Address for reply: PO Box 166, Fairfield, Victoria 3078

10 January 2019

Response to written questions on notice from Senator Urquhart

1. At the committee's public hearing in Melbourne you reported that a workshop on how to improve the threat abatement planning process would be held in the first quarter of 2019 and the results would be published. Can you confirm whether that workshop was held? Has anything been published as a result?

The Addressing Biodiversity Threats workshops facilitated by the Invasive Species Council was held in Sydney on 25-26 March 2019.

A workshop report has been completed but will not be published. We are planning to produce a public document that distils the workshop outcomes into a reform package. This is planned to be finalised by March 2020, possibly earlier.

We previously provided our discussion paper on KTPs and TAPs as an attachment to our submission to the Senate committee inquiry. The workshop outcomes were largely consistent with the recommendations in the published discussion paper, although with more detail and some new options.

2. The committee has received most evidence on the impact of and need for better control methods for deer. Do you agree that deer should be the focus of research?

Deer should be one of the foci of vertebrate pest research conducted by national, state and territory governments, ideally coordinated at the national level.

Deer is a pest species that has begun to spread across large parts of eastern Australia relatively recently and therefore only recently has there been strong interest in addressing research questions on deer impacts, behaviour and changes in density and distribution as well as more effective deer control methods.

The limited number of control methods available for deer has been due to the lack of research into improving control method effectiveness. This is due to the short period that research has been underway and the legal framework in NSW, Victoria and Tasmania that has stymied research on control measures and favoured protection of deer as a game animal. This has impacted on the availability of effective traps and approved bait and bait delivery mechanisms for feral deer.

It is important that research for feral deer management focuses on both control measures (reducing numbers where deer is present) and containment (preventing deer moving into new areas). While the interest of land managers currently impacted by deer is understandably in improved control measures, a greater focus on containment will provide relief for the majority of Australia (over 90% of the country) where deer are not presently found. The study by Davis et al. provided as an attachment to our submission confirmed the relatively limited areas currently occupied by deer but predicts deer can potentially occupy most of the continent.

It would be useful to prioritise new research for feral deer over the next five-ten years. Existing research efforts for feral pigs and goats should continue.

Deer research priorities should include:

1. Modelling of deer spread over time under different management regimes
2. Confirmation of best practice methods for control

3. Establishment of effective containment methods to prevent spread
4. Determining preferred densities to minimise impacts
5. Quantifying potential environmental, amenity and agricultural impacts
6. Confirming animal welfare outcomes for baiting and trapping options
7. Reviewing new and emerging methods to determine deer presence and abundance

Priorities 2, 5 and 6 are partly being addressed by the $8.7 million set of four CISS-coordinated research programs described in attachment 1 below. These four programs that commenced in 2019 are:

- Cost-effective management of wild deer
- The role of wild deer in the transmission of diseases of livestock
- Management of wild dog and deer in peri-urban landscapes
- Feral deer aggregator

Priority 2 is being addressed by the NPWS $9.21 million NSW deer research program that commenced in 2019 and will run over eight years. This program will develop and trial cost-effective, humane and coordinated techniques to complement existing control methods in south-east Kosciuszko National Park and adjoining landholder properties across a range of landscapes.

3. Please provide any examples of successful control programs which may have emerged/progressed since your submission was provided.

Ground-based shooting continues to be used as the primary control method for feral deer in Australia. This has shown little long-term reduction in deer numbers, even when coordinated across a number of properties. There are few examples of monitoring to gauge effectiveness. To gauge control effectiveness you need monitoring information on impact, distribution, behaviour and density to assess culling effectiveness.

Successes in terms of the reduction of large numbers of feral deer have only been achieved across small areas where there has been intensive aerial culling. This comes at a significant cost per animal.

Submission number 12 (Rowley and Roberts) refers to two aerial deer culls in 2018 coordinated by NSW Local Land Services at Willowtree in the Northern Tablelands where 5,313 deer were shot over an area of 40,000 ha, resulting in a reduction of the deer population of about 38%. Additional aerial culls have taken place in NSW in 2019. We have not been able to obtain the results of these culls.

a) <u>Parks Victoria feral deer shooting trial in Greater Alpine national parks</u>

Parks Victoria has recently completed its feral deer shooting trial in the Alpine and Mt Buffalo national parks. The trial commenced in 2015 and finished in mid 2019. In 2018, this trial was extended to include aerial shooting. Two aerial shooting operations were conducted, one in October 2018 and another in May 2019. In October 2018, 119 deer were shot by a professional marksman over 20 hours, while in May 2019, 130 deer were shot over 18 hours.

The results of the Parks Victoria ground-based and aerial shooting trial will be analysed and a report prepared. Ultimately an 'ongoing, sustainable, landscape-scale deer control action plan'[1] will be prepared for the Greater Alpine national parks.

The ground-based trial compared the outcomes of shooting by professional shooters with recreational hunters. It is worth noting that the Australian Deer Association argues strongly

[1] https://www.parks.vic.gov.au/news/2019/08/15/01/19/alpine-deer-aerial-shooting-trial-concludes

against using aerial shooting while Parks Victoria Chief Conservation Scientist Dr Mark Norman argued that aerial shooting is the most humane and effective method of controlling deer.[2]

b) NSW Tweed Valley deer plan

Northern Rivers Deer Prevention Working Group has developed the Northern Rivers Feral Deer Plan 2020-2030 to prevent the establishment of feral deer in the Northern Rivers. The Northern Rivers Deer Prevention Working is a sub group of the Northern Rivers Deer Prevention Stakeholder Group and consists of representatives of Tweed, Byron and Kyogle local governments, Landcare groups, National Parks and Wildlife Service, Local Land Services, and partners from Queensland.

Since Northern Rivers contains suitable habitat for most of the six deer species already in NSW, 'it is inevitable that unless an ambitious, strategic, coordinated approach is undertaken feral deer will establish across the Northern Rivers region'[3]. This would prevent the environmental, agricultural, amenity and safety impacts already experienced by those areas of NSW that already have deer.

The Northern Rivers and in particular the Tweed Valley is an ideal place to trial the containment of deer and prevent a large population from establishing because:

- Deer are expected to be largely absent or present in low population densities
- Historically deer farms were not allowed in the area due to the potential to spread cattle ticks
- Tick gates on the NSW-QLD border and current NSW tick biosecurity regulations restrict the free movement of livestock
- Natural boundaries including wide rivers, plunging cliff lines and mountainous country may hinder feral deer movement from adjacent areas.

A detailed plan is being developed that includes surveillance and control methods, mapping, monitoring, communication, surveying community perceptions, legislative tools and evaluation. The group is currently seeking funds to implement the plan.

4. Is the translocation/relocation of deer illegal in every state?

Queensland – translocation/relocation prohibited

Under the Queensland *Biosecurity Act 2014*, the following deer are listed as restricted invasive animals and fall under categories 3 and 4.

- hog deer
- Samba deer
- feral chital deer
- feral fallow deer
- feral red deer
- feral rusa deer

[2] https://www.gippslandtimes.com.au/story/6102149/cull-begins-next-week/

[3] 2019. NSW Northern Rivers Deer Prevention Working Group (2019) Northern Rivers Feral Deer Plan 2020-2025: Preventing the establishment of feral deer in the Northern Rivers NSW. Unpublished draft, November 2019.

Under category 3 they are not permitted to be distributed either by sale or gift, or released into the environment without a permit and category 4 dictates that 'the invasive animal must not be moved'.[4]

Additional restrictions under categories 2, 3, 4 and 5 apply to the following deer that are in Australia but not established in the wild in Queensland:

- blackbuck antelope (*Antilope cervicapra*)
- hog deer (*Axis porcinus*)
- Samba deer

Under these restrictions, in addition to the restrictions on movement (categories 3 and 4), these species cannot be kept (category 5) and must be reported (category 2).[5]

In addition to the specific provisions applying to restricted invasive species, the general biosecurity obligation under the Biosecurity Act imposes an obligation on everyone to take all reasonable and practical steps to minimise the risks associated with dealing with feral deer.

NSW – translocation/relocation prohibited

Under the NSW *Biosecurity Act 2015*, the transport or release into the environment of the six deer species already present in NSW is not specifically prohibited. Instead restrictions on the movement of deer are reliant on the general biosecurity duty under the Biosecurity Act. This duty imposes on a person a requirement to 'prevent, eliminate or minimise a biosecurity risk so far as is reasonably practicable.' (Section 21).

Across NSW there are eleven regional pest animal strategic plans that commenced on 1 July 2018, each which designate deer as a priority pest. These plans spell out the varying duties under the NSW Biosecurity Act to control, contain or eradicate feral deer. There is no specific requirement not to translocate feral deer from one location to another.

The NSW *Deer Act 2006* imposed restrictions on the release of deer from captivity, but this Act was repealed on 1 July 2017 with the commencement of the Biosecurity Act.

Victoria – translocation/relocation may be permitted (need further clarification of legal status)

Under the *Catchment and Land Protection Act 1984*, the six species of deer found in Victoria are specifically exempted from Schedule 1 prohibited pest animals that cannot be released. Therefore this legislation does not prevent the release of feral deer.

Section 75A of the *Catchment and Land Protection Act 1984* prevents the spread of any declared pest animal without a permit. This does not apply to the species of deer presently in Victoria since they are not listed as a pest species.

The *Wildlife Act* prohibits the release of certain animals from captivity or confinement. Feral deer are not specifically mentioned but an order in the government gazette may be published that restricts the release of feral deer. Since the orders are not readily accessible, it is difficult to determine if feral deer are a species that cannot not be released.

South Australia– translocation/relocation prohibited

The keeping, movement or release of any species of feral deer in South Australia is prohibited by the Natural Resources Management (General) Regulations under the *Natural Resources Management Act 2004*.[6]

[4] https://www.daf.qld.gov.au/__data/assets/pdf_file/0011/403868/IPA-Restricted-animals-of-Queensland.pdf
[5] https://www.daf.qld.gov.au/__data/assets/pdf_file/0011/403868/IPA-Restricted-animals-of-Queensland.pdf
[6] https://pir.sa.gov.au/__data/assets/pdf_file/0009/340893/Fact_sheet_-_Managing_Feral_Deer_-_July_2019_.pdf

Western Australia– translocation/relocation prohibited

The *Biosecurity and Agriculture Management Act 2007* (section 23) bans the release of any species of deer in Western Australia. There is a legal obligation on all those holding the three species of deer that can be kept in captivity to prevent them escaping.

Tasmania– translocation/relocation of farmed deer prohibited, but may be allowed under a permit that allows the possession of feral fallow deer (unlikely, but dependent on permit condition)

Fallow deer, the only feral deer found in Tasmania, are classified as 'partly protected wildlife' in the Wildlife (General) Regulations under the *Nature Conservation Act 2002*. This prevents the taking or possession of fallow deer without a permit.[7] The conditions of a permit to take a fallow deer would determine whether there is a restriction on relocating a captured live deer held by a permit holder.

Under the Wildlife (Deer Farming) Regulations of the *Nature Conservation Act 2010*, a person must not 'cause or permit, or do any act, matter or thing which is likely to cause or permit, any farm deer to either escape or be released into the wild.'

All other species of deer are prohibited from being imported into Tasmania under the Animal Health Act 1995.

The *Biosecurity Act 2019* was enacted by the Tasmanian Parliament in 2019. Like NSW and Queensland, this legislation imposes a general biosecurity duty to ensure that, so far as is reasonably practicable, a known biosecurity risk is prevented, eliminated or minimised. At the time of writing, the Act will progressively commence over a three/four-year period while new regulations are developed. Since feral deer are not declared as a pest species in Tasmania, it is unclear how the general biosecurity duty will apply to the release of feral deer.

Northern Territory – translocation/relocation prohibited

It is prohibited to release a feral animal in the Northern Territory under Section 67A of the *Territory Parks and Wildlife Act 1977*. Any non-native vertebrate animal that escapes or is released is automatically deemed to be a feral animal (Section 54). This applies to any species of feral deer.

5. The National Farmers' Federation has recently stated (as part of its drought policy) that: "As a result of consultation with its members, the NFF has proposed the following immediate measures, for consideration by Government: … 5. An increased federal-state focus on the eradication of feral pigs which are a biosecurity risk and a highly destructive pest, particularly in drought."

Do you support the NFF's recent call for an increased federal-state focus on the eradication of feral pigs? Please explain why or why not.

Deer, pigs and goats are vectors for animal diseases including those impacting on livestock. With the imminent threat of African swine fever arriving in Australia it is worth a renewed focus on feral pigs as a vector. Containment of the disease in areas near pig farms will be improved by reducing or eliminating the local pig populations.

The recently published paper Cripps et al 2019 (see 7g below) provides recent information on the potential risks of disease transmission by deer to livestock. Research has shown common

[7] https://dpipwe.tas.gov.au/Documents/Deer-Farming-Legislation-Handout.pdf

parasites in deer and domestic livestock and some viral/bacterial diseases are a threat, but the extent of the threat is unknown.

6. On 8 November 2019 the Minister for Agriculture announced the establishment of a National Feral Pig Coordinator, with Commonwealth funding of $1.4 million over the next three and a half years to support this role. Do you have any views on this announcement, and how the Coordinator should undertake their activities?

Improved control of feral pigs will require greater support for land managers and improved coordination at the regional or local level. Pest control in Australia is coordinated at either the local government or natural resource/catchment group level. Without resources for these bodies and for land managers themselves, it will be difficult to increase on-ground effort and effectiveness.

While the appointment of a national feral pig coordinator is a useful initiative, it is unlikely to have a significant outcome on the ground without investment by the federal, state and territory governments in coordinated control efforts at the regional and local level.

There is also the danger that a short pulse of control effort may be rendered meaningless if control efforts stops and pigs return to their original numbers.

7. Please provide information on any other relevant developments you believe the committee should be aware of since providing your submission.

There have been several significant developments since our submission was provided in November 2018.

a) <u>July 2019: NSW government delists deer as a game species on private land</u>

In July 2019 the NSW government announced that feral deer would be delisted as a game species on private land. This removes impediments for private landowners in controlling deer on their properties and treats feral deer like all other pest animals. As part of the change the NSW Department of Primary Industries now refers to non-farmed deer in all their communications material on their website as 'feral deer' rather than 'wild deer'. The media release issued by the NSW agriculture minister is provided as Attachment 2.

This leaves Victoria and Tasmania as the only state or territory jurisdictions with policies that protect deer as a hunting resource rather than designate it as a pest animal.

b) <u>2019: Four new research projects led by the Centre for Invasive Species Solutions</u>

In early 2019 the Centre for Invasive Species Solutions commenced a series of research projects relating to feral deer in conjunction with the federal government, state governments of Queensland, NSW, Victoria and South Australia, NRM bodies and universities. The projects are valued at $8.7 million (cash and in-kind) and include the following projects:

- Cost-effective management of wild deer
- The role of wild deer in the transmission of diseases of livestock
- Management of wild dog and deer in peri-urban landscapes
- Feral deer aggregator

The four CISS research projects are described in further detail in Attachment 1.

c) <u>2019: Eight-year trial of deer control methods led by NSW National Parks and Wildlife Service</u>

In early 2019 the NSW National Parks and Wildlife Service commenced an eight-year NSW Environmental Trust funded 'prospectus' project costing $9.21 million. Environmental Trust

prospectus projects must deliver early intervention to address an emerging issue, support innovative responses to environmental problems or lay the groundwork for further or complementary actions.

For this proof-of-concept project, NPWS will develop and trial cost-effective, humane and coordinated techniques to complement existing control methods in south-east Kosciuszko National Park and adjoining landholder properties across a variety of landscapes.

A summary of the project prepared by the farmers involved has been prepared and is provided in Attachment 3.

d) 2018: Victorian draft deer strategy

In October 2018 a draft Victorian Deer Management Strategy was exhibited from 1-29 October 2018.[8] The strategy aims to:

> '…maintain hunting opportunities while managing the impacts of deer on environmental, social, cultural, economic and agricultural assets'.

Unfortunately the draft strategy gave greater priority to ensuring deer continued to thrive for the benefit of hunters and lacked meaningful measures to lower the impact of feral deer and ensure selected areas of Victoria remained deer free.

An open letter to Victorian ministers, facilitated by the Victorian National Parks Association and endorsed by a large number of scientists, land management experts, industries, environmental organisations, landcare and similar volunteer groups and eminent people, was released in May 2019[9]. This letter called for specific improvements to the draft deer management strategy. The open letter is provided in Attachment 4.

e) 2019: Updated South Australian Deer Strategy

In 2019 the South Australian government updated its deer strategy.[10] This provides stronger regulations governing the keeping of domestic deer to prevent their escape and requirements to destroy feral deer on private property.

All domestic deer over 12 months old must be tagged and audits of deer fences are undertaken every two years to ensure the strict fencing requirements are met. Neighbours must be notified if deer escape from a deer farm. On Kangaroo Island there are stronger regulations on the import and movement of domestic deer after feral deer were eradicated from the island.

There is now a requirement to destroy feral deer on all private property. This is to prevent some landholders harbouring deer that then travel onto neighbouring properties where they are not wanted. There are requirements to notify authorities if any landholder finds a deer species not previously present in the state.

This is a good example of an effective deer management strategy. Resources will need to be made available to ensure good coordination of control efforts and widespread implementation.

f) 2019 Tasmania recreational deer hunting changes

There were minor changes to recreational hunting in Tasmania in late 2019 and early 2020.

On 2 October 2019, the Minister for Primary Industry and Water announced that crop protection permits to shoot deer can be issued for up to five years instead of one, and that for hunters and

[8] https://engage.vic.gov.au/draft-victorian-deer-management-strategy
[9] https://vnpa.org.au/wp-content/uploads/2019/05/Open-letter-Controlling-deer-in-Victoria-April-2019.pdf
[10] https://pir.sa.gov.au/__data/assets/pdf_file/0011/232040/Deer_policy_2019.pdf

crop protection permit holders, there will be no longer any quotas for deer without antlers.[11]

On 7 Jan 2020 the Minister for Primary Industry and Water announced that he will open up four new areas for hunters under the false claim that this will assist feral animal control.[12]

Despite these changes, there remains red-tape for farmers wanting to control deer on their land, including closed seasons, limits on controlling deer with antlers, mandatory reporting and the need to apply for a licence in the first place.

g) <u>December 2019: New paper on the risk of livestock disease transmission by feral deer</u>

In December 2019 a paper by Cripps et al. was published in Mammal Review that summarises the threat of deer in livestock disease transmission.[13]

The paper found that for the six deer species established in Australia, five diseases were rated as a high risk of transmission to Australian livestock. These are bovine tuberculosis, foot and mouth disease, malignant catarrhal fever, surra, and screw-worm fly infestation. Of these five diseases, only malignant catarrhal fever is present in Australia, but all five are nationally notifiable.

The paper also found that there is the limited data about diseases in deer, disease transmission between deer and livestock and deer behaviour which limits the ability to accurately determine the level of risk. This is especially so for deer that are not native to Europe such as one of the most abundant species, sambar deer.

[11] http://www.premier.tas.gov.au/releases/delivering_deer_measures_for_farmers_and_hunters

[12] http://www.premier.tas.gov.au/releases/supporting_traditional_hunting

[13] Introduced deer and their potential role in disease transmission to livestock in Australia by J Cripps, C Pacioni, M Scroggie and A Woolnough, is accessible at: https://onlinelibrary.wiley.com/doi/full/10.1111/mam.12142

ATTACHMENT 1: CISS Deer research projects

The total investment in deer related projects under the auspicing of CISS is $8.7 million (cash and in-kind). This includes Commonwealth, State, regional NRM (eg LLS) and university investment. Note that this includes the combined wild dog/deer peri-urban project, so it is not entirely spent on feral deer.

1. Cost-effective management of wild deer
2. The role of wild deer in the transmission of diseases of livestock
3. Management of wild dog and deer in peri-urban landscapes: strategies for safe communities
4. Feral deer aggregator

Project summaries from the CISS website for the four research projects are provided below:

1. Cost-effective management of wild dee

Cost effective management of wild deer (NSW led) ($1,068,000 cash + 1,566,300 in-kind)
https://invasives.com.au/research/cost-effective-management-wild-deer/

Summary

Wild deer are present in all Australian states and territories and are causing increasing agricultural, environmental and social impacts. The six species of deer occupy a wide variety of habitats including rangeland (chital deer), agricultural (fallow deer), plantation forests (sambar deer and red deer), and montane forest (sambar deer).

Land managers have started to use aerial shooting, ground shooting and exclusion fencing to manage wild deer, but the cost-effectiveness and appropriateness of these methods have not been evaluated. Best-practice guidelines for managing wild deer were identified as a priority need at the 2016 National Wild Deer Management Workshop.

This five-year project will provide land managers with the tools and expertise required to cost-effectively manage wild deer. The project will provide national leadership through the coordination of existing and planned deer management programs in QLD, NSW, VIC and TAS.

Objectives

This project has four key objectives:

1 In collaboration with the associated organisations, establish demonstration sites at which on-ground management, research and training will occur in NSW, QLD, VIC and TAS.
2 Evaluate the costs and efficacy of the main control tools (i.e. aerial shooting and ground shooting) at demonstration sites, supported by population modelling to assess longer-term impacts of control on deer populations.
3 Disseminate knowledge widely through: field days at demonstration sites; presentations at workshops, symposia and conferences; media releases; articles in peer-reviewed journals; and best-practice guidelines available from the PestSmart website.
4 Build technical and research capacity in wild deer management by up-skilling research and technical staff involved in vertebrate pest management and by training post-graduate students.

Project Leader: Dr Dave Forsyth

Project Team

- Dr Dave Forsyth, NSW DPI
- Dr Andrew Bengsen, NSW DPI
- Troy Crittle, NSW DPI
- Dr Tony Pople, QDAF
- Michael Brennan, QDAF

  - Matt Amos, QDAF
  - Dr Dave Ramsey, VIC DELWP
- Richard Duncan, UC
- Bronwyn Cameron, NSW North West LLS
- Mal Leeson, NSW Central Tablelands LLS
- Ashley Blokland, Charters Towers Regional Council
- Elaine Thomas, Parks Victoria
- Sally Bryant, Tasmanian Land Conservancy
- Jordan Hampton, Ecotone Wildlife Veterinary Services

Project Partners

- New South Wales Department of Primary Industries (NSW DPI)
- Queensland Department of Agriculture and Fisheries (QDAF)
- University of Canberra
- Tasmanian Land Conservancy
- Ecotone Wildlife Vet Services
- eSYS
- Charters Towers Regional Council

Outputs

February 2019 update:

Field research sites to assess the effectiveness of aerial shooting of wild deer have been established in North Queensland (chital deer), the New South Wales (fallow deer).

The project team has used helicopter mark-recapture distance sampling to estimate the abundance of deer at the field sites, prior to aerial shooting being conducted. Non-treatment sites were also surveyed using this method in the two New South Wales sites and using a combination of aerial and ground surveys in North Queensland.

This survey method has provided robust estimates of abundance at acceptable cost.

The team has assessed the welfare outcomes of aerial shooting of chital deer in North Queensland and have begun to assess the welfare outcomes of ground shooting of rusa deer in New South Wales.

During aerial shooting operations conducted for chital deer (North Queensland) and fallow deer (New South Wales), and ground shooting operations for rusa deer (New South Wales), blood samples have been collected that are being analysed by Jose Luis Alfredo Huaman Torres (PhD candidate, La Trobe University) as part of the project looking at the role of wild deer in the transmission of diseases of livestock.

A journal article has been published in PLOSone showing how many animals need to be sampled in assessments of animal welfare outcomes to provide robust estimates of the frequency of adverse events such as wounding during shooting operations. They are using this work to inform our assessments of the welfare outcomes of aerial and ground shooting of deer.

Research papers:

Hampton, J. O., MacKenzie, D. I., & Forsyth, D. M. (2019). How many to sample? Statistical guidelines for monitoring animal welfare outcomes. PloS one, 14(1), e0211417.

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0211417#ack

August 2019 update:

An additional field research site to assess the effectiveness of aerial shooting of wild deer was established in the ACT. The cost effectiveness of aerial shooting for the new site can be estimated and included with other sites from NSW and QLD. Negotiations are underway to assess the effectiveness of aerial shooting at additional sites in SA and NSW.

Welfare outcome assessments of aerial shooting were conducted in the ACT site for Fallow deer and in QLD for Chital deer. Negotiations to assess welfare outcomes of aerial shooting programs in NSW are underway.

Post-control helicopter surveys of a long-term aerial shooting site (treatment and non-treatment areas) in Mudgee, NSW indicate that control has been effective at suppressing the population to a low density. Ground and aerial surveys in north QLD monitoring Chital deer population recovery from control efforts compared with areas without control activities. These surveys give insight into the population dynamics for Chital deer in the dry tropics which impacts control strategies.

Negotiations are underway with Melbourne water to collaborate on an upcoming ground shooting program in their water catchments. A meeting is also scheduled with Tasmanian Land Conservancy to discuss potential sites to evaluate ground shooting.

2. The role of wild deer in the transmission of diseases of livestock

The role of wild deer in the transmission of diseases of livestock (Vic led) ($1,083,758,758 cash + $584,196 in-kind)
https://invasives.com.au/research/management-wild-dog-deer-peri-urban-landscapes-strategies-safe-communities/

Summary

In Australia, wild deer, including Fallow, Sambar, Red, Rusa, Chital and Hog deer, can feed on agricultural landscapes and, therefore, pose a biosecurity risk to the agricultural sector as potential carriers of important livestock diseases such as foot-and-mouth disease (FMD).

FMD is highly contagious and is the exotic disease of greatest significance to Australian agriculture. A large multi-state outbreak of FMD in Australia will result in an estimated direct economic loss of AU$52 billion over 10 years, with a current FMD freedom status underpinning a nationally significant annual trade in live animal and meat exports.

A spatially explicit, multi-species model has been developed (Australian Animal Disease Spread Model; AADIS) to predict the movement of FMD virus through various Australian agricultural industries. However, this model currently does not include virus transmission between livestock and wildlife populations, including deer. The role of wildlife in the transmission of FMD has been demonstrated overseas, but has not been evaluated against wild deer populations within the unique farming systems and environment of Australia.

This project will directly investigate the risk posed by deer to the livestock industry as hosts for exotic disease, using the transmission of endemic viral disease(s) between deer and livestock as an example. This project will also evaluate the effectiveness of possible mitigation strategies should an outbreak occur. This will be achieved by estimating deer population density adjacent to farms, quantifying their level of interactions with livestock, the level of connectivity between local deer populations and by estimating the cross-species infection rate between deer and livestock species.

Objectives

1. evaluating deer densities at the forest/farm interface
2. assessing the level of interactions between wild deer and domestic livestock and
3. quantifying the degree of connectivity between deer populations.

Project Leader: Dr Dave Ramsey, ARI

Project Team

- Dr Dave Ramsey, ARI
- Dr Carlo Pacioni, ARI

- Mr Luke Woodford, ARI
- Dr Karla Jayne Helbig, LaTrobe University
- Dr Teresa Carvalho, LaTrobe University
- Dr Jaimie Hunnam DEDJTR VIC
- Dr Andrew Woolnough, DEDJTR VIC
- Dr Dave Forsyth, NSW DPI

Project Partners

- Arthur Rylah Institute (ARI), Victorian Government
- Victorian Government Department of Economic Development, Jobs, Transport and Resources (VIC DEDJTR)
- NSW Department of Primary Industries (NSW DPI)
- La Trobe University

Outputs

February 2019:

Faecal, blood and DNA samples have been collected from deer species across Australia and analysis undertaken to confirm species.

Serum (blood) samples were screened for the presence of antigens and antibodies against Pestivirus and Bovine herpesvirus-1 using commercial serological tests. Antigens and antibodies against Pestivirus were detected in a very small number of the samples, while no serological evidence of Bovine herpesvirus-1 were detected in the samples.

For a subset of the blood samples collected, blood smears were performed on site at the time of blood collection. Microscopy examination of 50 blood smears revealed the presence of several morphological forms, possibly compatible with blood-protozoan. The corresponding blood samples were screened by PCR for known blood parasites. Published primers targeting conserved regions of seven parasitic genera commonly infecting livestock species were selected for molecular identification. PCR conditions and protocols were optimised to enable large scale screening, and analysis is currently ongoing.

Research papers:

Cripps, J. K., Pacioni, C., Scroggie, M. P., Woolnough, A. P., & Ramsey, D. S. (2019). Introduced deer and their potential role in disease transmission to livestock in Australia. Mammal Review, 49(1), 60-77. **https://doi.org/10.1111/mam.12142**

August 2019 update:

A high-throughput sequencing system (Illumina Hiseq) was used to analyse five serum samples from wild Fallow deer. The sequencing depth was increased five-fold from initial sequencing analysis to provide a greater scope of detection. Preliminary evidence of viral genetic material was found in some samples with confirmation and further analysis ongoing.

Microscopic examination of blood smears from NSW has revealed the presence of several morphological forms, possibly compatible with blood-protozoa. DNA from each blood sample was tested for seven parasitic genera using PCR, returning a negative result for these parasite groups. Analysis of additional blood samples is ongoing.

Deeper analysis of the viral sequences found in the last trial of metagenomics is necessary. This will allow the development of specific primers to detect individual viruses using PCR. PCR analysis of the blood samples from NSW revealed negative results, despite microscopic analysis revealing evidence of possible presence of some microorganisms. Metagenomics analysis of a specific RNA region will help identify the microorganism and provide information to develop a screening tool.

3. Management of wild dog and deer in peri-urban landscapes: strategies for safe communities

Management of wild dog and deer in per-urban landscapes: strategies for safe communities (Qld led) ($800,000 cash + $3,098,125 in-kind)

https://invasives.com.au/research/management-wild-dog-deer-peri-urban-landscapes-strategies-safe-communities/

Summary

Management of pest animals in the rapidly-expanding peri-urban region of eastern Australia requires tools and strategies markedly different to the rural landscape. The two priority pests for peri-urban councils are wild dogs and deer. Wild dogs are widespread through this region, but are becoming increasingly visible with raised public concern. Their impacts range from livestock and pet injury and loss, human harassment and even injury, being vectors of livestock and zoonotic disease, to predation on threatened wildlife. Managers have had some initial successes in controlling wild dogs, but these should be refined, extended and tailored to other areas.

In contrast, for deer, a more fragmented distribution suggests management of source populations may be more fruitful. Deer have modest rates of increase relative to canids, so suppression of small populations is theoretically feasible. The difficulty has been removing sufficient animals. Control tools are limited to trapping, shooting and fencing, but the efficacy of these methods in peri-urban settings is unknown. Methods for monitoring peri-urban deer have been developed overseas, but need to be evaluated in eastern Australia in order to guide and assess management actions.

Peri-urban local governments have identified the need for better tools and strategies for control of wild dogs (and foxes) and deer.

Behavioural science and engagement approaches are required to successfully identify, implement and monitor the success of strategies to manage pest animals in the peri-urban landscape. Planning workshops will be conducted to gauge community attitudes to wild dogs and deer issues, and guide the type, level and involvement in interventions required to reach 'acceptable levels of pest impact'. Findings from these planning workshops will guide the interventions conducted. Monitoring, evaluation and reporting of such plans will be completed during the intervention phase to determine the success of the management intervention. This would mesh with more traditional assessments of control strategies and will focus on the monitoring of impacts (e.g. incident records) and activity (e.g. sightings, activity) as metrics of success.

Objectives

This project aims to provide, through collaborations and community-led actions, pest managers with alternative strategies for managing wild dogs and deer in peri-urban areas of eastern Australia. This will involve:

1. Refine and assess management techniques (e.g. trapping and ejectors for dogs) by drawing on a) an improved understanding of wild dog ecology from the recent IA CRC project, b) removal and monitoring data on deer collected by pest managers (NSW Local Land Services (LLS) and Qld local governments) and c) an improved understanding of community attitudes to peri-urban deer and wild dog management.
2. Develop, implement and monitor community engagement strategies for wild dogs and deer to facilitate the effective implementation of management strategies.
3. Test the application of new tools for wild dogs and potentially foxes (PAPP, ejectors, lethal trap devices) that have been identified as feasible and acceptable to the community.
4. Evaluate the costs and benefits of techniques and strategies for different situations, and develop decision support tools for local governments and other pest managers.
5. Improve the knowledge of and capacity for monitoring impacts/sightings/pest activity to provide pest managers with the ongoing ability to target and monitor control activities.

Project Leader: Dr Matt Gentle, QDAF

Project Team

  - Dr Matt Gentle, QDAF
  - James Speed, QDAF
- Dr Tony Pople, QDAF
- Michael Brennan, QDAF
- Dr Matt Amos, QDAF
- Dr Dave Forsyth, NSW DPI
- Dr Michelle Dawson, NSW South East LLS
- Professor Darryl Low Choy (Griffith University)

Project Partners

- Queensland Department of Agriculture and Fisheries (QDAF)
- New South Wales Department of Primary Industries (NSW DPI)
- New South Wales Local Land Services (NSW LLS)
- ACT Parks and Conservation Service
- Griffith University
- Sunshine Coast Regional Council
- Brisbane City Council

Outputs

February 2019:

A number of field sites have been established and monitoring of deer and wild dog abundance or other activity on these sites is ongoing.

These sites will be used to assess effectiveness of control of wild dogs and deer over time.

Camera monitoring of wild dog presence/activity was undertaken over a 2-month period at five sites within the Southern Queensland areas prior to deployment of canid pest ejectors (CPEs). Sites were chosen through consultation with project collaborators with criteria including historical and ongoing issues with wild dogs and suitability for longer-term CPE deployment.

Community engagement with peri-urban residents and groups across the field sites is underway to ensure they are kept informed and aware of the management taking place and why.

The team has begun to assess the animal welfare outcomes of ground shooting of rusa deer in peri-urban Wollongong. At the time of writing, we have assessed outcomes for 35 deer. They will continue to assess animal welfare outcomes until we have a sample size of at least 100 deer.

August 2019 update:

Wild dogs:
Interviews were conducted with peri-urban residents in the Toowoomba area who have an interest in wild dog control. A working group has been established to progress a community-led plan for invasive animal management.

Sightings and impacts of wild dogs reported to local authorities are being recorded to help refine guidelines for the safe use and effectiveness of long-term canid pest ejectors (CPEs) deployment in peri-urban areas. An average of 22% of toxic CPEs were activated over three-week periods by wild dogs and foxes at five sites in QLD.

GPS-collared wild dog movement was overlaid with modelled locations of control tools (CPEs, traps) placed at different distance intervals. Strategic placement of control tools at high impact locations (trail intersections) efficiently target wild dogs during long-term deployments. Alternatively, CPE placement at the highest permitted density would reduce the time until first encounter and removal of wild dogs.

Wild Deer:
Preliminary analysis of historical transect sites (NSW) indicate a population decrease in urban transects and an increase in rural transects since 2018. These transects will be monitored in 2020,

and an improved analysis incorporating the historical data, management effort and biophysical values will be conducted.

Transect sites have also been established around Brisbane in 2018, with follow-up monitoring scheduled for 2020. Faecal pellet density and camera grids will help to determine deer abundance and determine efficacy of control
by local authorities.

4. Feral deer aggregator

Feral Deer Aggregator (SA led) ($300,000 cash + $235,000 in-kind)
https://invasives.com.au/research/feral-deer-aggregator/

Summary

The NSW Office of Environment and Heritage developed a feed structure, with the aim of aggregating feral goats and deer to improve the efficiency of control programs. They trialled the structure in combination with commercially available salt blocks and oats to attract feral goats and deer to set locations in forested study areas. The feed structure exploits differences in the sizes and shapes of the feet of native herbivores (kangaroos and wallabies) to prevent them accessing the food, whilst making it accessible to feral goats and deer.

The feed structure was highly target-specific, with feral goats freely able to access salt blocks, whilst non-target native species were excluded. Other introduced ungulate species, such as fallow deer and red deer, successfully accessed the food in the feed structure, but at considerably lower rates than feral goats. The feed structure that is effective for feral goats is now commercially available.

This project will build on the foundational research and development by NSW Office of Environment and Heritage to refine the feed structure so that feral deer can readily use the feed structures. This project will test the refined structure (the Deer Aggregator, DA) in areas with high densities of kangaroos and possums and feral fallow or red deer.

Project Leader: Dr Brad Page (Incursions Domain)

Project Team

- Brad Page, PIRSA
- Lindell Andrews, PIRSA
- Annelise Wiebkin, PIRSA
- Grant Pelton, SA DEW
- Vicki Linton, SA DEW
- Susan Ivory, SA DEW
- Megan Harper, SA DEW

Project Partners

- Primary Industries and Regions South Australia (PIRSA)
- South Australian Department of Environment and Water (SA DEW)

Outputs

February 2019:

In late 2018, two industrial design companies were contracted to brainstorm ideas for the design of the deer aggregator. Design criteria were that the aggregators should be cheap, preferably made from material or parts that are readily accessible, simple, lightweight and they should meet WH&S requirements. Several design ideas were submitted by the two companies. The project team

selected one design to develop further for the trial, with the first prototype to be built before the end of April 2019.

Field sites are being considered for testing the first prototype of the aggregator.

August 2019 update:

Trials of the latest prototype Deer Aggregator (DA) began in April 2019, when feral deer spend more time in larger groups, increasing effectiveness of the trials. Newly integrated features fine-tuned for large scale field testing have been implemented.

The locations for the trial of the prototype DA were selected by Natural Resource Management (NRM) staff from three regions in SA. A range of feed types (grains) will also be trialed and assessed using motion cameras. No toxins will be trialed in this project. As with previous trials, these will inform design improvements which will be tested again.

NSW Local Land Services (LLS) staff from two regions have expressed interest in trialing DAs on four deer species. To prepare for these trials, potential field sites were monitored using simplified PVC feeders and motion cameras to assess species present and their abundance. The trials also provide data on how different species interact with the feeders, for DA prototype development.

ATTACHMENT 2: Media release NSW Minister for Agriculture, Adam Marshall

Adam Marshall
Minister for Agriculture
Minister for Western NSW

MEDIA RELEASE

Friday, 23 August 2019

GAME OVER FOR DEER IN NSW

Farmers and private landholders will be able to better and more easily control the State's exploding feral deer population, following a regulation change announced today by Agriculture Minister Adam Marshall.

Deer currently occupy the unique 'game species' classification, meaning a special hunting licence is required to eradicate them. Under the changes anyone with a firearm licence will be able to eradicate deer on private land, so long as they have landholder's permission.

Mr Marshall said removing game status would give landholders the upper hand in dealing with surging numbers of the four-legged menace.

"The NSW deer population has exploded in recent years and these feral animals are not only causing grief for farmers battling drought – they're encroaching on urban areas and creating a hazard for motorists too," Mr Marshall said.

"As it stands, landholders are fighting these feral animals with one hand tied behind their back. It simply doesn't make sense for deer to have a semi-protected status while their population is soaring.

"Removing game status will give landholders more flexibility to manage deer and will bring its classification into line with other feral animals such as wild dogs, foxes, rabbits and pigs."

Over the last 10 years the distribution of deer across the State has increased from approximately 8 to 17 per cent.

Member for Port Macquarie Leslie Williams said the changes would come as a huge relief to members of the local community.

"In Port Macquarie and surrounding areas the deer population has become a significant issue. They're damaging farms, causing grief for motorists and encroaching on residential properties," Mrs Williams said.

"I spoke in Parliament in May on the need for something to be done about the deer and our community has been calling for this change. I'm glad the NSW Government has listened and will empower landholders to better manage deer."

The changes will be made under the *Game and Feral Animal Control Act 2002* and come into effect on 6 September 2019.

MEDIA: Jackson Busse | 0447 949 718

ATTACHMENT 3: Project logic for NPWS deer research project

The diagram below was prepared in April 2019 by farmers involved in the project.

Environmental Trust Deer Habit, Extent, Impact, Control Research Project – Draft Project Logic – (for discussion and improvement)

ATTACHMENT 4: Open letter to Victorian Ministers in response to Draft Deer Management Strategy 2018

(see next page)