safety risks if collisions occur between aircraft and birds⁶⁰.

The Alinytjara Wilurara (AW) NRM Board submission discusses the relationships between wild dogs and humans within Aboriginal communities. In remote communities, conflicts can occur where domesticated dogs are ill-kept and roam or breed with wild dogs. The submission advocates for greater communication with Aboriginal communities to build understanding about the impacts of wild dogs for people, the environment, and the integrity of wild dog genetics⁶¹.

⁵⁴ SA Arid Lands NRM Board, *Submission 28*, p. 5.

⁵⁵ Sporting Shooters' Association of South Australia, *Submission 7*, p. 8.

⁵⁶ Light Regional Council, *Submission 10*, pp. 1-2.

⁵⁷ District Council of Grant, *Submission 41*, p. 6.

⁵⁸ *Committee Hansard*, 4 April 2019, p. 65.

⁵⁹ City of Charles Sturt, *Submission 8*, p. 1.

⁶⁰ Local Government Association, *Submission 25*, p. 8.

⁶¹ Alinytjara Wilurara NRM Board, *Submission 3*, p. 4.

Positive impacts

The Committee heard that overabundant and pest species also have the potential to cause positive impacts in some contexts.

The Trees for Life and Adelaide Mount Lofty Ranges NRM Board submissions discuss the positive role of ‘pest’ plants as habitat for threatened species. In the Mount Lofty Ranges region, the endangered brown bandicoot is dependent on blackberry for its survival. Landholders are discouraged from removing blackberries when other native habitat retreats are not available to bandicoots. Similarly, threatened glossy black cockatoos are highly dependent on exotic pine species, which forms approximately 80% of their diet⁶².

The South Australian Arid Lands NRM Board submission comments that flowering pests such as Salvation Jane and onion weed attract tourists⁶³. The Murray Darling Basin NRM Board submission also notes that abundant native species play an important role in tourism where tourists travel to iconic sites such as the Riverland, Murray Mallee or Coorong to see species in their natural habitats⁶⁴. The South East NRM Board makes the same point⁶⁵.

Adelaide Mount Lofty Ranges NRM Board submitted that foxes play both valuable and negative roles within the region’s landscape. They can impact on lambing and free-range poultry activities, and distribute weed seeds, but assist in the regulation of overabundant species such as kangaroos, cats, and rabbits⁶⁶.

The South Australian Wild Dog Advisory Group submission notes the ongoing conflict between the positive ecological contribution made by wild dogs and their negative impacts on pastoral activities⁶⁷.

Committee response

The Committee acknowledges that stakeholders are concerned about a range of impacts that are arising from overabundant and pest species populations, including agricultural outputs, biodiversity and ecosystems, cultural heritage, tourism, amenity, and communities. The Committee further notes that overabundant and pest species also have positive impacts in certain circumstances.

⁶² Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 5.

⁶³ South Australian Arid Lands NRM Board, *Submission 28*, p. 7.

⁶⁴ Murray Darling Basin NRM Board, *Submission 9*, p. 6.

⁶⁵ South East NRM Board, *Submission 33*, p. 5.

⁶⁶ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 6.

⁶⁷ South Australian Wild Dog Advisory Group, *Submission 21*, p. 1.

TERM OF REFERENCE 2: COSTS OF MANAGING OVERABUNDANT AND PEST SPECIES

The Committee heard that financial costs of responding to overabundant and pest species can be difficult to quantify, differ widely across species, and vary according to seasonal conditions. Some financial costs are a 'best estimate'. Evidence presented to the Committee was therefore reported as an evaluation of costs in terms of specific programs or species. A majority of submitters also noted that responding to overabundant and pest species is costly and that there are rarely, if ever, sufficient resources to undertake management activities beyond short-term control measures. The intractable nature of this challenge means that most regional authorities are approaching management strategies with a 'best effort' mindset rather than being focussed on a complete control strategy. The Coorong District Council summarised this approach:

*We may not be able to control species but we need to be able to limit the environmental and economic damage that they cause.*⁶⁸

In terms of specific costs, stakeholders were able to quantify control of Little Corellas as costly and unabating in nature. The Light Regional Council reported that it budgets \$15,000 for Corella control activities including contractor costs, materials and staff overtime, but this figure does not include all staff time and is therefore an under-estimation of true costs⁶⁹. The Mid Murray Council budgets \$10,000 annually for control measures and has spent \$40,000 on contractors and \$10,000 in staff time for the period 2015 – 2018. The Mid Murray Council submission also notes that its ability to undertake control measures is restricted by budget availability; the Council must prioritise its activities according to seasonal events, and areas with higher Little Corella numbers that are on Council property. Additional control measures are undertaken on private land in consultation with landholders⁷⁰. The Barossa Light Council budgets \$10,000 for contractors, and an estimated additional \$10,000 in staff costs, vehicle costs, and clean-up costs. Costs of repairs to 'community assets' have not been quantified but are additional⁷¹. The Mid Murray Council submission notes that one producer estimates the cost of Little Corella control activities at \$96,000 annually. Alexandrina Council reports that it spends around \$40,000 per annum on Little Corella control measures⁷². The Coorong District

⁶⁸ Presentation to the NRC in Meningie 30/11 p.6.

⁶⁹ Light Regional Council, *Submission 10*, p. 2.

⁷⁰ Mid Murray Council, *Submission 18*, p. 2.

⁷¹ Barossa Light Council, *Submission 15*, p. 2.

⁷² Alexandrina Council, *Committee Hansard 10 December 2018*, p. 19.

Council estimates that Little Corellas result in a cost impost of \$20,000 to \$40,000 annually, which is used to limit damage and is insufficient to control populations⁷³.

The Murray Darling Basin NRM Board submission states that the cost of managing wild dogs in South Australia in 2017 – 2018 was \$2.27 million. This includes \$1.3 million for the Dog Fence, the funding of the Biteback program, \$300,000 for wild dog trapping and \$200,000 for baiting⁷⁴. The South Australian Wild Dog Advisory Group submission contends that wild dog impacts cost Australian agricultural industries around \$89 million per year⁷⁵. The South Australian Government allocated \$1.2 million over 4 years to increase dog trapping activities in the Eyre Peninsula, Northern and Yorke, and South Australian Arid Lands NRM regions. Increased trapping has been undertaken since July 2018⁷⁶.

The South Australian Arid Lands NRM Board submission notes that the Board invested \$221,000 during the 2017/2018 financial year in supporting landholders to control a range of pest plant species, including \$40,000 on Opuntia cactus control and \$35,000 on buffel grass control⁷⁷. The Kangaroo Island NRM Board submission comments that the Board has allocated \$9000 for control of roadside bluebell creeper in 2018 – 2019. It has also allocated \$8000 for olive control at Hog Bay Road, to further efforts funded by DPTI in 2017-2018, valued at \$25,000⁷⁸.

Parawa Agricultural Bureau increased costs of kangaroo-repellent fencing estimated at least \$10,000/km⁷⁹.

The Murray Darling Basin NRM Board submitted that landholders have spent approximately \$1.9 million on 1080 baits to control foxes over the past 10 years⁸⁰.

In addition to direct financial costs of management, the Committee heard that there are substantial indirect and opportunity costs arising from responding to overabundant and pest species. The Apple and Pear Growers' and Cherry Growers' Associations submission list among these costs the mental health of agricultural producers risking the loss of their livelihood. At the peak of production season, one or more persons may be required to work

⁷³ Coorong District Council, Presentation to the NRC in Meningie 30/11/18

⁷⁴ Murray Darling Basin NRM Board, *Submission 9*, p. 6.

⁷⁵ South Australian Wild Dog Advisory Group, *Submission 21*, p. 5.

⁷⁶ <https://strongplan.com.au/policy/protecting-our-livestock-industry/> and https://www.saliberal.org.au/marshall_government_contract_seven_wild_dog_trappers

⁷⁷ South Australian Arid Lands NRM Board, *Submission 28*, p. 8.

⁷⁸ Kangaroo Island NRM Board, *Submission 37*, p. 7.

⁷⁹ Parawa Agricultural Bureau, *Submission 6*, p. 2.

⁸⁰ Murray Darling Basin NRM Board, *Submission 7*, p. 9.

full time engaged in bird deterrence activities. Additional costs arise from any equipment required, such as scaring devices, gas guns and drones.

The Adelaide Hills Wine submission states that consumers are increasingly aware of sustainable grape growing and are strongly averse to destructive control methods. Therefore, culling is not the preferred option for managing the impacts of overabundant and pest species. However, the impacts of climate change may increase pressures on the industry in future and render it economically unviable if the impacts of overabundant and pest species are not strategically managed. Pest scaring methods such as shotguns, rifles, gas guns and audio devices impact on neighbouring properties and their use is limited to comply with relevant statutory frameworks. Approximately 40 staff each covering 100 hectares would be required to maintain an effective bird scaring program during the daylight hours throughout harvest. Bird netting can form part of a management program and reduce damage but is cost prohibitive at \$3000 per hectare. Installing the netting is costed at \$400 per hectare, which must then be removed for harvest. Protecting the existing vineyards in the Adelaide Hills with netting would cost around \$3.8 million per annum, and some damage would still occur as netting is not 100 per cent effective⁸¹. The Apple and Pear Growers' and Cherry Growers' Associations notes that total exclusion netting is the most effective deterrent, but costs approximately \$50,000 to \$75,000 per hectare. Throw-over netting is less effective and less costly at \$10,000 to \$15,000 per hectare. Approximately 180 hectares of land in the Adelaide Hills are permanently netted, at an estimated cost of \$10.8 million. A further 1000 hectares would be required to be netted to guarantee the sustainability of the apple, pear and cherry industries into the future⁸².

Committee response

The Committee notes that the management of overabundant and pest species is both costly and recurring. Once a species has established an overabundance, the costs of management are directed at keeping the overabundance to a threshold, which results in an ongoing impost on stakeholders. The Committee further notes that stakeholders expressed concern about inadequate levels of funding being available to contain impacts. This suggests that some stakeholders perceive that current management responses do not result in effective control measures.

⁸¹ Adelaide Hills Wine, *Submission 20*, p. 2.

⁸² Apple and Pear Growers' and Cherry Growers' Association, *Submission 4*, p. 3.

TERM OF REFERENCE 1: EFFICACY OF EXISTING OR NOVEL REGULATORY, POLICY AND PARTNERING FRAMEWORKS USED TO MANAGE OVERABUNDANT AND PEST SPECIES

Management of macropods

Kangaroos are a protected species in accordance with the *National Parks and Wildlife Act*. Permits to destroy animals that are causing or are likely to cause damage to the environment, crops, stock or other property can be obtained from the Department for Environment and Water.

Non-commercial harvesting

The Department for Environment and Water estimated that South Australia's kangaroo population was approximately 4.4 million animals in 2018⁸³. This was slightly reduced from the 2017 estimated population of five million, likely due to drought conditions. The Department's submission acknowledges that there are currently high numbers of kangaroos. It states that the Department aims to promptly issue permits to destroy wildlife where non-lethal management methods are ineffective and where the impacts of the species are well understood. It explains that regional officers make a decision whether to issue a destruction permit based on factors including:

- Non-lethal alternatives
- Environmental and economic impacts caused by the overabundant species
- The ecology of the species
- Human health and safety considerations
- Animal welfare considerations
- Social factors
- Applicable legislative or regulatory requirements⁸⁴.

The Committee heard that the permit system is an 'ad hoc' system of managing macropod numbers⁸⁵. The RSPCA submission expresses concerns that the current permit system is insufficiently rigorous on the basis that it does not allow landholders or the Department for Environment and Water to quantify the magnitude of impacts from kangaroos. The RSPCA submission contends that the permit does not require the landholder to state the timeframe during which damage occurred, the proportion of their property affected, or to estimate the amount of damage in financial cost. The permit application form does not instruct landholders

⁸³ <https://www.environment.sa.gov.au/news-hub/news/articles/2018/11/manage-kangaroo-populations>

⁸⁴ [https://www.environment.sa.gov.au/topics/plants-and-animals/permits-and-licences/Native animals in the wild/Permits to Destroy Wildlife](https://www.environment.sa.gov.au/topics/plants-and-animals/permits-and-licences/Native%20animals%20in%20the%20wild/Permits%20to%20Destroy%20Wildlife)

⁸⁵ Associate Professor David Paton, *Committee Hansard*, 4 April 2019, p. 61.

how to conduct a population density assessment⁸⁶. The Ranges to River submission expresses concern that the Government is passing on the costs of kangaroo control measures to landholders without their being able to ameliorate the costs through economic opportunities⁸⁷.

Leigh Jennings' submission identifies some limitations in the current permit-based system:

- Silencers cannot be used so that animals are frightened by shooting-related noise
- The shoot and let lie requirement means that carcasses of culled animals create an upsetting scene
- The shoot and let lie requirement is wasteful because carcasses cannot be used by either human or animal consumption⁸⁸.

Associate Professor David Paton informed the Committee that the 'shoot and let lie' requirement also results in feral foxes and cats having a ready food source from kangaroo carcasses. Associate Professor Paton expressed the view that the shoot and let lie requirement 'makes no sense'⁸⁹.

Associate Professor Paton also reflected on the need to assure appropriate animal welfare outcomes. He stated that the key to managing macropod numbers is to 'treat these animals with dignity'⁹⁰. The RSPCA submission expresses concerns about lack of appropriate regulation of non-commercial shooting activities. It contends that the incentive to produce a head trophy may result in a chest shot being used, whereas a more humane outcome would be achieved with a head shot. Recreational shooters are not required to demonstrate weapon competency or knowledge of animal welfare standards, which is likely to result in lower animal welfare standards being achieved. It further argues that hunters may target large males, which ensures that future generations continue to be available for hunting⁹¹.

Recent research discusses these issues. Wilson and Edwards state that: 'Non-commercial kill leads to poor animal welfare outcomes and considerable wastage.'⁹² Wilson and Edwards argue that non-commercial harvesting has poor outcomes because 'shoot and let lie' requirements do not enable regulators to assess how many animals are taken, or monitor shooter accuracy and skill, or assess compliance with welfare codes. The RSPCA submission expresses concerns about inhumane killing in the non-commercial sector, including inhumane

⁸⁶ Department for Environment and Water, *Submission 44*, p. 9.

⁸⁷ Ranges to River NRM Group, *Submission 35*, p. 2.

⁸⁸ L Jennings, *Submission 2*, p. 1.

⁸⁹ *Committee Hansard*, 4 April 2019, p. 61.

⁹⁰ *Committee Hansard*, 4 April 2019, p. 7.

⁹¹ RSPCA, *Submission 43*, p. 10.

⁹² George R Wilson and Melanie Edwards. (2019) 'Professional kangaroo population control leads to better animal welfare, conservation outcomes and avoids waste'. *Australian Zoologist* In-press.

treatment of orphaned joeys, non-compliant shooting practices and killing of higher numbers than authorised by a permit, though it concedes that the degree of policing and enforcement of non-commercial killing makes any evidence about inhumane practices largely anecdotal in nature⁹³.

The RSPCA notes that non-commercial shooters are not required to hold accreditation in firearm proficiency⁹⁴. Persons who hold a permit to destroy kangaroos on their land in accordance with section 53 of the *National Parks and Wildlife Act* must hold a valid firearms licence and be able to conduct shooting in accordance with the *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Non-Commercial Purposes*. The RSPCA submission expresses concern that this Code is not integrated into the *Animal Welfare Act* and compliance with its Standard Operating Procedures are not mandatory. In practice, this means that chest shooting can be undertaken when a higher standard of welfare could be achieved by head shooting. The RSPCA is further concerned that no regular review of the Code is scheduled.

The Sporting Shooters' Association submission contends that permits are also costly and time consuming to obtain in times of crisis. The alternative is a commercial shooter, who would charge \$10-\$15 per kangaroo. This could cost a landholder thousands of dollars⁹⁵.

The Adelaide Mount Lofty Ranges NRM Board submission suggests that, 'broadening the carcass use options for landowners may appeal to many in the community.' The Adelaide Mount Lofty Ranges NRM Board undertook a trial whereby carcasses were provided to a commercial composter, which achieved effective outcomes but was cost prohibitive.

Dierdre Woods' submission proposes that landowners should have the ability to harvest kangaroos on their land without a permit if they have a suitable second use for the carcass, e.g. animal or human consumption.

Commercial Harvesting

Kangaroos are commercially harvested in South Australia in accordance with the *South Australian Commercial Kangaroo Management Plan 2018-2022*. The Plan is an approved Wildlife Trade Management Plan in accordance with the Commonwealth *Environment*

⁹³ RSPCA, *Submission 43*, p. 6.

⁹⁴ RSPCA, *Submission 43*, p. 7.

⁹⁵ Sporting Shooters Association of SA, *Submission 7*, p. 6.

Protection and Biodiversity Conservation Act. The current harvesting zones are shown in the following image:

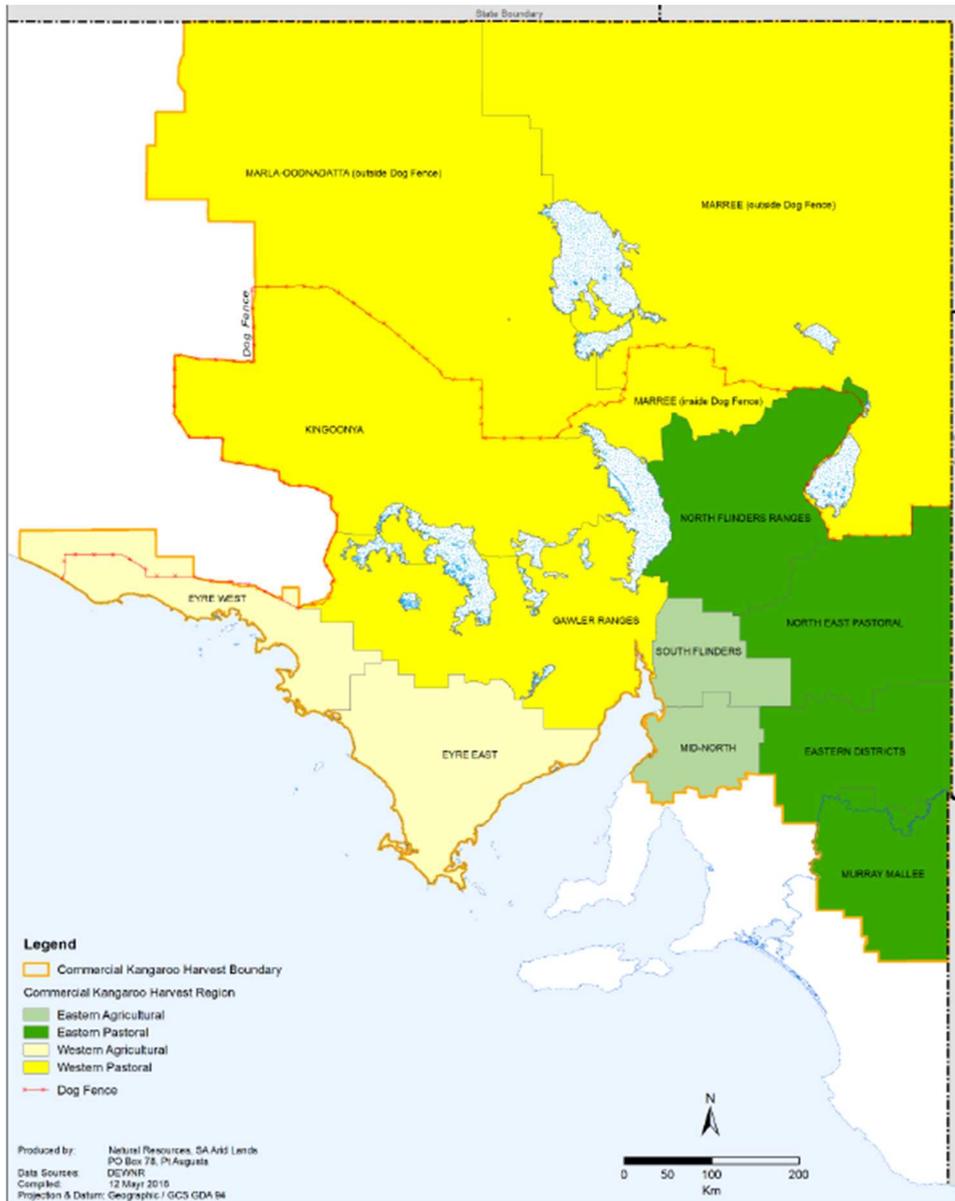


Figure 2: Commercial Harvesting zones in South Australia

Multiple submissions to the Inquiry discussed the limitations of the commercial harvesting system. The main concerns relate to the aims and outcomes of the system, the market conditions for kangaroo products, commercial harvesting zones, and social licence issues associated with culling.

Outcomes and aims of the macropod management framework

Matt Farrell's submission contends that the current commercial harvesting system has not been effective in managing kangaroo population numbers. Despite the number of kangaroos

harvested, population numbers continue to increase⁹⁶. The Murray Darling Basin NRM Board submission suggests that the current harvest system is not intended to mitigate the impacts of kangaroos⁹⁷. The RSPCA also makes this point in stating that the quotas are determined based on the animal's use as a resource rather than the impact that the animals are having on their environment and other concerns such as welfare⁹⁸.

The South Australian Arid Lands NRM Board submission asserts that commercial harvesters target large male kangaroos due to low meat prices and high operating costs, so that females and smaller males are left in the population. This reduces the effectiveness of outcomes from the commercial harvesting system⁹⁹.

Markets for macropod products

The Chief Executive of the Department for Environment and Water, Mr John Schutz, observed that the outcomes of the commercial harvesting system are primarily driven by market demand factors domestically and internationally¹⁰⁰. The limitations of the current market conditions provide a challenge to greater numbers of kangaroos being harvested. In 2016 and 2017, only 14% of the market quota was reached¹⁰¹.

The kangaroo harvesting industry is currently managing the difficulties of low commodity prices while numbers of kangaroos remain abundant. Wilson and Edwards reflect that:

Harvesters are currently price-takers and have no opportunity to receive an improved margin for higher quality...harvester profit margins are slim...They currently receive a little more than AUD\$0.60 per kilogram for carcasses¹⁰².

The South Australian Arid Lands NRM Board submission discusses the low value of kangaroo products, which does not provide enough incentive for harvesters to harvest kangaroos in numbers that will result in reduction on total grazing pressure¹⁰³.

⁹⁶ Matt Farrell, *Submission 12A*, p. 5.

⁹⁷ Murray Darling Basin NRM Board, *Submission 9*, p. 5.

⁹⁸ RSPCA, *Submission 43*, p. 6.

⁹⁹ South Australian Arid Lands NRM Board, *Submission 28*, p. 5.

¹⁰⁰ Mr John Schutz, *Committee Hansard*, 10 December 2018.

¹⁰¹ Department for Environment and Water, *2018 Quota Report for Commercial Kangaroo Harvest in South Australia*, p.11.

¹⁰² George R Wilson and Melanie Edwards. (2019) 'Professional kangaroo population control leads to better animal welfare, conservation outcomes and avoids waste'. *Australian Zoologist* In-press.

¹⁰³ South Australian Arid Lands NRM Board, *Submission 28*, p. 6.

The Department for Environment and Water submission states that it is working with Primary Industries and Resources SA to ensure that commercial harvesting remains viable¹⁰⁴.

Stakeholder perceptions

The Department for Environment and Water submission notes that it receives significant negative correspondence when it undertakes kangaroo culling within protected areas, and also when permits are granted for culling on private land¹⁰⁵.

Committee response

The Committee acknowledges that macropod management is an urgent challenge for South Australia. The weight of evidence presented to the inquiry demonstrates that macropod numbers are having significant impacts on agriculture, biodiversity, and communities. Submissions to the inquiry reveal the multiple complexities involved in developing management options that take into account: the need to manage populations for landscape sustainability, animal welfare concerns, stakeholder perceptions, market conditions, and more effective bureaucracy. Recommendations 2, 11 and 12 specifically address macropod issues.

Management of deer

There are six species of deer in Australia. The most abundant of these in South Australia are red Deer and Fallow Deer¹⁰⁶, though exact population numbers are unknown. The 2019 *Interim Declared Animal Policy: Feral Deer* states that feral deer numbers are at their highest level since deer were introduced to South Australia, and their distributions have expanded across the state. Lethbridge and Andrews' 2016 study indicates that fallow and red deer populations have increased by 30% and 16% respectively in the South East NRM Region¹⁰⁷. The South East NRM Board submission comments that there are several deer farms in the region as well as an established population of feral deer that is boosted by deer escaping from farms. Current estimates for the South East region, the most densely populated region, are around 35,000 individuals¹⁰⁸. The number of properties registered to keep deer has increased from 49 to 107 since 2006¹⁰⁹. The number of deer that has escaped from farms is unknown.

¹⁰⁴ Department for Environment and Water, *Submission 44*, p. 7.

¹⁰⁵ Department for Environment and Water, *Submission 44*, p. 10.

¹⁰⁶ http://www.pir.sa.gov.au_data/assets/pdf_file/0009/300321/identifying_feral_deer_in_SA.pdf

¹⁰⁷ https://pir.sa.gov.au_data/assets/pdf_file/0011/232040/Deer_policy_2019.pdf

¹⁰⁸ Mr N McBride, Member for Mackillop, Hansard 10 December 2018

¹⁰⁹ https://pir.sa.gov.au_data/assets/pdf_file/0011/232040/Deer_policy_2019.pdf

The 2017 draft policy states that ‘the current level of control has not been effective at containing the spread or reducing the number of feral deer since 2006.’¹¹⁰

The Natural Resources Management Act declares deer as a controlled animal across the state and imposes conditions that relate to releasing deer, complying with instructions from an authorised officer, and applying control measures:

- Section 179 of the Act provides that a person must not release a deer or cause or permit a deer to be released
- Section 181(1) of the Act provides that a person keeping deer in captivity must respond to any instructions given by an authorised officer in relation to that animal/
- Section 182(3) of the Act provides that a landholder must take measures prescribed to control deer on their land.

The *Natural Resources Management (General) Regulations* provide that deer on land with the consent of their owner must be secure or confined and identified. Where a deer is on land without the owner’s consent, the deer must be captured and removed or destroyed within six weeks. If a population of deer establishes, the landholder whose property that population establishes on is responsible for eradicating it. NRM Boards may be able to assist by coordinating efforts among adjoining landholders where required.¹¹¹

Deer can be controlled in South Australia by shooting or trapping. An aerial control program has operated in the South East region since 2009. This has resulted in over 7000 deer being culled, but it is unknown what the impact this number has been on total population numbers, as deer are capable of producing a high number of offspring over their lifespan. Culling activities that have been undertaken in the South East region have reportedly removed 1500 to 3000 individuals in a culling period. Culls can be undertaken in protected areas and on private land, but landholders must provide consent to conduct culling on their properties.

The 2017 draft policy contends that aerial and ground culling are effective methods to reduce feral deer populations if more females are culled each year than the number of fawns born.

The Parawa Agricultural Bureau submission describes the culling of fallow deer within the Deep Creek Conservation Park and surrounding private properties in May 2018. While Forestry SA contributed \$5000 to the costs of the operation, it did not permit the cull to be undertaken on Forestry SA land. This arguably reduced the effectiveness of the cull¹¹². The Livestock SA submission reports that the organisation has lobbied for greater implementation of control measures within Forestry SA plantations¹¹³.

¹¹⁰ https://pir.sa.gov.au/_data/assets/pdf_file/0011/232040/Deer_policy_2019.pdf

¹¹¹ www.pir.sa.gov.au/_data/assets/pdf_file/0003/137613/Advisory_note_on_controlling_feral_deer.pdf

¹¹² Parawa Agricultural Bureau, *Submission 6*, p. 2.

¹¹³ Livestock SA, *Submission 31*, p. 3.

The Sporting Shooters' Association of South Australia (SSA SA) submission discusses the difference between management approaches towards deer in South Australia and Victoria. In Victoria, deer are managed as game, while in South Australia they are managed as pests whose numbers should be controlled and ideally eliminated. In the SSA's view, some culling programs are run with the aim of controlling population numbers rather than eliminating them. This results in populations of deer persisting¹¹⁴.

While anecdotal in nature, PIRSA is aware of persistent allegations about deliberate release of deer. This allows deer populations to proliferate, to take advantage of a market for deer products. In evidence presented to the Inquiry, Executive Director of Biosecurity SA Mr Wil Zacharin spoke about food safety requirements. Depending on potential future uses of deer products as human food or other animal products, accreditation requirements apply for parties who are involved in harvesting venison¹¹⁵. The Livestock Act differentiates between feral animals and animals farmed as livestock. Animals farmed as livestock must be contained appropriately, while feral animals can either be taken to shoot and lie or redirected into the food chain where the parties involved are appropriately accredited.

The Policy on Feral Deer in South Australia was adopted in 2005 and is currently in interim status prior to the enactment of the Landscapes South Australia Act. The interim policy focusses on suitable fencing and containment of farmed animals, to prevent deer being released. The interim Policy aims to reduce numbers of feral deer by removing at least 40 per cent of females from feral subpopulations each year. It further aims to ensure that fencing of deer farming properties is adequate, by introducing revised fencing standards and a fencing audit schedule.¹¹⁶ It introduces a permit system for deer farmers whereby farmed deer over the age of 10 months would be required to wear ear tags.

Committee response

The Committee notes that the South Australian Government has recently released the *Interim Declared Animals Policy: Feral Deer*, which will be updated with the finalisation of the Landscapes South Australia Act. This relates to Recommendations 4 and 5 from the inquiry.

¹¹⁴ Sporting Shooters' of SA, *Submission 5*, p. 4.

¹¹⁵ Biosecurity SA, *Committee Hansard*, 10 December 2018.

¹¹⁶ https://yoursay.sa.gov.au/decisions/feral-deer-policy/consultation_process

Management of Little Corellas

The Committee heard evidence, and received submissions, from a number of Councils as well as the Local Government Association. The number of submissions relating to Little Corellas reveal complexity within the issues, a diversity of views among stakeholders, and a wide range of stakeholders who have been involved over a period of years.

The Discovery Circle Report *Little Corella: Social and Ecological Research for Management in South Australia* identifies 2300 corella sites mapped by the public across the state¹¹⁷. The Local Government Association submission attributes the growth in Little Corella populations to landscape modification, whereby modification of landscapes has resulted in the creation of more appealing habitats for Little Corellas¹¹⁸. The Light Regional Council submission cites research undertaken by Ian Temby, which states that Little Corella populations have expanded as a consequence of land clearing, water provision and extension of grain crops. Control measures used on competitors for resources, such as rabbits, have also contributed to population growth¹¹⁹. Associate Professor David Paton commented that stakeholders are not often aware that corellas and galahs are not endemic to the Mount Lofty Ranges but have benefited from vegetation clearance in the area to establish populations¹²⁰.

Little Corellas are not a protected species in South Australia. Their numbers can be controlled through shooting undertaken on private land without a permit. Any shooting of Little Corellas must be undertaken in accordance with the *Code of Practice for Humane Destruction of Birds in South Australia*.

Council evidence advocated for statewide, Government-led action to cull overabundant populations of Little Corellas, particularly in regional towns. As damage seems to occur as soon as a population settles into a particular location, management approaches should be commenced immediately¹²¹. The Local Government Association notes that short-term measures are generally ineffective and expensive, and often lead to a flock relocating to another Council area. Short-term actions implemented with varying outcomes have included: spotlighting, noise, laser shooting, capture, gassing, whip-cracking, drones, and falconry¹²².

¹¹⁷ Scanlon et al (2017). *Little Corellas: Social and Ecological Research for Management in South Australia*. P.4.

¹¹⁸ Local Government Association, *Submission 25*, p. 4.

¹¹⁹ Light Regional Council, *Submission 10*, p. 1.

¹²⁰ *Committee Hansard*, 4 April 2019, p. 63.

¹²¹ *Committee Hansard*, 4 April 2019, p. 60.

¹²² Local Government Association, *Submission 25*, p. 7.

The SSA SA submission contends that the prevailing management approach in Adelaide Hills towns of Mount Barker and Strathalbyn has mainly been based on scaring the birds away with a small number of scout birds being culled. Harassing populations as a management action alone does not seem to address population persistence. The SSA SA argues that short-term actions have been mostly ineffective and that a large-scale cull targeting the birds' roosting sites undertaken at night would achieve a better outcome¹²³. The Barossa Council submission notes that targeting roosting areas seems to have provided the most effective results, however Little Corellas often roost in populated areas, which limits the actions that can be taken. The Light Regional Council submission also notes that Little Corellas seem to favour school sites, which limits Council intervention¹²⁴. The Light Regional Council submission contends that the most effective management approach for Little Corellas has been a mix of deterrent devices and culling. The submission contends that Little Corellas are adaptable to control devices such as bird scarers, starter pistols/caps, flashing strobes, torches, and water jets, which cease to have an effect once the Little Corellas become aware that these do not pose an actual threat¹²⁵. The Light Regional Council submission also observes that several other Councils are managing or have sought to manage abundant populations of Little Corellas with short term gains only, or alternatively, the outcome of moving problem populations between adjoining local government areas.

Committee response

The Committee acknowledges the pervasive impacts caused by Little Corella populations across several local government areas. It notes the substantial resources being expended across councils in deterring and managing Little Corella impacts, and recognises that Councils are seeking coordinated State Government-led management of the issues. Recommendations 1 and 2 specifically refer to Little Corellas.

Management of long-nosed fur seals

The Committee received a presentation from the Department for Environment and Water in relation to its monitoring of long-nosed fur seal activities in South Australia and attended a meeting with local stakeholders in Meningie on 30 November 2018.

The Department for Environment and Water reports that 80 per cent of the national population of long-nosed fur seals is located in South Australia. The most recent statewide survey shows

¹²³ Sporting Shooters' Association, *Submission 7*, p. 9.

¹²⁴ Light Regional Council, *Submission 15*, p. 1.

¹²⁵ Light Regional Council, *Submission 15*, p. 2.

total pup production at approximately 20,000 individuals, with a likely range of total population estimated at 80,000 to 100,000 individuals¹²⁶. The Department's surveys show that one significant breeding area is located on the southern coast of Kangaroo Island with another two sites on the Neptunes and another at Liguanea Island. There are smaller sites at Cape Gantheaume and Cape du Couedic¹²⁷.

Non-breeding sites where juvenile animals haul out to feed include parts of the Coorong, particularly where the fresh water meets salt water around the barrages. The Department for Environment and Water stated that these animals number 'in the tens during summer and the low hundreds in winter'¹²⁸.

The inquiry highlighted some inconsistencies in evidence relating to the seals' diet. Anecdotal evidence provided by the Southern Fishermen's Association and Ngarrindjeri local residents expressed concern that long-nosed fur seals prey on pelicans, which are a Ngarrindjeri totem species and former apex predator. However, SARDI analysis of seal scat shows no evidence of pelican consumption¹²⁹. Diet studies on the animals in the Coorong show that seals are consuming mainly bony herring and carp, with some smaller fish coming through the barrages also being consumed, including mullet, mulloway and golden perch¹³⁰.

The Southern Fishermen's Association submission contends that the South Australian Government's management of the increasing long-nosed fur seal population within the Murray Lakes and Coorong has been inadequate. The Department for Environment and Water stated that it,

*'doesn't actually have an independent estimate of the economic impact that seals are having on the [Coorong fishing] industry at this point in time.'*¹³¹

The Coorong District Council includes a strategy to 'advocate for the removal of long-nosed fur seals from water bodies in the Coorong District Council to support the sustainability of the local fishing industry and to protect our native fauna and flora' in its *Strategic Management Plan 2016-2020*. The Coorong District Council seeks endorsement from the South Australian Government to allow the fishing industry to take direct action against the seals. The Committee heard that the South Australian Government formally recognising that the population numbers

¹²⁶ The Department for Environment and Water, *Committee Hansard*, 18 October 2018, p.2.

¹²⁷ The Department for Environment and Water, *Committee Hansard*, 18 October 2018, p. 3.

¹²⁸ The Department for Environment and Water, *Committee Hansard*, 18 October 2018, p. 5.

¹²⁹ *Committee Hansard*, 21 March 2019, p. 53.

¹³⁰ The Department for Environment and Water, *Committee Hansard*, 18 October 2018, p. 5.

¹³¹ The Department for Environment and Water, *Committee Hansard*, 18 October 2018, p. 7.

of long-nosed fur seals as being overabundant within the Coorong area would be a first step towards managing their numbers.

Professor Simon Goldsworthy from the South Australian Research and Development Institute told the Committee that a range of options have been explored over the past five years to deter seal activity within the Coorong. Limiting entry to seals within the Murray Mouth is difficult because the Mouth is open to the sea. Fencing around the barrage areas would require high expenditure. Transitioning to different types of netting or more active fishing gears proved unsuccessful due to the estuary conditions in the area. The uptake of single use crackers has been limited¹³². Member for Hammond Mr Adrian Pederick MP told the Committee that with a cost of \$3.50 per unit and a requirement to use 10 – 20 crackers per day, the total annual cost for licenced fishers within the Coorong would be \$245,000. To meet this additional cost, each fisher would need to catch an extra 100 kilograms of fish per week¹³³.

Committee response

The Committee acknowledges the concerns about the impacts of long-nosed fur seals that have been raised by stakeholders. It notes other areas of seal impact including Granite Island penguin colony, West Island, and Wright Island. Both Aboriginal and non-Aboriginal communities are affected by the seals' activities within the Coorong. The Committee refers to recommendations 1 and 2.

Management of carp

Biosecurity SA advised the Committee that it has been involved in the development of the National Carp Control Plan¹³⁴, which is considering the potential for the release of a herpes virus to manage carp populations. Further research will be undertaken in 2019 prior to the implementation of any national strategy.

Management of foxes

The Parawa Agricultural Bureau submitted that current fox control methods (shooting and baiting) are effective but that these become less effective with increasing density of housing within the area, as control methods cannot be used within a defined distance of a dwelling¹³⁵.

¹³² *Committee Hansard*, 18 October 2018, p.9.

¹³³ *Committee Hansard*, 21 March 2019, p. 52.

¹³⁴ Biosecurity SA, *Committee Hansard*, 10 December 2018.

¹³⁵ Parawa Agricultural Bureau, *Submission 6*, p.2.

Management of flying foxes

Culling of grey-headed flying foxes is currently prohibited in South Australia. The Department for Environment and Water submission notes that grey-headed flying foxes are listed species with conservation status under the Commonwealth *Environment Protection and Biodiversity Conservation Act*.

Management of Wild Dogs

The South Australian Arid Lands NRM Board recently released *Best Practice Guidelines for Wild Dog Control*, but the South Australian Wild Dog Advisory Group recommends that best practice standards should be developed for all tenure types inside the fence and ideally linked to the forthcoming Landscape Act to ensure compliance¹³⁶.

Management of Marine Pests

Marine pests spread through attachment to vessels. Ensuring that all boat users clean their hulls is difficult to enforce. Biofouling management among recreational boat users is not regulated by the State or Federal governments, and there are thus no incentives or penalties in place to assist management.

Management of Plants

The Department for Environment and Water reported to the Committee that 152 weeds are declared under the Natural Resources Management Act. Declared plants can attract conditions relating to movement, sale, and control. Each Natural Resource Management Board is responsible for overseeing programs relating to declared plants in its region. The Department has produced a weeds handbook and weeds smartphone application, which guides users on management approaches for declared weeds. The Murray Darling Basin NRM Board submission supports the declaration process under the NRM Act¹³⁷, whereby one or more NRM Regions can request that the State Government undertakes a risk assessment process to appraise the impacts of a plant species. The Government can 'declare' the species as a pest and develop management options and policy in accordance with the NRM Act.

¹³⁶ South Australian Wild Dog Advisory Group, *Submission 21*, p. 2.

¹³⁷ Murray Darling Basin, *Submission 9*, p. 3.

The Parawa Agricultural Board submission contends that many ‘lifestyle’ property owners do not manage pest plants correctly and proposes that landholders should be required to manage pest plants within 50 metres of their property boundary¹³⁸. Deirdre Woods’ submission suggests that responsibility for weed management should lie with the broader community as properties that do not control weeds impact negatively on properties that do. Woods proposes that weed management could be undertaken as a ‘Work for the Dole’ project. She also suggests a reporting tool where landowners could report weed outbreaks, and the registration of weed control on land titles so that owners are aware of their responsibilities. She contends that further resourcing and enforcement of weed related issues is required¹³⁹.

The Port Augusta Council submission notes that the *South Australian Buffel Grass Strategic Plan* has expired. The Strategy supported the role of a Buffel Grass Operations Coordinator, the engagement of contractors, access to funding for chemicals, and trials for applications rates for best practice¹⁴⁰.

SUCCESSSES IN THE MANAGEMENT OF OVERABUNDANT AND PEST SPECIES

Several submissions to the Inquiry reflect on the approaches and outcomes achieved under the current management framework.

Statewide policy frameworks

The Committee heard that stakeholders view the Biosecurity SA policies for priority species as a successful tool for managing pest species in South Australia¹⁴¹. These policies outline management approaches that assist landholders in meeting their legislative responsibilities. They are seen as successful because improved management increases compliance and reduces the impacts of pest species. The policies are developed with extensive consultation and stakeholder engagement, and there is wide stakeholder acceptance and compliance.

Agency and peak body support

The Port Augusta Council submission recognises the valuable roles played by agency and peak body support within the current system. It cites the PIRSA website, *PIRSA Weed Control*

¹³⁸ Parawa Agricultural Bureau, *Submission 6*, p. 2.

¹³⁹ Deirdre Wood, *Submission 32*, page 1.

¹⁴⁰ Port Augusta Council, *Submission 27*, p. 2.

¹⁴¹ SA Murray Darling Basin NRM Board, *Submission 9*, p. 3.

Handbook for Declared Plants in South Australia published annually, PIRSA workshops coordinated by Northern and Yorke NRM Board, supporting policy papers published under the Natural Resources Management Act, and assistance offered by Greening Australia staff in identifying grass species¹⁴².

The Murray Darling Basin NRM Board submission also notes the success of District Officers as frontline points of guidance and assistance for the community. Tools have been developed to assist the community in managing certain overabundant species including the Weed Control Handbook, a smartphone app that enables community members to report weed infestations via GPS, a weed identification service run in partnership with Biosecurity SA and the State Herbarium, a short land management course for landholders, and fact sheets on State Alert Weeds¹⁴³.

Partnerships

The Sporting Shooters' Association of South Australia submission recommends that the State Government should support a continued partnership between the organisation and the Department of Environment and Water. It contends that the established programs are successful and recommends that they should be maintained¹⁴⁴.

The Murray Darling Basin NRM Board submission discusses the allocation of responsibilities for management of overabundant species¹⁴⁵. The NRM Act is underpinned by the principle that landholders are responsible for managing overabundant species, yet some species are so widespread that landholders form an understanding or expectation that the Department for Environment and Water will assist in management activities. The Adelaide Mount Lofty Ranges NRM Board submission contends that some landholders do not understand that they are responsible for managing overabundant species on their land, while others do not have the capacity or knowledge to manage their responsibilities. The submission also contends that the management of overabundant and pest species is beyond the capacity of the Department of Environment and Water and the NRM Boards, due to its scale and complexity. It recommends a strategic investment approach, particularly in biodiversity. This is an internationally recognised approach¹⁴⁶. The Trees for Life submission also makes this point, commenting that:

¹⁴² Port Augusta Council, *Submission 27*, p. 1.

¹⁴³ Murray Darling Basin NRM Board, *Submission 9*, p. 4.

¹⁴⁴ Sporting Shooters Association of SA, *Submission 21*, p. 9.

¹⁴⁵ Murray Darling Basin NRM Board, *Submission 9*, p. 3.

¹⁴⁶ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 2.

*...the enormity of the challenge means the investment is beyond the scope of the existing State stakeholders and responsible landholders. It therefore requires tri-government and community investment that is both strategic and complementary...*¹⁴⁷

Further, the Trees for Life submission emphasises the role of community-based surveillance networks and action groups in complementing the roles of government. It cites the work done by Bush for life as an example: on-ground weed management and surveys undertaken by volunteers at over 310 sites across the Adelaide and Mount Lofty Ranges regions¹⁴⁸.

The Murray Darling Basin NRM Board submission further contends that partnerships with community, industry and stakeholder groups represent a vital measure to maximise the benefits of any management response¹⁴⁹. The South Australian Arid Lands NRM Board submission also remarks on the need for lasting commitments and partnerships. The Biteback and Bounceback programs are examples of successful, long-running measures. Factors underpinning their success include:

- High levels of collaboration and cooperation ranging from joint planning, working with multiple funding bodies and cross-boundary cooperation
- A range of stakeholders being involved
- Capacity building and social outcomes
- Managing issues on a landscape basis
- Being outcome driven rather than input driven
- Attraction of external funding and support.¹⁵⁰

The Inquiry has highlighted evidence of successful partnerships, for example the Mount Lofty Ranges NRM Board proactive approach to grey-headed flying foxes. The Board convened stakeholders together to build awareness and establish a support and planning network for those impacted. The strategy has been well received within the Region¹⁵¹.

Primary Producers SA recommends that the State Government maintains coordinated efforts to manage overabundant populations in South Australia, and that these are appropriately resourced and implemented on both publicly- and privately- held land. Efforts coordinated at a state level, complement efforts undertaken at a local level by regional NRM Boards¹⁵².

The Inquiry received few submissions concerning the relationships between state and national programs for responding to overabundant and pest species. The Alinytjara Wilurara (AW) NRM Board submission is in favour of national approaches being adopted to coordinate

¹⁴⁷ Trees for Life, *Submission 26*, p. 1.

¹⁴⁸ Trees for Life, *Submission 26*, p. 1.

¹⁴⁹ Murray Darling Basin NRM Board, *Submission 9*, p. 5.

¹⁵⁰ South Australian Arid Lands NRM Board, *Submission 28*, p. 3.

¹⁵¹ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 7.

¹⁵² Primary Producers SA, *Submission 22*, p. 1.

management activities, but varying definitions of pest species across states pose a challenge for the adoption of national strategies. The Board recommends that coordination across state borders could be further encouraged, as pest and overabundant species move across borders. It cites the '10 Deserts' Program as an example of effective cross border stakeholder coordination¹⁵³.

The Department for Environment and Water submission suggests that opportunities for collaborative partnerships between states with common issues could be explored. This could occur through leveraging existing funding to support research or investigating how efficiencies of scale can be achieved by working across regions or states¹⁵⁴.

Committee response

The Committee recognises the successes achieved through statewide policy-making, partnerships and agency supports. Programs which have demonstrated successful outcomes should be considered for continued support with the implementation of the Landscapes South Australia framework. Partnerships should be part of the policy-making framework wherever applicable. The Committee recommends that the Landscapes South Australia framework should continue to provide sufficient resourcing to enable affected stakeholders to respond effectively to overabundant and pest species. Recommendations 3 to 9 arise from successful existing frameworks.

SUGGESTED IMPROVEMENTS TO CURRENT MANAGEMENT SYSTEMS

Risk-based and impact-based management principles

The prevailing national framework has been established based on risk- and impact-assessment. The national approach is based on a premise of preventing pest incursions before they are established, or as soon as they are observed. This approach is supported by Biosecurity SA and the Department of Environment and Water as the primary state regulators.

The RSPCA submission describes the advantages of threat abatement plans, which are used at the national level. The RSPCA states that this approach identifies threats and enables strategic management responses to be developed, which take into account impact evaluation, animal welfare, costs, appropriate control measures and evaluation measures. The use of landscape-based approaches also facilitates the involvement of local communities such as landholder groups¹⁵⁵.

¹⁵³ www.tendeserts.org

¹⁵⁴ Department for Environment and Water, *Submission 44*, p. 11.

¹⁵⁵ RSPCA, *Submission 43*, p. 5.

The Murray Darling Basin NRM Board submission recommends that the risk- and impact-based approach be retained in the Landscapes SA framework, in recognition that it is the most cost-effective management response. The South East NRM Board submission also expresses the view that governments should prioritise their resourcing efforts on 'potential' pests that have not yet established and allow market forces to drive the management of species that are establishing and or impacting¹⁵⁶. The Adelaide Mount Lofty Ranges NRM Board further recommends that managing species according to their actual impacts tends to be a more acceptable approach for community stakeholders, rather than targeting species that have been labelled as 'pest'. The submission contends that resourcing should therefore be allocated according to risk-based priorities. It suggests that assessments should be undertaken to measure the potential impacts and feasibility of control¹⁵⁷.

The Adelaide Mount Lofty Ranges NRM Board submission concurs with a preventative approach. It notes, however, that stakeholders raise concerns when they perceive that established populations of overabundant species are 'flourishing'. It suggests that market forces should be used to manage existing overabundant species, though this is not always applicable. For example, in the Adelaide Mount Lofty Ranges NRM area 'lifestyle' landholders do not have economic imperatives that drive their management of overabundant species. The Adelaide Mount Lofty Ranges NRM Board strategically invests in assisting landholders to build capacity in managing existing populations. It aims to achieve programs and project supports that encourage long-term behaviour change¹⁵⁸.

The Murray Darling Basin NRM Board submission recognises the strengths of the existing policy frameworks, which are managed by Biosecurity SA and accord with national approaches. However, it also notes that some of the policies have not been reviewed since 2005 and that reviews are underway, with further new policies also being developed. More regular scheduled reviews may be warranted.

Committee response

The Committee considers that state-level priorities should continue to be identified on the basis of actual impacts using existing risk assessment frameworks. The risk assessment frameworks employed at the national level and mirrored by the states are applicable to impacts caused by invasive species and native species in overabundant numbers or native species that have moved beyond their original range. Existing risk assessment frameworks

¹⁵⁶ South East NRM Board, *Submission 33*, p. 4.

¹⁵⁷ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 4.

¹⁵⁸ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 3.

are also suitable for application to Crown lands and privately held land. Recommendations 3 and 5 arise from the evidence presented in relation to this matter.

Urgent response management

The Sporting Shooters' Association of South Australia (SSA SA) identifies the major issue in managing overabundant species population numbers as the lack of speed that is applied by the State Government, Local Government and conservation organisations in responding to rising population crises¹⁵⁹.

In relation to kangaroos, the SSA SA observes that no action is taken even when mass deaths occur due to starvation and thirst and the landscape is devastated by overgrazing. The SSA SA attributes this lack of speed to the political and social issues surrounding management of overabundant species, including issues such as culling of an iconic native species, a potential negative public response, potential political impacts, potential tourism impacts, and process issues. The SSA SA emphasises that it does not seek to blame particular agencies. Rather, it contends that the State Government should be acting resolutely, and leading and directing in this space by providing political and practical support to the relevant agencies when required. Processes involved in responding to a crisis should be 'streamlined'. It recommends that:

*Government and relevant Departments expedite bureaucratic processes and manage public perceptions and concerns to facilitate rapid action on overabundant kangaroo species when critical situations arise.*¹⁶⁰

The Committee acknowledges that an urgent response protocol does not exist in South Australia, and that there may be a small number of situations where a bureaucratic process could be applied in an expeditious way to manage an emerging impact. The Committee cautions that such a protocol should be used only at Ministerial level, in accordance within agreed parameters developed by expert representatives from relevant state agencies, Landscape Boards, and Aboriginal communities.

Committee response

The Committee agrees that an expedited management approach would enable a more rapid response to urgent circumstances. It recommends that a Ministerial declaration be developed to trigger immediate short-term management responses including culling and modification of permit-based restrictions for a particular species impacting on an identified location for a prescribed period of time. In the Committee's view, several species are currently producing deleterious impacts, including western grey kangaroos, Little Corellas,

¹⁵⁹ Sporting Shooters' Association of SA, *Submission 7*, p. 2.

¹⁶⁰ Sporting Shooters' Association of SA, *Submission X*, p. 7.

long-nosed fur seals and koalas. Recommendations 1 and 2 arise from the evidence presented on this matter.

Integrated, statewide-level and landscape-level coordination

The Committee heard that there is a need to establish a default position in which stakeholders can expect a state-level response to the impacts of a particular species where applicable. The Local Government Association submission recommends that a statewide strategy is developed for the management of all overabundant and pest species, which includes short, medium and long-term goals¹⁶¹. The Environmental Defenders' Office submission supports overabundant species being most effectively managed on a whole of landscape scale rather than region-by-region¹⁶².

This position is being implemented by the relevant agencies. The Department for Environment and Water submission reports that statewide strategies for multiple impact-causing species are currently being developed. These include kangaroos, koalas, Little Corellas, and long-nosed fur seals. Several case studies emerged throughout the inquiry to affirm the need for statewide coordination. The Local Government Association (LGA) submission cites Little Corellas as an example of an overabundant species that warrants a statewide management approach, on the basis that, 'this species has become so prolific that isolated management actions are ineffective.' Species such as Little Corellas and ibis¹⁶³ are mobile between Council areas, so that an integrated statewide management approach supports the work done by all councils, rather than undermining measures taken by individual councils. The Barossa Light Council and Mid Murray Council submissions support the Local Government Association's position in seeking support from the State Government to implement a statewide program to reduce the impacts of Little Corellas, rather than allowing individual Councils the issues on a case by case basis. The Apple and Pear Growers' and Cherry Growers' Association submission calls for a management plan to be developed for the state for grey-headed flying foxes, including funding subsidies for netting.

The Murray Darling Basin NRM Board submission asserts that 'there are currently limited options for implementing current management options in an integrated, strategic way'¹⁶⁴. The Committee recognises that statewide approaches must also be integrated. Integrated statewide approaches would provide widespread economic, environmental and community

¹⁶¹ Local Government Association, *Submission 25*, p. 4.

¹⁶² Environmental Defenders' Office, *Submission 40*, p. 2.

¹⁶³ City of Charles Sturt, *Submission 8*, p. 1.

¹⁶⁴ Murray Darling Basin NRM Board, *Submission 9*, p. 5.

benefits. The Murray Darling Basin NRM Board submission contends that the integrated social and ecological approach provides the most effective means to manage issues¹⁶⁵. Conservation SA recommends the setting of clear objectives for each species of concern, as well as a comprehensive set of potential management strategies that follow the standard impact mitigation hierarchy whereby ecological issues are of primary concern, followed by human health, human land use requirements, and social impact¹⁶⁶. Independent research undertaken by Discovery Circle recommends an integrated management approach that clearly allocates actions and responsibilities.

The Committee notes that stakeholders are eager to work across the relevant levels of government, and to involve public and private landholders in management responses. The Regional Development Australia submission emphasises the benefits of a collaborative management strategy with involvement across the three levels of Government if this can be achieved¹⁶⁷. The Livestock SA submission comments that a coordinated effort, with appropriate implementation, enforcement and resourcing are the key factors in effective pest management¹⁶⁸. The Conservation SA submission recommends that costs of managing overabundant species be shared, with clear and transparent coordination of beneficiary pays, polluter pays and combined funding models.

Livestock SA acknowledges that State Government support for statewide priorities and coordination bolsters the impacts of investments made at the local level by NRM Boards. Livestock SA recommends the formation of an Invasive Species Committee, which would be a peak body that considers all species and would be able to adopt a landscape perspective in responding to issues. Livestock SA further recommends that the former Wildlife Advisory Committee be reinstated and expanded to include feral species. The Committee would have a mandate to advise on both native and non-native species¹⁶⁹.

Committee response

The Committee agrees that statewide and or landscape-scale management of overabundant and pest species offers economies of scale and is likely to deliver more effective outcomes. It therefore supports the development of strategies that can be applied as widely as possible across the state. Recommendation 4 arises from evidence on this matter.

¹⁶⁵ Murray Darling Basin NRM Board, *Submission 9*, p. 5.

¹⁶⁶ Conservation SA, *Submission 34*, p. 2.

¹⁶⁷ Regional Development Australia, *Submission 30*, p. 2.

¹⁶⁸ Livestock SA, *Submission 31*, p. 2.

¹⁶⁹ Livestock SA, *Submission 31*, p. 2.

Short- and long- term measures and diverse measures within statewide strategy

Evidence about a range of management approaches adopted for different species presented to the Committee supports a diversity of measures being included within statewide strategies. The Committee accepts that novel solutions emerge through research and evidence of best practice. The Committee recognises that certain measures may be more cost-effective than others, and that a range of management approaches may be appropriate in managing the impacts of a species or situation.

Committee response

The Committee agrees that a diverse range of management approaches should be investigated, and implemented where a weight of evidence demonstrates likely success. Recommendation 7 addresses the evidence raised in relation to this matter.

Need for supporting instruments

The Committee acknowledges that legislation and high-level strategy must be accompanied by practical guidance to stakeholders who are managing the impacts of overabundant and pest species. The recently released *Best Practice Guidelines for Wild Dog Control* are a valuable example of a supporting instrument that provides stakeholders across the state with clear advice on managing wild dog impacts in their area, and which explains how statewide obligations apply.

Compliance with guidelines, codes of practice or policies is achieved through relevant stakeholders being invested and engaged. The Committee heard that successful programs have been implemented at the local level by local authorities, including the use of local-level officers and technical supports such as the Weed Handbook and smartphone applications. Local and coordinated sources of assistance should continue to be developed and supported as a matter of principle. Through evidence of stakeholder support for integrated management options at all levels, the Committee heard that a range of stakeholders should be involved in the development of supporting instruments. At the state level, representatives of relevant agencies are required. At a local level, representation should be sought from Landscape Boards, local government, and potentially, renowned individual experts. Through evidence of impacts on country, the Committee heard that Aboriginal stakeholders have a vital role to play in contributing to the development management strategies.

The RSPCA submission recommends that the humane codes of practice should be integrated into animal welfare legislation. Adopting the codes and relevant standard operating procedures would ensure that the highest standards of welfare outcomes are prescribed for animal control activities. Introducing scheduled reviews of the codes and implementing compliance and enforcement provisions within legislation would ensure that these higher standards are being adhered to.

Committee response

The Committee agrees that there is a need to develop instruments to support statewide strategies in the practical implementation of management responses to the impacts of overabundant and pest species. Such instruments could be represented through policy, guidelines, or codes of practice. It is imperative that these instruments are developed as collaborative undertakings between state, local, and community stakeholders. Recommendation 5 addresses the evidence on this matter.

Partnerships between management authorities

The Livestock SA submission comments on agency roles and responsibilities. It reflects that siloed approaches in the past have prevented the state from adopting management strategies that consider both the economic and environmental impacts of overabundant species. Officers managing overabundant species issues can be answerable to Biosecurity SA or to the Department for Environment and Water. The Port Augusta Council submission recommends that the frameworks for managing overabundant and pest species should aim to improve clarity relating to which agencies are responsible¹⁷⁰.

Livestock SA recommends that a single agency approach would be more effective, and advocates for all overabundant species-related issues being managed through Primary Industries and Regions SA¹⁷¹. In a recent article, Andrew Cox, Chief Executive of the Invasive Species Council suggests that future management approaches should give greater consideration to environmental as well as economic and industrial impacts. He notes that lead agencies are agricultural agencies at both the state and federal level, resulting in issues being addressed from a primarily agricultural perspective. If environmental impacts are provided greater consideration, this may result in more preventative management approaches, such as fewer species extinctions.¹⁷²

¹⁷⁰ Port Augusta Council, *Submission 27*, p. 4.

¹⁷¹ Livestock SA, *Submission 31*, p. 5.

¹⁷² Graham Readfern. 'We are clearly losing the fight: scientists sound alarm over invasive species.' *The Guardian*, 21 January 2019.

The Adelaide Mount Lofty Ranges NRM Board¹⁷³ and Trees for Life¹⁷⁴ submissions note that Biosecurity SA focusses on non-native species. The submissions recommend that clearer frameworks are required for managing native species that have moved beyond their native range habitat.

Livestock SA asserts that State Government has ‘abrogated its responsibility’ by allocating local management of overabundant and pest species to NRM Boards¹⁷⁵. The South East NRM Board considers that there are some limitations in the NRM Boards’ abilities to manage overabundant species in their regions. For example, an NRM Board can request that the Minister declare a non-endemic native species of plant but a non-endemic species of animal cannot be declared under section 174(3) of the NRM Act¹⁷⁶.

The Murray Darling Basin NRM Board submission suggests that the forthcoming Landscapes South Australia Act is an opportunity to reduce complexity. Roadside weed management is an example. It argues that private landholders are confused about the agencies’ roles and responsibilities for weeds on roadsides adjoining private properties. The Adelaide Mount Lofty Ranges NRM Board submission explains that roadsides are managed between the Department of Transport, Planning and Infrastructure (DPTI) on DPTI-managed roads, local government, NRM Boards and landholders. It contends that this is a complex and often confusing arrangement. The previous Natural Resources Committee *Inquiry into Invasive Species* recommended that all agencies involved in roadside weed management should clarify the respective roles of each party. A draft manual has been prepared, which explains the legislative frameworks that operate in relation to this issue and the roles and parties involved.

Committee response

The Committee acknowledges that many parties are involved in the frameworks for managing overabundant and pest species. It considers that partnerships are the most appropriate response to address the considerable complexities involved in responding to the issues. It further notes that collaborative responses provide the most cost effective arrangements. The Committee does not recommend any changes to the structure of the current framework in terms of agency roles, but does recommend that partnerships be implemented wherever these are applicable. See Recommendation 5.

¹⁷³ Adelaide Mount Lofty Ranges NRM Board, *Submission X*, p. Y.

¹⁷⁴ Trees for Life, *Submission X*, p. Y.

¹⁷⁵ Livestock SA, *Submission X*, p. Y.

¹⁷⁶ South East Natural Resources Management Board, *Submission X*, p. Y.

Need for further research and modelling

The Committee heard that research would provide accurate data about South Australia's challenges in relation to overabundant and pest species, and facilitate interventions based on modelling and extrapolation.

The Department for Environment and Water submission recognises the role of research to support management approaches and agrees with the need for funded research to find more effective management responses¹⁷⁷.

Best practice management of overabundant and pest species requires sophisticated population modelling to optimise different management approaches for different species and provide cost-benefit analysis for multi-species management approaches. Professor Corey Bradshaw told the Committee that:

*...we have a surprising lack of rigorous data that we can absolutely prescribe with a high level of certainty that particular species cause certain amounts of damages and then relate those damages to particular densities. If we don't have an idea of the density impact relationship, we can't target particular densities to reduce certain species...*¹⁷⁸

Professor Bradshaw further explained to the Committee that creating population models via virtual experiments on different types of culling regimes enables researchers to develop protocols for targeted reductions. Without this type of modelling, Professor Bradshaw told the Committee that, 'You are just going to spend lots of money and you are not going to get anywhere.'¹⁷⁹

The University of Adelaide submission contends that a common modelling framework for assessing the population-level responses of target species to possible management interventions is required. The University recommends that immediate research be undertaken in the areas of: spatially explicit harvest models for native and alien large herbivore species (e.g. kangaroos, goats, deer), spatial risk assessment for existing and emerging human-wildlife conflicts and the consequent disruptions to key industries (e.g. interruptions to power networks and motor vehicle accidents), quantification and prediction of disease-transmission risk between pest species, domestic livestock, threatened native species, and spillover to

¹⁷⁷ Department for Environment and Heritage, *Submission 44*, p. 11.

¹⁷⁸ Professor Corey Bradshaw, *Committee Hansard*, 10 December 2018. P. 34.

¹⁷⁹ Professor Corey Bradshaw, *Committee Hansard*, 10 December 2018, p. 31.

humans, multi-species modelling for the rangelands to identify management and policy options that can limit total grazing pressure to acceptable levels, predator control models that stimulate that population-level impact of baiting strategies across different habitats and land uses, and spatially explicit models of species dynamics that evaluate population control strategies to manage overabundant species¹⁸⁰.

The University of Adelaide submission also strongly recommends a research partnership and shared investment approach. The University submission also discusses the importance of research-based training for emerging researchers and practitioners. It suggests establishing a Research Hub led by best-practice interdisciplinary research to facilitate the adoption of best practice policy for managing overabundant and pest species. The Hub would be able to develop best practice management models based on world-class interdisciplinary science and clear pathways to research adoption. The Hub would be able to engage with researchers from Biological and Environmental Sciences, Engineering, Physics and Mathematical Sciences, and Economics, Law, and allied disciplines¹⁸¹.

Multiple submissions to the inquiry highlighted the potential benefits of research for applications to specific species. In relation to long-nosed fur seals, the Committee heard that the project *Seal-fisher ecosystem interactions in the Lower Lakes and Coorong: understanding causes and impacts to develop longer-term solutions* is being undertaken to assess the economic impact of seals on the gillnet fishery, assessing the ecological impacts of seals on the system, identifying seal movements within the system and exploring options for reducing seals' impacts. Additionally, commercial fishers in the Coorong and Lakes fishery will be provided the opportunity to use electronic logbooks via an iPad app known as Deckhand. This will require fishers to record lost catch, retained catch and damage to nets, to assist in better quantifying the actual costs of seals for the fishery. Professor Simon Goldsworthy told the Committee that an assessment of the real economic and ecological impacts of seals will determine which management options are adopted for the future. This demonstrates the integral role of research in developing appropriate management responses to overabundant and pest species¹⁸².

Matt Farrell's submission recommended that further research should be undertaken into the impacts of honeybees on pollinating weeds and exotic species. Mr Farrell submitted that very

¹⁸⁰ University of Adelaide, *Submission 19*, p. 2.

¹⁸¹ University of Adelaide, *Submission 19*, p. 2.

¹⁸² Professor Simon Goldsworthy, *Committee Hansard*, 18 October 2018, p. 14.

little research has been undertaken to appraise the impacts of honeybees on environmental conditions, overall.

In relation to kangaroos, the RSPCA submission recommends that robust research is needed to determine whether or how much population control of kangaroos is required¹⁸³. The Murray Darling Basin NRM Board submission contends that there may be opportunities to better use the harvesting system to manage localised populations if more accurate evidence was available to show how kangaroos respond to local reductions in density.

The Murray Darling Basin NRM Board recommends that state and local governments prioritise their funding into research of biological and non-biological controls for Weeds of National Significance, particularly Bridal Veil and all asparagus weeds. The Alinytjara Wilurara NRM Board submission contends that research into biological control should be a priority where pests are impacting at a landscape scale. The Board uses Buffel Grass as an example¹⁸⁴.

The Committee also heard that research can be used to determine the cost effectiveness of a specific management approach. The Conservation SA submission suggests economic analysis being undertaken to investigate the opportunity costs of management measures, to identify whether alternative uses of management measures would represent better use of resources¹⁸⁵. In relation to animals that are managed by culling programs, such as deer, goats and macropods, the Sporting Shooters' Association of Australia - Conservation and Wildlife Management submission recommends that a cost benefit analysis be undertaken to determine whether aerial culling programs represent best value for the outcomes that they deliver.

Committee response

The Committee agrees that further research into the impacts of overabundant and pest species and effective management responses is essential and warranted, to quantify relevant issues, develop best practices and inform decision-making processes. Recommendation 7 addresses the evidence presented on this matter.

Implementation of novel approaches

The Committee heard that stakeholders are eager to consider a range of novel approaches, which could supplement existing measures.

¹⁸³ RSPCA, *Submission 43*, p. 7.

¹⁸⁴ Alinytjara Wilurara NRM Board, *Submission 3*, p. 2.

¹⁸⁵ Conservation SA, *Submission 34*, p. 5.

Habitat modification

Habitat modification practices were raised as novel approaches in relation to kangaroos, Little Corellas, carp, and long-nosed fur seals. The Conservation SA submission suggests that converting pastures to less palatable herb and shrub varieties will be less appealing for kangaroos¹⁸⁶. Discovery Circle recommendations included:

- Removing unnecessary open food and water storage near problem sites e.g. covering water troughs
- Installing or planting barriers to water resources around problem sites e.g. increasing vegetation around water to reduce direct access
- Installing or planting barriers to food resources around problem sites e.g. covering grain piles, crop netting
- Increasing tree density to avoid narrow tree corridors thus making habitat less appealing
- Increasing understorey planting thus making habitat less appealing
- Reducing irrigated lawn areas thus making habitat less appealing
- Increasing native plantings through succession planting and replacing exotic species with native species which are less attractive
- Creating Little Corella refuges to support movement of the species to sites that cause minimal community disruption. Suitable sites must be located away from residential and farming properties. The Conservation SA submission also suggests the use of sacrificial sites.

The Kangaroo Island NRM Board submission recommends that state and local levels of government give consideration to the Discovery Circle outcomes¹⁸⁷. The Local Government Association concurs. It recommends that landscaping should be undertaken so that creating appealing habitats for Little Corellas are avoided. Landscape design that discourages Little Corella populations could be incorporated into State and local government planning and capital works frameworks. Design or refurbishment of parks and gardens could include features that discourage Little Corellas¹⁸⁸.

In relation to carp, the Southern Fishermen's Association submitted that the impacts of carp can be reduced by improving flows within the River system, as carp favour a low-flow environment in which to breed¹⁸⁹.

The Conservation SA submission suggests that ecological impact assessments should be undertaken to identify potential habitat modifications that would address the overabundance of long-nosed fur seals. These may include restoring the marine habitat, re-instating flows through the Murray Mouth, allowing traditional hunting practices or restoring the whaler nursery outside the Murray Mouth. Other management strategies could include placement of

¹⁸⁶ Conservation SA, *Submission 34*, p. 3.

¹⁸⁷ Kangaroo Island NRM Board, *Submission 37*, p. 4.

¹⁸⁸ Local Government Association, *Submission 25*, p. 5.

¹⁸⁹ Southern Fishermen's Association, *Submission 36*, p. 7.

acoustic repellent devices over the peak season, changing fishing practices, excluding seals from fish ways and or jetties, behavioural modification actions (eg crackers), and culling to achieve population management. The Coorong District Council submission seeks direct action from the South Australian Government to remove long-nosed fur seals from the Coorong. The Association is eager for more active management, potentially including modifying the local habitat to make it less appealing to seals, prohibiting any feeding or services that attract seals to the area, installing electronic barriers into the Coorong, staging periodic events that would unsettle the seals and encourage them to leave the area, and removing 'persistent offenders', that is, certain seals who have been observed damaging equipment and attacking fishing gear.

Exclusion Zones

Exclusion zones were raised in evidence in relation to kangaroos, wild dogs, and long-nosed fur seals. Matt Farrell's submission recommends the use of exclusion zones to manage kangaroo populations, on the basis that dramatic results have been obtained when exclusion was undertaken in Newland Head Conservation Park. Farrell cites evidence showing a double in the number of species flowering in the exclusion plot and significant increases in the number and height of certain species.¹⁹⁰ This would be a high cost and high maintenance strategy and does not result in an overall reduction in the number of kangaroos unless it is combined with humane culling. Associate Professor David Paton affirmed these points. He told the Committee the exclusion fencing 'doesn't deal with the kangaroos' because it simply transfers their impact to another location but does have a role to play in recovering plant populations where kangaroos can be prevented from accessing the plants.

Edwards and Wilson argue that exclusion zones can have adverse welfare impacts where used in small areas. Species such as kangaroos cannot move in response to seasonal conditions and are thus compelled to eat whatever food sources are available. This can detrimentally impact biodiversity outcomes. Kangaroos prevented from moving can be herded into small areas for culling, which impacts on the quality of products entering the commercial harvest system where the animals are stressed or suffering malnutrition. Where exclusion zones are used across larger areas, kangaroos are subject to fewer welfare concerns and can be potentially more efficiently managed¹⁹¹.

¹⁹⁰ Matt Farrell, *Submission 12A*, p. 4.

¹⁹¹ George R Wilson and Melanie Edwards. (2019) 'Professional kangaroo population control leads to better animal welfare, conservation outcomes and avoids waste'. *Australian Zoologist* In-press.

The Port Augusta Council submission notes that it is concerned about kangaroo numbers in Stirling North Cemetery and Australian Arid Lands Botanic Garden, which are attracted to native wildflower displays and roses. Exclusion fences have been proposed but no funds have been yet allocated¹⁹².

Similar issues were discussed in relation to the use of exclusion fences to manage seal populations around the Tauwitchere Barrage near Goolwa. Mr Adrian Pederick MP, Member for Hammond, told the Committee that 80 metres of fencing was erected around the Barrage to deter the seals but was largely ineffective because the seals skirted the fencing. To be more effective, the entire length of the Barrage would need to be fenced to exclude seals¹⁹³.

The Committee acknowledges that exclusion zones are a specific intervention tool suitable in a limited number of contexts. It therefore considers that these could be adopted as a novel approach as part of a wider strategy.

Dog Fence

The Dog Fence is a specific model of exclusion fencing used across multiple Australian states to manage the movement of wild dogs and prevent incursions into pastoral districts. The South Australian Wild Dog Advisory Group submission notes that some parts of the Dog Fence are over 100 years old and are in need of urgent repair. It recommends that upgrading and replacing the Fence be undertaken as a matter of priority¹⁹⁴. Livestock SA also makes this point in its submission. The Livestock SA submission observes that the entire state population benefits from the Dog Fence. If wild dogs moved to the Adelaide Hills, impacts would include household pets being at risk and control measures even more difficult to undertake due to the high number of residential properties in the area. Until the repair of the Dog Fence is undertaken, there is an ongoing need to conduct baiting and trapping programs¹⁹⁵. The South Australian Wild Dog Advisory Group suggests that upgrades to the Fence should be funded from the Sheep Industry Fund and other sources of Government revenue. The Advisory Group also recommends that the South Australian government should implement monitoring and evaluation programs.

The Committee notes that the South Australian Government recently commissioned the Economic Analysis of the South Australian Dog Fence, which recommended that large section

¹⁹² Port Augusta Council, *Submission 27*, p. 4.

¹⁹³ *Committee Hansard*, 21 March 2019, p. 55.

¹⁹⁴ South Australian Wild Dog Advisory Group, *Submission 21*, p. 2.

¹⁹⁵ Livestock SA, *Submission 31*, p. 5.

of the fence be replaced. The Committee awaits the South Australian Government's response to the Analysis and therefore provides no further recommendations at this juncture.

Total Grazing Pressure Model

Multiple submissions to the inquiry discussed the potential to adopt a novel model of management that takes into account the total grazing pressure on a landscape exerted by all species. The Committee considers that a total grazing pressure model could be considered for implementation.

The Murray Darling Basin NRM Board submission defines total grazing pressure as 'the sum impact of stock, native herbivores and introduced species on pastures.' The Murray Darling Basin NRM Board contends that uncontrolled total grazing pressure is the most significant issue for its area¹⁹⁶. In the SA Murray Darling Basin, sheep, kangaroos, goats, deer and rabbits contribute to total grazing pressure. The Livestock SA submission states that grazing pressure and competition for feed from pest animal species have been issues for producers across the state, according to a 2018 annual survey of members. This has been exacerbated in the most recent survey period by dry seasonal conditions. Livestock SA contends that:

...there is an urgent need to develop total grazing pressure management plans that...identify and quantify the effect of invasive species...¹⁹⁷

Wilson and Edwards argue that a total grazing pressure model could also be used to re-frame kangaroo management outcomes. Currently, kangaroo numbers exist in addition to agricultural stock. While agricultural stock numbers are managed in accordance with seasonal conditions and competing land uses to derive a carrying capacity, exact kangaroo numbers are unknown and unmanaged, and their contribution to total grazing pressure is unquantified. If kangaroos could be included in a calculation of total grazing pressure, their impacts would be better understood. Potentially, this could catalyse market-based interventions for kangaroo products¹⁹⁸. Associate Professor David Paton told the Committee that a total grazing pressure model could also be adopted in protected areas, whereby kangaroo populations could be managed according to desired population numbers and their grazing impacts within a National Park or other conservation area¹⁹⁹.

¹⁹⁶ Murray Darling Basin NRM Board, *Submission 9*, p. 6.

¹⁹⁷ Livestock SA, *Submission 31*, p. 6.

¹⁹⁸ George R Wilson and Melanie Edwards. (2019) 'Professional kangaroo population control leads to better animal welfare, conservation outcomes and avoids waste'. *Australian Zoologist* In-press.

¹⁹⁹ *Committee Hansard*, 4 April 2019, p. 65.

The Murray Darling Basin NRM Board submission contends that further research should be undertaken to assess the impacts of grazing pressure on biodiversity. This is likely to yield more accurate quantitative information about desirable population densities and also provide a compelling narrative for management²⁰⁰.

Culling

The Committee heard that culling is appropriate for managing population numbers of certain species, and its use is condoned in South Australia as part of the commercial harvesting system for kangaroos, and for managing species in accordance with permits granted by the Department for Environment and Water.

Culling is a short-term approach to population management and may be more appropriate for use with some species than others. The Southern Fishermen's Association concedes that culling of long-nosed fur seals in the Coorong fishery would have limited impacts as a new population would simply move into the area to replace the previous population. If implemented, culling would need to be supplemented by other activities that deter seals from colonising the area altogether. Associate Professor David Paton advised that culling programs could be implemented at the state level for certain species, such as kangaroos and long-nosed fur seals²⁰¹. However, these programs would need to be closely regulated by the State Government and undertaken regularly to have significant impacts.

The Sporting Shooters' Association of SA contends that culling is also a resource-intensive management approach, particularly helicopter-based culls and the use of private commercial shooters. The SSA SA recommends that 'minimising the costs to the Government should be a significant consideration in the balance of control mechanisms for feral species in National Parks'²⁰².

The Sporting Shooters' Association of Australia – Conservation and Wildlife Management (SSASACWM) provides volunteers to assist with culling of overabundant species in South Australia. It provides services to private landholders, SA Water, Nature Foundation SA, Australian Wildlife Conservancy, Northern Areas Council, Port Pirie Council, Operation Flinders, Bush Heritage Australia, and the Department for Environment and Water. The Association views its service as complementary to the role of National Parks and Wildlife within protected areas. It cites the example of a feral cat culling program in Ikara-Flinders Ranges

²⁰⁰ Murray Darling Basin NRM Board, *Submission 9*, p.5.

²⁰¹ *Committee Hansard*, 4 April 2019, p. 66.

²⁰² Sporting Shooters' Association of SA, *Submission 7*, p. 5.

National Park, which facilitated the re-introduction of quoll and brushtail possums. The Association submission contends that culling offers a management approach that supplements baiting, sterilisation, and aerial shooting. The Australian Deer Association submission also provides volunteers to assist the Department for Environment and Water in culling overabundant numbers of deer, foxes, cats, brumbies, camels and wild dogs. The Adelaide Mount Lofty Ranges NRM Board submission endorses the service offered by the Sporting Shooters' Association where landholders cannot meet the required standards for firearms handling, as it provides control measures that are undertaken on a voluntary basis by shooters who are likely to have a greater level of experience and/or skill. On this basis, the Adelaide Mount Lofty Ranges NRM Board contends that the Department for Environment and Water should be supportive of the Sporting Shooters' Association programs for managing overabundant and pest species. Livestock SA comments that landholders should have more freedom to choose contractors to undertake shooting on their property. According to Livestock SA, volunteer shooters are 'discriminated against' in ways that paid contractors are not. Livestock SA suggests that landholders should be able to use any person willing to undertake the activity, on condition that the person holds the relevant licence for the firearm being used. The RSPCA submission contends that all ground shooting for animal control activities should be undertaken by 'professional, trained and competent shooters'²⁰³. It would support recreational shooters being used only as part of planned animal control programs under direct supervision of relevant authorities²⁰⁴, and only where these shooters are assessed as competent in shooting accuracy and can demonstrate their knowledge of animal welfare standards and comply with relevant animal welfare codes and associated standard operating procedures.

The Australian Deer Association and Sporting Shooters' Association of South Australia – Conservation and Wildlife Management submissions both recommended that their volunteers should receive a subsidy as recompense for their out of pocket expenses. The Sporting Shooters' Association of SA (SSA SA) submission further recommends that the State Government should apply bounties to wild dogs, foxes and feral cats. The Association recommends that these should be available to all SA-based firearms owners²⁰⁵.

In relation to koalas, the Kangaroo Island NRM Board submission recommends that the culling of koalas be re-considered as a management tool, in view of the risks posed by the koala population. The Board is concerned that the koala population will continue to increase to a

²⁰³ RSPCA, *Submission 43*, p 10.

²⁰⁴ RSPCA, *Submission 43*, p. 12.

²⁰⁵ Sporting Shooters' Association of SA, *Submission 7*, p. 9.

point where irreparable habitat damage occurs. It contends that sterilisation cannot work into the future without a very large increase in budget and immediate action. The Committee heard that the sterilisation of the Kangaroo Island population has had limited success. Associate Professor David Paton told the Committee that social sensitivity was a significant element in avoiding the use of culling as a management strategy at the time that the sterilisation program was implemented²⁰⁶. Population numbers on the Island continue to rise and their impacts are threatening its biodiversity.

Other novel approaches

The Murray Darling Basin NRM Board submission supports the development of new tools and techniques for responding to overabundant species. Recent innovations include a portable 1080 mixing unit for use across the region and a two-year trial in a remote 1080 applicator for feral cat control²⁰⁷.

The Port Augusta Council submission is supportive of adopting more environmentally sensitive methods of controlling overabundant plants in preference to toxic chemicals and cites the example of cochineal in cacti responses²⁰⁸.

The Adelaide Mount Lofty Ranges NRM Board and South East NRM Board submissions recommend that biological control measures are investigated on a national or international basis where overabundant species are impacting at a landscape scale.

Committee response

The Committee acknowledges that novel management approaches are being developed regularly, and that these may warrant further consideration as part of a broader strategy. In recognition that some novel approaches are resource-intensive and likely to be appropriate only in certain circumstances, the Committee suggests that novel approaches should be implemented judiciously, and only where supported by credible evidence showing their likely effectiveness. Recommendation 7 addresses the need to continue monitoring of emerging research.

Need for appropriate resourcing

The Committee heard about several successful programs, which are categorised by long-term goal setting supported by long-term resourcing. The Department for Environment and Water

²⁰⁶ Committee Hansard, 4 April 2019, p. 64.

²⁰⁷ Murray Darling Basin NRM Board, *Submission 9*, p. 4.

²⁰⁸ Port Augusta Council, *Submission 27*, p. 4.

submission acknowledges that its most successful program in responding to the impacts of overabundant and pest species is Operation Bounceback, which has run continuously for 25 years. This is a testament to the merits of long-term management approaches²⁰⁹. The South East NRM Board recommends that funding for management measures is provided on a long-term, sustained basis. Short-term funding cycles can undermine the outcomes achieved. Quarantining sources of funding for long-term use in managing overabundant species would be a means of achieving more effective outcomes²¹⁰.

With the introduction of a new framework, the Local Government Association submission contends that it is appropriate that the Landscape Boards are resourced appropriately to manage overabundant and pest species, to mirror the responsibility for management of overabundant species currently allocated to NRM Boards. Funding would be required to include control measures as well as management expertise and community facilitation²¹¹. The Trees for Life submission suggests that the new Landscape Boards would be well positioned to engage with the Commonwealth Government on matters of investment²¹².

The AW NRM Board submission recognises that early intervention to prevent the establishment of invasive species is the most cost-effective management approach. However, the practical difficulties of this strategy include the Board having minimal resources and depending on Federal funding that must be directed towards National priorities for managing existing issues. Prevention- and biosecurity-based approaches receive negligible funding²¹³.

The RSPCA also recommends that more resources must be allocated to ensure compliance with animal welfare standards in relation to overabundant and pest species²¹⁴.

Committee response

The Committee recognises that significant ongoing funding is required to respond to the impacts of overabundant and pest species. At a state level, the Landscape South Australia framework must provide for local authorities to be funded in undertaking local management. At the state-national level, the Committee considers that further negotiation among the states and Commonwealth for funding on prevention-based approaches would be a worthy endeavour. Recommendations 8 and 9 address the evidence raised in relation to this matter.

²⁰⁹ Department for Environment and Water, *Submission 44*, p. 9.

²¹⁰ South East NRM Board, *Submission 33*, p. 6.

²¹¹ Local Government Association, *Submission 25*, p. 10.

²¹² Trees for Life, *Submission 26*, p. 1.

²¹³ AW NRM Board, *Submission 3*, p. 3.

²¹⁴ RSPCA, *Submission 43*, p. 8.

Community engagement

Multiple submissions received reflected on the role of community stakeholders in the management of overabundant and pest species, and the potential benefits of greater engagement. These potential benefits include: improved understanding about the impacts of overabundant and pest species, improved understanding about management approaches, and the development of a 'social licence' to undertake management.

The Adelaide Mount Lofty Ranges NRM Board submission suggests that further work must be done in engaging with the community on how and why overabundant and pest species are managed²¹⁵. The Port Augusta Council submission also contends that community education about declared species needs to be improved²¹⁶. The Adelaide Mount Lofty Ranges NRM Board submission recommends that the Department for Environment and Water website should also provide information about why the management of certain species is/ is not required²¹⁷.

The Murray Darling Basin NRM Board submission notes that some native species have cultural significance and that there are differing views among South Australians about management of overabundant species. It contends that further research about social attitudes to overabundant species would be useful to understand the socio-political community segments underpinning community attitudes, which would then inform communications strategies²¹⁸. The Murray Darling Basin NRM Board submission expresses the view that an 'optimal' use of limited resources for an on-ground pest management strategy would need to include support from local communities²¹⁹.

The Local Government Association submission discusses one of the impacts of overabundant species being 'social tension caused by opposing views about management', especially where lethal control measures divide communities. It contends that increasing public knowledge and awareness would help manage community expectations that councils should undertake eradication programs at significant expense²²⁰.

The RSPCA submission describes social licence as one of the key elements in managing overabundant and pest species. It contends that all stakeholders involved in managing

²¹⁵ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 10.

²¹⁶ Port Augusta Council, *Submission 27*, p. 4.

²¹⁷ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 10.

²¹⁸ Murray Darling Basin NRM Board, *Submission 9*, p. 5.

²¹⁹ Murray Darling Basin NRM Board, *Submission 9*, p. 2.

²²⁰ Local Government Association, *Submission 25*, p. 4.

overabundant and pest species can gain and maintain social licence by adopting mandatory standards, implementing effective compliance frameworks, and employing transparent processes²²¹. The RSPCA submission contends that, without the social licence to manage overabundant and pest species, management systems and strategies will be open to ongoing criticism and less likely to galvanise community support.

One management model where the issue of social licence has been particularly prevalent relates to macropods. Associate Professor David Paton told the Committee that a ‘substantial’ reduction of kangaroo numbers within the Mount Lofty Ranges region is required; he estimated that this reduction would need to be ‘more than half’ of current numbers. He cited stakeholder sensitivity as a main challenge to population reduction²²². He recommended that the South Australian Government should start genuinely educating the community about environmental management practices in this regard. Greater clarity in establishing ideal population numbers should be applied, linked to the notion of identifying what a landscape should contain for future biodiversity preservation. This will mean less sensitivity to a notion that populations of certain species need to be reduced, in some cases substantially²²³.

Matt Farrell’s submission recommends that a community awareness campaign is required if destocking of kangaroos occurs. The purpose of the campaign would be to explain the need for reducing kangaroo numbers and the consequences if this action is not taken. A 2015 kangaroo culling undertaken in the ACT supported by community consultation could offer a precedent in communicating with the public. Providing the community with information about the negative impacts of overabundant kangaroo populations could increase the social acceptability of culling²²⁴.

The Committee received evidence from Aboriginal stakeholders about the importance of engaging with these communities in discussions about long-nosed fur seals and wild dogs. Submissions from the Southern Fishermen’s Association and Alinytjara-Wilurara NRM Board shared unique perspectives on the impacts of overabundant and pest species. It is imperative that the South Australian Government engages with Aboriginal stakeholders in the development of any management responses.

²²¹ RSPCA, *Submission 43*, p. 13.

²²² *Committee Hansard*, 4 April 2019, p. 64.

²²³ *Committee Hansard*, 4 April 2019, p. 64.

²²⁴ Matt Farrell, *Submission 12A*, p. 7.

The Department for Environment and Water acknowledged that it can improve information that is accessible to the public relating to the necessity and complexity of issues involved in managing overabundant and pest species. It hypothesises that greater access to information may mitigate some of the contentious aspects of managing overabundant native fauna population, and support landholders in addressing community concerns. It further submits that:

*Effort is also required to better understand broad community attitudes and to engage the community in finding solutions to impact causing species and their management.*²²⁵

The Murray Darling Basin NRM Board would also like to see a greater focus on engagement rather than consultation within the new Landscapes SA framework, which would support the aims of the legislation in empowering local and regional communities as stewards of their regions.

Committee response

The Committee recognises the important role of communication and education within environmental management. It agrees that more information being provided to stakeholders about management approaches to overabundant and pest species would likely improve the community's understanding about the relevant issues and potentially garner support. It recommends increased communication and information provision between decision-makers and the community about the rationale for decisions made in relation to overabundant and pest species, particularly the need for population control that preserves biodiversity for the future.

The Committee acknowledges that Aboriginal communities have a unique role to play in identifying and explaining the impacts of overabundant and pest species.

Recommendations 6 and 10 address the evidence raised in relation to this matter.

Additional options for kangaroo management

As previously stated, the urgent need for a response to macropod populations was a key theme presented in evidence to the inquiry. The Committee acknowledges that the aims of the commercial harvesting system are not currently directed towards population management, and that there are multiple challenges currently hampering the market for macropod products.

Several submissions discussed the challenges intrinsic to the market system for commercial kangaroo harvesting and suggested options for consideration. Primary Producers SA contend that fees and registration costs for commercial harvesters should be reviewed so that these are equivalent to the same costs operating in other states. Associate Professor David Paton

²²⁵ Department for Environment and Water, *Submission 44*, p 11.

observed the waste involved in the ‘shoot and let lie’ non-commercial system, and the likelihood that predators such as feral cats and foxes are feeding on carcasses. He suggested that even where kangaroo meat products could not be better used by the market, other opportunities should be explored, for example fertiliser products²²⁶. Livestock SA makes the further point that South Australia is geographically disadvantaged by the distance between field processor collection point and the processing facility. Livestock SA suggests that field processors should be able to operate across states and that the ‘export’ restriction should be lifted when carcasses are sold interstate.

Several submissions to the Inquiry proposed changes to the commercial harvesting zones for macropods in South Australia. Primary Producers SA contends that the zones in which commercial harvesting of kangaroos can be undertaken should be broadened²²⁷. The Parawa Agricultural Bureau submission contends that the Government should consider the introduction of commercial harvesting of kangaroo in the Fleurieu Region, for either pet or human consumption²²⁸. The District Council of Grant submission reports that the Council has been approached by a commercial harvester to undertake activities in the south-eastern region, but the *Commercial Harvest Regulations* prevent this from being undertaken. Eastern Grey Kangaroos are abundant in the area, but these animals are not recognised at all within the Management Plan. Conversely, they are listed as rare within the *National Parks and Wildlife Act*. Landholders can apply for a permit to cull kangaroos on their land but cannot use the carcasses productively. Victoria is currently conducting a pet meat trial using kangaroo products, and the District Council of Grant suggests that the south-eastern corner of South Australia could conduct a similar trial whereby accredited shooters could coordinate with landholders to harvest kangaroos in areas heavily affected by pasture/crop/property damage and or reduced biodiversity values.

The Department for Environment and Water is considering adding eastern grey kangaroo to the commercial harvest system. This would require the existing management plan to be amended and new regulations made under the *National Parks and Wildlife Act*. Expanding the harvest areas for existing species would require amending the existing management system. The main challenge associated with modifying the current harvest system is demonstrating a robust and sustainable harvest model for new species and or new areas in accordance with section 60I(2) of the Act.

²²⁶ *Committee Hansard*, 4 April 2019, p. 62.

²²⁷ Primary Producers SA, *Submission 22*, p. 1.

²²⁸ Parawa Agricultural Bureau, *Submission 6*, p. 2.

Further inquiry into macropod industry

In the Committee's view, the South Australian Government must recognise the pressing nature of impacts arising from macropod population numbers. The Committee received many suggested options for improving the current management framework. In relation to kangaroos, the Committee heard that the commercial harvest system does not seem to facilitate a sufficiently significant population reduction. Stakeholders suggested that adjusting market factors would be one way of addressing some of the issues related to an overabundant population of macropods.

Committee response

The Committee considers that further investigation could be undertaken to improve both the commercial and non-commercial harvest systems. Additional options could include further use of carcasses, broadening the range of areas in which commercial harvesting can be undertaken, allowing harvesting trials in non-commercial zones, and reviewing fee structures associated with harvesting activities. In addition to giving consideration to amending the commercial harvest zones and investigating opportunities for developing stronger market conditions for kangaroo products, the Committee considers that further inquiry should be initiated to examine the challenges associated with kangaroo markets and industries. Recommendations 11 and 12 address the evidence presented in relation to this matter.

Development of new industries

The Committee heard that some new industries could be developed from better use of overabundant and pest species. The Southern Fishermen's Association submission discusses opportunities for commercial harvesting of carp. This would add to the economic value of the fishery and deliver increased industry confidence. Some changes would need to be made to fishing practices if carp are being harvested as a food grade product. The Coorong District Council submission supports harvesting of carp by the local fishing industry. The Sporting Shooters' Association of South Australia submitted that the increased market value for goat products indicates that further consideration could be given to commercial harvesting. Livestock SA submitted that a proposal to establish temporary goat depots in each district was discussed with the South Australian Government in December 2016 but that no outcomes have eventuated. Mr Adrian Pederick MP, Member for Hammond, recommended that further market opportunities could be investigated for seal products. Oil, meat and skins could potentially be used²²⁹.

²²⁹ *Committee Hansard*, 21 March 2019, p. 56.

Committee response

The Committee considers that new industries and initiatives should be developed wherever possible. It recognises that in some instances, these new industries could offer economic stimulus in regional areas. Further investigation into market possibilities for products originating from overabundant species is warranted. Recommendation 13 addresses the evidence presented in relation to this matter.

Additional regulation

The Committee heard that additional regulation may be required within the existing framework.

NRM principles

The Adelaide Mount Lofty Ranges NRM Board submission contends that the existing NRM framework has some limitations, including:

- landholders cannot always undertake permitted management options, especially in urban environments;
- conflicting community views about appropriate management options;
- community expectations that the Department for Environment and Water or the regional NRM Board will undertake all management activities;
- management activities undertaken by Natural Resource Management Boards having insufficient outcomes due to prohibitive costs;
- management of highly mobile or migratory species adds complexity;
- need for more research to be undertaken supporting chosen management strategies;
- land managers may receive partial information and evidence that supports control measures, resulting in potential for misinformation²³⁰.

The Kangaroo Island NRM Board submission recommends that legislative and non-legislative measures be considered to expedite or replace the process of declaring plants in accordance with the Natural Resources Management Act. The Kangaroo Island NRM Board submission comments that the process of amending the declared weed list is 'onerous'. The Board recommends that the government consider how better efficiencies in this process can be achieved.

Permit system

The Livestock SA submission recommends that the permit system operating within the National Parks and Wildlife Act could be improved by increasing the number of animals to

²³⁰ Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 4.

1000 per permit²³¹. The Adelaide Mount Lofty Ranges NRM Board also contends that the destruction of wildlife permit system is outdated. It should be converted to an online system which reminds permit holders when their permit returns are due and the relevant timelines²³². The Apple and Pear Growers' and Cherry Growers' Associations contend that the current permit system is limited in its efficacy when a grower must estimate in advance the number of animals that they will need to cull when applying for a permit and must then re-apply for an additional permit if required. If an additional permit is required during a peak production period, this can be impractical as a crop can be destroyed within days. Conversely, if a grower applied for an initial permit with a high cull number, a lack of evidence to support need for this number can slow down the process of obtaining a permit. The Associations contend that culling is not the preferred management solution for preventing damage to crops but that it may be required in combination with alternatives such as scaring devices in years where pressures from overabundant species are high. The Associations would prefer to see a simpler permit system implemented. The Associations applaud the introduction of simpler regulations relating to the installation of environmental covers (for example, netting). The Associations submit that environmental covers such as netting are the most effective means of preventing birds impacting on crops, and growers should be able to install these without unnecessary time delays, restrictions or additional expenses²³³.

In relation to kangaroos, the RSPCA submission recommends that much more regulation of kangaroo management should be undertaken. Its preference would be for commercial shooters to replace the non-commercial harvest system altogether, or at least for non-commercial shooters to be required to hold equivalent accreditation as commercial shooters. In the RSPCA's view, 'shooting should only occur as part of a fully regulated, government supervised management program.'²³⁴

Enforcement

The Livestock SA submission argues that there are existing control regimes for many overabundant species in place across South Australia, but lack of enforcement means that 'there is no compulsion to follow the rules'²³⁵. The Environmental Defenders' Office submission recommends that enforcement of offences relating to declared pest plants and overabundant animals should be consistent. Penalties should be proportional to the biosecurity impacts and

²³¹ Livestock SA, *Submission 31*, p. 5.

²³² Adelaide Mount Lofty Ranges NRM Board, *Submission 23*, p. 10.

²³³ Apple and Pear Growers' and Cherry Growers' Associations, *Submission 4*, p. 2.

²³⁴ RSPCA, *Submission 43*, p. 7.

²³⁵ Livestock SA, *Submission 31*, p. 5.

risks posed by the species. More effective compliance would occur if authorised officers are able to undertake control measures or direct landholders to undertake these²³⁶.

In relation to feral deer, the SA Feral Deer Policy enables NRM Boards to recover costs where landholders have allowed deer to escape. Enforcement of provisions relating to deer would be done by each NRM Board on an ad hoc basis. James Darling's submission argues that this provision is very lenient and would never be practically enforced by a Board. The Livestock SA submission notes that no enforcement of offences relating to escaped feral or farmed deer has been undertaken in the last decade. The South East NRM Board submission suggests that there is a risk of some farmers liberating deer if the requirements of the revised Feral Deer Policy seem too difficult to comply with.

The RSPCA submission notes a lack of data on significant metrics associated with overabundant species, for example the number of kangaroos culled in the non-commercial sector and evidence about auditing of practices within the commercial and non-commercial kangaroo management sectors. It recommends that more resources must be allocated to public reporting of departmental operating processes and outcomes and reviewing the success of its programs against their objectives²³⁷.

Committee response

The Committee acknowledges the submissions which propose additional regulation and amendments to the principles operating as part of the Landscapes South Australia framework. It suggests that these submissions be conveyed to the Minister for Environment and Water for action.

²³⁶ Environmental Defenders' Office, *Submission 40*, p. 2.

²³⁷ RSPCA, *Submission 43*, p. 8.

CONCLUSIONS

Term of Reference 1: Efficacy of existing or novel regulatory, policy and partnering frameworks used to manage overabundant and pest species

Stakeholders agreed that a risk-based approach is the appropriate basis for managing overabundant and pest species in South Australia. However, the inquiry heard multiple criticisms of the current framework. The Committee received evidence about a range of potential new options, which could be implemented through the Landscapes SA framework and allow for coordination at state level.

For certain species, Ministerial declaration could facilitate urgent population management. Such a protocol does not exist within the current framework. The Committee agrees that the Minister for Environment and Water is best placed to initiate an 'urgent response' for critical situations involving an overabundant or pest species. This would apply to a designated area for a prescribed time period. In response to the information presented to the inquiry, the Committee recommends that the proposed Ministerial declaration be considered in relation to identified populations of western grey kangaroos, Little Corellas, long-nosed fur seals, and koalas.

The Committee recommends that a statewide plan for the management of multiple priority species be expedited where these are not already in place. These could potentially include Little Corellas, long-nosed fur seals, deer, goats, and grey-headed flying foxes. Statewide strategies would be best supported by practical implementation instruments, whether formulated as policy, best practice guidelines or codes of practice. Integrated strategies should identify populations and incorporate short- and long-term management practices, whether or not a species is subject to a declaration related to its overabundance and impact in a particular location.

In view of the large number of stakeholders impacted by overabundant and pest species management, it is imperative that statewide strategies and supporting instruments be developed with inputs from the South Australian Government, Local government, Landscape Boards, and relevant experts. Overabundant and pest species have specific impacts for Aboriginal communities. Therefore, specific and active engagement with Aboriginal stakeholders is required in the development of an urgent response protocol, statewide policy and supporting instruments. The Committee heard that an ideal model of state-based management of overabundant and pest species would incorporate partnerships between

stakeholders, stable and long-term investment, and greater stakeholder involvement and engagement. Stakeholders recommended that much more research is needed to provide an evidence base for management decisions.

In response to the information presented to the inquiry, the Committee recommends:

Recommendation 1:

The Minister for Environment and Water should be able to declare a species as 'abundant', for the purposes of managing its population impacts.

Recommendation 2:

The Minister for Environment and Water should consider declarations in relation to western grey kangaroos, Little Corellas, long-nosed fur seals, and koalas where populations are having a deleterious impact on an identified landscape.

Recommendation 3:

The South Australian Government should apply a risk-based and impact-based approach to both native and invasive impact-causing species alike, and to both Crown land and privately-held land.

Recommendation 4:

The South Australian Government expedites the development of integrated strategies for priority species where these are not in place. Integrated strategies should include identification of populations and incorporate short- and long-term measures, whether or not a species is presently declared abundant.

Recommendation 5:

The South Australian Government should develop policy and codes of practice for the management of species in partnership with Landscape Boards, Councils, communities including landholders, local Aboriginal communities, industries, and relevant experts.

Recommendation 6:

The South Australian Government should seek engagement with and advice from local Aboriginal communities in developing management approaches.

Recommendation 7:

The South Australian Government should continue to monitor research to provide an evidence base for effective management responses and greater understanding of best practices.

Term of Reference 2: Costs of managing overabundant and pest species

The Committee heard that the costs of managing overabundant and pest species are substantial, and often dependent on periodic funding arrangements between parties. Evidence for successful initiatives cites long-term funding and funding partnerships as a key factor. The national framework also recognises that prevention-based approaches are the most cost effective. These principles should continue to be recognised within the Landscapes SA framework.

In response to the information presented to the inquiry, the Committee recommends:

Recommendation 8:

The Minister for Environment and Water should ensure that the Landscapes SA framework provides appropriate resourcing of Landscape regions to continue the local management of overabundant and pest species.

Recommendation 9:

The South Australian Government should participate in further negotiation among the states and Commonwealth for longer-term funding, and funding of prevention-based approaches.

Term of Reference 3: Impacts of overabundant and pest species on agricultural outputs, environmental values, tourism, road safety, and amenity

The Committee received evidence about a wide range of impacts arising from overabundant and pest species populations, including impacts on agricultural industries and outputs, ecosystems and biodiversity, animal welfare, and communities. The Committee also heard that some positive impacts arise from overabundant and pest species populations.

In relation to these impacts, the Committee heard evidence about the importance of engaging with stakeholders to build understanding about environmental management approaches, particularly the need for managing species population numbers to maintain biodiversity for the future. The Committee recognises that management approaches supported by an evidence base are likely to engender greater stakeholder endorsement. In response to the information received as part of the inquiry, the Committee recommends:

Recommendation 10:

The South Australian Government should provide more education and information to the community about environmental management practices, including the rationale for decisions made in relation to overabundant and pest species.

Term of Reference 4: Any other relevant matters

The Committee heard that macropod management is a serious and urgent issue affecting South Australian environments and agricultural outputs. Some discord is apparent between the outcomes of the commercial harvest system and parallel strategies for population management. The Committee considers that urgent attention is required to strengthen markets for kangaroo products and otherwise amend the economic settings that will facilitate better commercial outcomes and better environmental outcomes. Further inquiry would be valuable in illuminating the key challenges for the industry. The non-commercial harvesting system allows under-utilisation of kangaroo carcasses and likely enables a high margin of waste. Better use of non-commercially harvested kangaroo products is a current opportunity.

The Committee heard that some industries arising from the use of overabundant species products could be investigated. Carp mining within the River Murray is one example.

In relation to *any other matters*, the Committee recommends that:

Recommendation 11:

The South Australian Government should take urgent action to establish and develop markets for abundant species, particularly kangaroos, including by consulting with industry with the objective of avoiding waste. Measures should include further use of carcasses, broadening the range of areas in which commercial harvesting can be undertaken, allowing harvesting trials in non-commercial zones, and reviewing fee structures associated with harvesting activities.

Recommendation 12:

The South Australian Government should undertake further inquiry to examine the structures, processes and challenges that prevent the development of a more robust commercial kangaroo products industry.

Recommendation 13:

The South Australian Government should investigate the potential for mining carp with the River Murray system.

ABBREVIATIONS

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| NRM | Natural Resources Management |
| NRM Act | Natural Resources Management Act 2004 |
| NRM Board | Natural Resources Management Board |
| SSA SA | Sporting Shooters' Association of South Australia |

APPENDIX A: CONSIDERATION OF EVIDENCE

The Natural Resources Committee considered evidence from submissions, witness statements and published literature. Committee activities related to this inquiry included following:

| Fact finding tour |
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| 30 November 2018 - Meningie and Coorong |
| Witnesses |
| <p>10 December 2018 – Watarru Room, Parliament House</p> <p>Department for Environment and Water: Ms Vicki Linton, Manager Conservation, Sustainability and Wildlife Management; Mr John Schutz, Chief Executive; Mr Jason van Weenan, Species Ecologist, Natural Resources; Dr Matthew Ward, Director, Conservation, NRM and Protected Areas Policy</p> <p>Mr Mike Grant, Economic Development Adviser, District Council of Grant</p> <p>Department for Primary Industries and Regions SA: Dr John Virtue, General Manager, Strategy, Policy and Invasive Species, Biosecurity SA; Mr Will Zacharin, Executive Director, Biosecurity SA</p> <p>Mr Lea Bacon, Director Policy, Local Government Association</p> <p>Mr Keith Parkes, Mayor, Alexandrina Council</p> <p>Ms Sharon Starick, Presiding Member, South Australian Murray Darling Basin NRM Board</p> <p>Mr Jamie Tann, Health and Public Safety, Mount Barker District Council</p> <p>Professor Corey Bradshaw, Matthew Flinders Fellow in Global Ecology, College of Science and Engineering, Flinders University</p> |
| <p>14 February 2019 – Constitution Room, Parliament House</p> <p>Livestock SA: Mr Joe Keynes, President; Mr Andrew Curtis, Chief Executive</p> |
| <p>28 February 2019 – Constitution Room, Parliament House</p> <p>RSPCA SA: Dr Rebekah Eyers and Dr Di Evans</p> |
| <p>21 March 2019 – Constitution Room, Parliament House</p> <p>Mr Adrian Pederick, MP: Member for Hammond</p> |
| <p>4 April 2019 – Constitution Room, Parliament House</p> <p>Associate Professor David Paton, University of Adelaide</p> |

APPENDIX B: SUBMISSIONS

The following people made submissions to the Committee.

| No. | Name |
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| 1 | Mr Andrew Pointon, Executive Officer, Pork SA, PO Box 7070 West Lakes SA 5021 |
| 2 | Mr Leigh Jennings, Property Owner Willunga Hill |
| 3 | Mr Parry Agius, Presiding Member, Alinytjara Wilurara NRM Board, Level 9, 81-85 Waymouth Street Adelaide SA 5000 |
| 4 | Ms Susie Green, Chief Executive Officer Apple and Pear Growers' Association and Executive Officer, Cherry Growers' Association |
| 5 | Mr Rob Parkes, Secretary, Sporting Shooters' Association of South Australia – Conservation and Wildlife Management Branch |
| 6 | Mr Peter Filsell, President, Parawa Agricultural Branch, PO Box 24 Delamere SA 5204 |
| 7 | Mr Anthony Judd, President, Sporting Shooters' Association of SA |
| 8 | Mr Mark Hannan, Strategic Planner, City of Charles Sturt, 72 Woodville Road Woodville SA 5011 |
| 9 | Ms Sharon Starick, Presiding Member, South Australian Murray Darling Basin NRM Board, PO Box 2343 Murray Bridge SA 5253 |
| 10 | Mayor Bill O'Brien, Light Regional Council, PO Box 72 Kapunda SA 5373 |
| 11 | Mr Neil MacDonald, Executive Officer, Southern Fishermen's Association, PO Box 263 Meningie SA5264 |
| 12a | Matt Farrell |
| 12b | Matt Farrell |
| 13 | Mr Paul Castle, South Australian State President, Australian Deer Association |
| 14a | Mr James Darling, Property Owner Duck Island |
| 14b | Mr James Darling, Property Owner Duck Island |
| 15 | Mr Jamie Turley, Manager Regulatory Service, Barossa Council, 43-51 Tanunda Road Nuriootpa SA 5355 |
| 16 | Ms Lee Williams, PO Box 123, Mundulla SA 5270 |
| 17 | Mr Will Zacharin, Executive Director, Biosecurity SA, GPO Box 1671 Adelaide SA 5001 |
| 18 | Mr Rocky Warren, Manager Regulatory Services Mid Murray Council, PO Box 28 Mannum SA 5238 |
| 19 | Associate Professor Bill Cassey, School of Biological Sciences, University of Adelaide North Terrace Adelaide SA 5000 |
| 20 | Mr Richard Hamilton, Grapes and Environment Committee Coordinator, Adelaide Hills Wine, 18 Oakwood Road, Oakbank SA 5243 |
| 21 | Ms Heather Miller, Chair, South Australian Wild Dog Advisory Committee, PO Box 283 Wilmington SA 5485 |
| 22 | Ms Amy Williams, Primary Producers SA, Unit 5/780 South Road Glandore SA 5037 |
| 23 | Ms Felicity-ann Lewis, Presiding Member, Adelaide and Mount Lofty Ranges NRM Board 205 Greenhill Road Eastwood SA 5063 |
| 24 | Counsellor Neville Jaensch, Coorong District Council, PO Box 399 Tailm Bend SA 5260 |
| 25 | Mr Stephen Smith, Director Policy, Local Government Association, 148 Frome Street Adelaide SA 5000 |
| 26 | Ms Vicki-Jo Russell, Acting Chief Executive, Trees for Life, 5 May Terrace Brooklyn Park SA 5032 |
| 27 | Ms Francene O'Connor, Parks Manager City of Port Augusta, PO Box 1704 Port Augusta SA 5700 |
| 28 | Ms Anne Dickin, Executive Officer, South Australian Arid Lands NRM Board, PO Box 78, Port Augusta SA 5700 |
| 29 | Mr James Donnelly |
| 30 | Jo Podoliak, Chief Executive Officer, Regional Development Australia Murraylands and Riverland SA, PO Box 134, Murray Bridge SA 5253 |

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| 31 | Mr Joe Keynes, President, Livestock SA, Unit 5, 780 South Road Glandore SA 5037 |
| 32 | Ms Deirdre Wood, Bararinga |
| 33 | Ms Fiona Rasheed, Presiding Member, South East NRM Board, PO Box 1046, Mount Gambier SA 5290 |
| 34 | Mr Craig Wilkins, Chief Executive, Conservation Society of South Australia, 111 Franklin Street Adelaide SA 5000 |
| 35 | Ms Shen Mann, Ranges to Rivers NRM Group |
| 36 | Mr Neil Macdonald, Southern Fishermen's Association, PO Box 1062 Clearview SA 5085 |
| 37 | Mr Mike Greig, Manager Sustainable Development, Natural Resources Kangaroo Island, PO Box 39 Kingscote SA 5223 |
| 38 | H. Ann Wyndham and Dr Christopher Wyndham, Hawthorndene SA 5051 |
| 39 | Mr Jeff Groves, Vice President, BirdsSA |
| 40 | Ms Melissa Ballantyne, Solicitor, Environmental Defenders' Office, GPO Box 170, Adelaide SA 5000 |
| 41 | David Singe, Chief Executive Officer, District Council of Grant, PO Box 724 Mount Gambier SA 5290 |
| 42 | Mr Graham Philp, Chair of Save Granite Island Penguins, PO Box 564 Victor Harbor SA 5211 |
| 43 | Dr Rebekah Eyers, Animal Welfare Advocate RSPCA SA 16 Nelson Street Stepney SA 5069 |
| 44 | SA Department for Environment and Water, 81-95 Waymouth Street Adelaide SA 5000 |

