

Invasive Species Review

[REDACTED]
Sydney NSW2001

31/10/2023

The Game and Pest Management Advisory Board (GPMAB) has considered the questions posed by the Natural Resources Commission (NRC) for the 'NSW Invasive Species Management Review'. The comments by the Board are only focused on vertebrate animal pests and excludes weeds. The questions presented by the NRC for comment are as follows:

1. To what extent are the NSW environment, industries and communities currently impacted by invasive species?
2. To what extent do you think existing programs in NSW are effectively managing invasive species?
3. What, if any, are the key barriers to effective management of invasive species?
4. How has invasive species management changed since the introduction of the [NSW Biosecurity Act 2015](#) legislation and associated programs and plans?
5. What are the future risks posed by invasive species to the NSW environment, industries, and communities?
6. What opportunities do you see to improve the outcomes of invasive species management in the future?

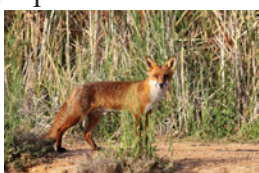
The preamble provided with the questions to establish context is:

“Invasive species cause over \$25 billion in damage to agriculture and biodiversity each year nationally, of which NSW bears a large proportion. Over 70% of NSW's threatened species and endangered ecological communities are also impacted by invasive species.

Managing the impacts of invasive species requires coordinated effort across public and private land. This is guided by the objectives and responsibilities set out in the [NSW Biosecurity Act 2015](#) and supported by a range of state and regional programs and plans.”

The GPMAB strongly supports the premise that “Managing the impacts of invasive species requires coordinated effort across public and private land“, a position the Board has advocated at every available opportunity since the launch of the NRC document titled: Shared Problem, Shared Solutions. Pest Animal Management Review (2016). Lack of community engagement, and collaborative management actions across landscape management groups, particularly government agencies, continues to hinder contiguous effort for management of overabundant pest species in NSW. It has been clear for some time that the resources required to reduce the social, environmental and economic impacts of a number of pest species in NSW is beyond the capability of any one agency. In relation to community engagement the Board again advises that ground shooting by highly trained responsible hunters from approved hunting organisations (AHO's) can assist in integrated pest management (IPM) programs in an effective way (see Bengsen et al, 2020; NRC, 2017). There is little long-term value in expensive and local knock down programs for any pest species unless co-ordinated longer-term follow up is implemented.

The statement that “Invasive species cause over \$25 billion in damage to agriculture and biodiversity each year nationally, of which NSW bears a large proportion”, requires comment and justification. The estimate of \$25 billion is exactly that, an estimate, and requires justification by the NRC by providing a peer reviewed document with associated methodology used to arrive at this estimate. It



may be higher or lower than this figure, it may even be unquantifiable, but guessing is unhelpful. Irrespective of the cost number, what landscape managers can all agree on is that populations of vertebrate pests rise and fall regularly as seasonal and resource conditions change, and that overabundant populations of pest species can have far reaching economic, environmental and social consequences. The Board recommends that licenced hunters be engaged more regularly by government agencies to assist with co-ordinated pest animal mitigation across the state. Ground hunters are an under-utilised resource, are well equipped, operate cost effectively (see Bengsen et al, 2020; Comte et al, 2023) and are willing to help. They should be called upon in co-ordinated IPM programs after initial knockdown of population numbers. As suggested by the NRC preamble, managing the impacts of invasive species requires coordinated effort across public and private land, and this should include licenced hunters as part of the solution. Continuing to ignore this vital resource will not help to solve this ongoing and burgeoning problem.

Board comments to questions, as follows:

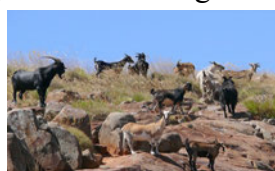
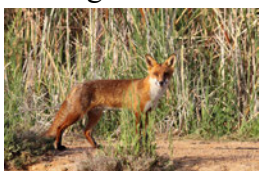
1. To what extent are the NSW environment, industries and communities currently impacted by invasive species?

In 2019, global annual costs of biological invasions were estimated to exceed US\$423 billion (IPBES, 2023). In Australia, costs of invasive species were estimated to be AUD\$2.45 billion per year, with costs increasing exponentially over time – up to sixfold each decade since the 1970s (Bradshaw *et al*, 2021). When considering only the highly reliable, observed costs, NSW had the highest costs of any state. These costs are considered to be a vast underestimate of true costs due to insufficient coverage and a lack of standardised reporting by management authorities and other agencies (Bradshaw *et al*, 2021).

Although these stated costs are estimates, and presumably include weed invasions also, it is clear that the impact of invasive animal species (existing and emerging threats) in NSW is very large, growing and cannot be overstated. However, it is also important that the message being conveyed is not being tailored to suit the interests of the messenger. Whilst impacts to agriculture from some invasive species can be estimated reasonably accurately through estimating loss and cost of control, impacts to the community and environment are less easily quantified and these areas need more work to value the true impacts to social fabric, native species, threatened species and ecological communities. Significant lag times between incursion/establishment and understanding of impacts are often not fully considered.

Both the number and spread of invasive species has increased in recent years, largely due to the cycle of wet years which aided reproduction and survival of most pest species whilst prohibiting access for mitigation work in many parts of the state. As populations increase in size they expand into new areas, establish new home ranges and new societal groups. Species like, deer, wild dogs and pigs are becoming more accustomed to human activity and due to the peri-urban sprawl are becoming more entangled with humans. This increasing entanglement with human activities brings with it biosecurity threats to agriculture, native species, and potential impact of zoonotic diseases. A recent example of this is the outbreak of *Brucella suis* in wild pigs in northern NSW and southern Queensland. This is a zoonotic disease which has already impacted hunting dogs, hunters, and members of the veterinary profession.

The impact of feral pigs on agricultural industries such as grain growing is significant, causing costly damage to crops, particularly crops such as sorghum. Ground ripping by pigs on pastoral lands is also significant, often causing permanent damage to pasture lands and increasing siltation of water courses. Although aerial shooting is seen as an appropriate knock-



down response in some areas where high numbers of feral pigs exist, in other areas with high vegetation cover the most effective method of controlling pigs is by trapping and hunting them on the ground. In some areas during drought conditions poisoning of pigs is also effective if baits can be used without risk to other domestic and native species.

Much of the commentary on pest animals concentrates on large animal species such as pigs, deer, horses, dogs, cats, and foxes yet the impact of mouse plagues is more widespread and dramatic than the impacts of other problem species in those years when they occur. Mouse plagues affect the crops pre-harvest, and contaminate and ruin hay and grain bunkers, or sheds, post-harvest. The grain industry is Australia's largest rural export commodity and efforts to protect this industry from mouse damage as well as from pigs and other grazing animal pests requires constant government surveillance and support. The dominant focus on larger and more visible invasive species must not be allowed to detract from early intervention in areas where smaller but high impact animals such as mice can quickly overpopulate to plague proportions.

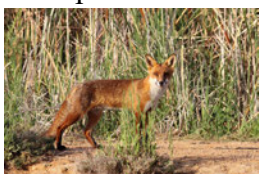
In this context also, the elephant in the room is the impact of native species such as macropods, which in overabundant numbers can cause significant crop damage also. Management of kangaroos is more difficult given the dramatic collapse of kangaroo hide and meat markets, which has driven professional shooters out of the business. However, the Board encourages government to facilitate meat recovery from pest animals such as kangaroos, pigs, deer, and goats wherever possible. In particular the sustainable harvest of kangaroos as is currently being practised represents an excellent model.

2. To what extent do you think existing programs in NSW are effectively managing invasive species?

Many existing programs in NSW are barely keeping ahead of invasive species population growth to protect key assets and in many cases are falling behind population growth or failing to curb expansion of invasive species into new areas. The emergence of new invasive species threats and the continued spread of existing invasive species into new areas across NSW is challenging. Incursion of invasive species from other states is highly reactive and significantly underfunded and resourced. Prevention provides the best value.

History shows that we are losing the battle on invasive plant and animal species, and at present the problem is growing. Initial effort and focus is around eradication. This fails in most cases and the focus shifts to asset-based protection. The increased data from aerial monitoring and control programs clearly shows that some invasive species are expanding in both population size and geographical range. Some control programs have worked but the lack of inclusion of some control methods used in an IPM approach has limited outcomes. Where good knock down of numbers has occurred the inclusion of additional techniques to mop up would have a greater and longer lasting impact in many cases on populations of invasive species and would certainly slow down population regrowth. Again, this Board re-iterates the call for inclusion of planned ongoing ground shooting as a population regrowth regulator on both public and private land to support the general biosecurity duty of landscape managers.

The focus of existing management programs appears to be entirely asset-based protection aimed at a tally of animal kills. With aerial culling the carcasses are left in the field to rot, and the Board acknowledges that in some instances this can be the only possible outcome. There are alternatives though, which are worth remembering and considering how they might be included in management. For some consumers, pigs, goats, and deer are sources of excellent meat. There have been periods when the markets for this meat have been strong, resulting in a significant



contribution to both the management of these species and a positive economic outcome for farmers, graziers, hunters, and meat processors. Since it is the NRC doing this review, it might benefit the whole management strategy for these animals to consider them as a natural resource. Pig hunters have long done this. There are graziers who managed to weather the last drought by mustering their rangeland goats. It has been noted by experts in this area, that deer maintain their condition better than other species during drought. It is logical to try and use the carcasses of these animals when they are culled. What this requires is markets, accommodating meat handling laws, and a promotion of game meat for its natural value.

The Board agrees that existing programs are financially unsustainable and are devoid of plans to suppress populations of pest animals between peaks of abundance. Scarce resources are being diverted from higher risk species (pigs) to lower risk species (deer), and at a time when a coordinated effort across public and private land is being called for by the NRC the non-use of community effort available from approved hunting organisations and licensed hunters remains an enigma.

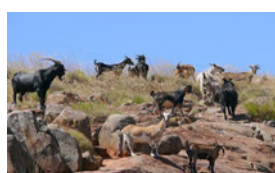
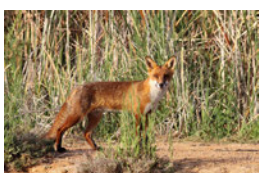
3. What, if any, are the key barriers to effective management of invasive species?

Short term funding linked to government cycles is hampering the ability to manage impacts at an effective spatial and temporal scale. Long term, sustainable funding is needed to reduce ongoing impacts of invasive animals, and private sector funding to expand wildlife harvesting would reduce total reliance on government funding. Both of these constraints require a longer term commitment (10-15 years) by government to support development of sustainable management practices.

New technologies (including toxins, lethal tools and gene drive etc.) take many years from concept to application in the field, and animal welfare considerations and biosecurity controls are difficult to accommodate within the developmental framework. Community concerns surrounding acceptability or not of lethal control techniques will continue to be a barrier to these developments. The Centre for Invasive Species Solutions (CISS) is being well supported federally and has delivered a number of successful strategies contributing to management of pest animals. For example, the recent publication of a special edition of the journal *Wildlife Research* was dedicated to the ecology, impacts and management of wild deer in Australia and contained 14 peer reviewed papers that reported research done in Australia over the past 5-6 years (Forsyth, People and Nugent, 2023). This work will support development of management programs for several species of deer by landscape managers in eastern Australia. The Board commends the CISS for the quality of the work undertaken and recommends similar work of an equivalent standard be undertaken for other pest species to underpin development of new approaches to management.

As previously mentioned in this response, lack of cooperation between agencies and failure to use all available tools ie. recreation or organised volunteer hunting, remains a constraint in current management programs. However, it doesn't need to be this way, as the evaluation of the Supplementary Pest Control Trial in a selection of NSW National Parks (NRC 2017) showed. The NRC report concluded that:

"The SPC trial has shown that using appropriately trained and capable volunteer ground shooters can deliver positive pest management outcomes and social benefits, such as improved relationships and communication between NPWS and their neighbours. The trial has also demonstrated that volunteer ground shooting can be done safely and humanely when sufficient risk management, supervision and planning are undertaken. The Commission has concluded that volunteer ground shooting has the potential to be an effective supplementary pest control technique in the state's national parks and other reserves, if used as part of an integrated pest management program under controlled conditions."



Not including all techniques in an IPM program limits program effectiveness. Practitioners agree that it is not a one size fits all approach in pest control. Topography, season, human occurrence, species, home range, land tenure, habitat density etc all have an influence on effectiveness of control, and techniques used. A further factor is the attitude and personal beliefs of organisations and individuals coordinating the programs.

Conversations between members of the general public and Board members at hunter stakeholder meetings revealed that the perception in the wider community is that the only management tools used by government agencies to manage invasive species are aerial culling and use of poison (ie. hop into a helicopter, kill them, and let them rot). The Board believes that this perception has gained traction because of a consistent failure to fully engage all stakeholders (including hunters). Further, if harvesting of these animals was part of the strategy the use of professional hunters, pig chasers and trappers, goat mustering groups, and R licenced hunters could be included in management programs to achieve effective control and have a positive economic outcome.

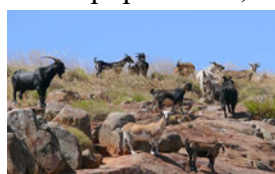
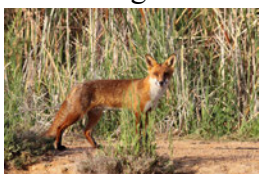
When discussing opportunities for licensed hunters to join LLS or National Parks staff in pest management programs the standard responses are i) Farmers don't want private hunters on their land, or ii) the insurance is too great, or iii) we have to supervise them. The NRC (2017) report on the use of volunteer hunters in NSW national parks demonstrated that partnerships between volunteer hunters and government agencies can be achieved, and are effective. It is time for a fresh rethink of how this approach can be applied more broadly. The need for new energy to deliver outcomes instead of ignoring invaluable resources is evident. The Board recommends stronger partnerships be formed between AHO's, licensed hunters and government agencies as part of refreshing new approaches to vertebrate pest management in NSW.

Expertise is lacking in many situations, and trained people with appropriate leadership skills and the capacity to organise 'landscape scale' control programs is a constant barrier to success. The Board recommends the establishment of a training program to produce pest animal management professionals so that community support can be harnessed in invasive species management instead of government agencies trying to do it all themselves. Ongoing maintenance funding to support ground truthing of innovative methods as they arise, and a fresh approach that incorporates collaborative rather than competitive management approaches will bring about greater community support than currently exists. Harvesting over-abundant pest animals could be incentivised in a number of ways that would assist the work of government agencies and deliver the environmental, social and economic outcomes required.

4. How has invasive species management changed since the introduction of the [NSW Biosecurity Act 2015](#) legislation and associated programs and plans?

Whilst the general biosecurity obligation is a good concept it is poorly understood by the general public and the burden is left to land managers who face the most visible impacts. Other beneficiaries (including the public) should contribute proportionately. The Board believes that the campaign message encouraging general biosecurity obligations across the broader community should be revisited regularly to re-enforce awareness.

A greater emphasis has been placed on broad scale, often aerial culls yet their effectiveness is limited when there are landholders, both private and public that do not engage in these programs, for whatever reasons. As previously mentioned, dispersal of target animals to new territory is sometimes an unintended consequence of aerial culling. This increases the need for IPM even more. Effort seems to be in reducing populations, not targeting new and emerging populations in isolated populations where a concerted approach has the potential to remove invasive species from some areas. Whilst there is a continuing need to knock down over-abundant populations, effort also needs to go into



reducing geographic spread of pest species into new locations.

There appears to have been a decline in hunting of feral pigs in recent years, most likely due to Covid 19 travel restrictions, widespread flooding across NSW and more recently bushfires. The decline also co-incided with a depression in the market for game meats due to the impact of decisions made by some export market destinations. Overall, there is far less community involvement in management of problem animals and things like local dog groups, individual pig hunting, and fox hunting are vanishing. The use of poison is replacing hunting as a management tool in many instances, with unintended environmental consequences in some situations and accidental poisoning of non-target species and farm dogs in others. Hence, as long as the cash is available, it appears that helicopter shooting will remain the method of choice for deer and pigs, although the public purse cannot sustain this approach for anything other than local population outbreaks for some species. Aerial baiting will also continue for dogs despite domestic dog deaths and scant data to demonstrate its effectiveness.

The question needs to be asked: Are current invasive species management approaches being monetised by those in service delivery functions? The Board supports the need for research to develop new approaches that embrace wider community collaboration.

5. What are the future risks posed by invasive species to the NSW environment, industries, and communities?

Lack of sustainable funding, growing size of the problem, new species incursions and expansion of ranges will only increase impacts and resources required to manage key assets. The biggest risk is that the resources required to keep up will not be available.

Exotic disease spread is a major risk, although prior preparation for known exotic diseases is well advanced in Australia. A greater risk is the emergence of a new exotic disease that impacts a wide suite of domestic, exotic, and invasive species.

Increased contact between humans and invasive species particularly in peri urban situations may increase risk through contact with zoonotic diseases, and threats to pets from disease via interaction with invasive species.

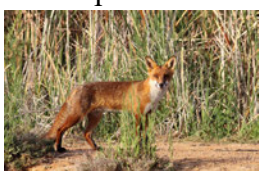
Increased risk of injury from car collisions and personal interaction between society and invasive species as populations increase.

6. What opportunities do you see to improve the outcomes of invasive species management in the future?

A key recommendation would be to adopt the model used successfully for bushfires, SES and similar response capabilities. ie. the paid staff focus on capability development and co-ordination roles, and volunteers are used to provide the workforce in times of need. This would be an about-face to what currently occurs, but it is time for a re-think. Instead of continuing approaches that haven't worked The Board supports a 'glass half full' approach whereby ways to make things work that have previously been dismissed as not doable need to be revisited. The most obvious of these is the exclusion of licensed hunters in NSW who now number in excess of 24000 in NSW, and members of approved hunting organisations where numbers are many times this.

Valuing invasive species management in carbon credit and nature repair markets. Monetise the benefits of removal of invasive species to encourage private investment.

Better integrated management cross tenure and agencies / communities. Leaders need to be trained for successful implementation of this strategy.



Continued investment in R+D

- i) Better investment in prevention, and new incursion response so emerging species do not establish.
- ii) Continued community education on the need for pest management and control.
- iii) Use of all available tools including recreational hunting and resource harvesting.
- iv) Move towards local eradication with a "remove and defend" model.

Better consultation and inclusion of all stakeholder groups and increased usage of all available control techniques in IPM programs.

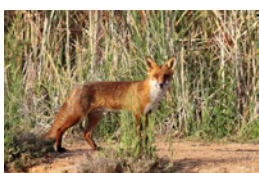
Increased knowledge of both pest species habits (range, breeding cycle, disease risk etc.) and the effectiveness of various control options in varying situations to increase effectiveness of control.

Increased funding will help the above points. Increased knowledge and acceptance of all control options by all stakeholder groups will help. Don't just go for a one size fits all approach.

Encourage community involvement in pest animal management, both in the form of farmer groups, and a significant role for hunters, private and professional.

References

- Bengsen, A.J., Forsyth, D.M., Harris, S., Latham, A.D.M., McLeod, S.R. and People, A. (2020) A Systematic Review of Ground Based Shooting To Control Overabundant Mammal Populations. *Wildlife Research* – <https://doi.org/10.1071/WR19129>
- Comte Sebastien, Thomas Elaine, Bengsen Andrew J., Bennett Ami, Davis Naomi E., Brown Daniel, Forsyth David M. (2023) Cost-effectiveness of volunteer and contract ground-based shooting of sambar deer in Australia. *Wildlife Research* **50**, 642-656.
- Corey J. A. Bradshaw, Andrew J. Hoskins, Phillip J. Haubrock, Ross N. Cuthbert, Christophe Diagne, Boris Leroy, Lindell Andrews, Brad Page, Phill Cassey, Andy W. Sheppard, Franck Courchamp, (2021). Detailed assessment of the reported economic costs of invasive species in Australia. In: Zenni RD, McDermott S, García-Berthou E, Essl F (Eds) The economic costs of biological invasions around the world. *NeoBiota* 67: 511-550. <https://doi.org/10.3897/neobiota.67.58834>
- IPBES (2023). Summary for Policymakers of the Thematic Assessment Report on Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Roy, H. E., Pauchard, A., Stoett, P., Renard Truong, T., Bacher, S., Galil, B. S., Hulme, P. E., Ikeda, T., Sankaran, K. V., McGeoch, M. A., Meyerson, L. A., Nuñez, M. A., Ordonez, A., Rahlao, S. J., Schwindt, E., Seebens, H., Sheppard, A. W., and Vandvik, V. (eds.). IPBES secretariat, Bonn, Germany. <https://doi.org/10.5281/zenodo.7430692>
- [Forsyth, D.M., People, A. and Nugent, G. \(2023\) Ecology, impacts and management of wild deer in Australia. *Wildlife Research*, 50\(9\) i-vii, <https://doi.org/10.1071/WR23092>](#)



Natural Resources Commission (2017) Supplementary Pest Control Trial Final
Evaluation Report. Pp 1-43, ISBN: 978 1 925204 21 6

On behalf of the GPMAB members, thank you for the opportunity to contribute responses to this series of questions regarding the 'NSW Invasive Species Management Review'.



NSW Game and Pest Management Advisory Board

gameandpest.advisoryboard@dpi.nsw.gov.au
Locked Bag 21, Orange NSW 2800

