

Feral deer management strategy 2013–18



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Acronyms

AUSVETPLAN	<i>Australian veterinary emergency plan</i>
CRC	Cooperative Research Centre
DAFF	Department of Agriculture, Fisheries and Forestry
DNRM	Department of Natural Resources and Mines
JCU	James Cook University
NRM	natural resource management
QPWS	Queensland Parks and Wildlife Service
UQ	The University of Queensland

About this strategy

Currently, four species of deer have formed feral populations in Queensland. Additional species have the potential to naturalise if they are imported and released. There is a considerable body of evidence, primarily from overseas sources, indicating that large deer populations have significant agricultural, environmental and social impacts. These include:

- competing with livestock for pasture
- carrying pests and diseases that can affect livestock
- damaging crops
- grazing of certain native plants, causing changes to floristic composition and structure
- crossing roads and causing motor vehicle accidents
- damaging reforestation, landscaping, gardens and parks.

There is anecdotal evidence that deer abundance is increasing in Queensland. Although the exact rate of population increase has not been accurately quantified, if populations are allowed to expand, the total impact of feral deer in Queensland will increase accordingly.

In response to growing community concern over the apparent increase in deer abundance and potential impact, all feral deer were declared as Class 2 or Class 3 pests, and deer not yet in the wild in Queensland were declared as Class 1 pests, under the *Land Protection (Pest and Stock Route Management) Act 2002*, in May 2009.

The *Feral deer management strategy 2013–18* has been developed to provide stakeholders with a framework to coordinate control measures and reduce impacts.

The final value of any strategy is in its application. A sustained and coordinated effort in controlling feral deer is required to ensure that the strategy provides value to the community.

Summary

The purpose of this strategy is to provide an integrated set of strategic directions, agreed to by stakeholders, for the future management of feral deer in Queensland.

Currently, four species of deer have formed feral populations in Queensland. Additional species have the potential to naturalise if they are imported and released. There is a considerable body of evidence, primarily from overseas sources, indicating that large deer populations have significant agricultural, environmental and social impacts.

Under current legislation, all landholders (including the state government) are responsible for the control of Class 2 feral deer on lands that they manage. Also, landholders in or adjacent to environmentally significant areas may have a responsibility to control Class 3 species if directed by a local government that reasonably believes the species are affecting the environmentally significant area.

The aim of control is to minimise the impacts of existing feral deer populations, limit the spread of these populations and prevent the establishment of new populations.

Control efforts are most successful when they are conducted cooperatively with all landholders in an area. It is also important to prevent releases of domesticated deer into the wild, so owners need to be aware of the legislation regarding the release of animals.

This management strategy has been developed through consultation with all stakeholders. It is structured around an overall vision and five interrelated desired outcomes.

Specific strategies and actions to achieve each of the desired outcomes (including who will undertake them) are detailed in this document.

Vision

To minimise the spread and impact of feral deer in Queensland.

Desired outcomes

- 1. The community understands that feral deer management has positive outcomes for the community.**

Strategy 1 Develop and implement awareness programs to encourage adoption of effective feral deer management.

- 2. Feral deer populations are managed effectively.**

Strategy 2 Remove all feral deer from recently established populations and areas where feral deer are having a significant impact.

Strategy 3 Adopt best practice management techniques and procedures for feral deer control and prevention of new populations.

Strategy 4 Implement feral deer management.

3. **Resources are used effectively and strategically through collaborative and coordinated pest management planning.**

Strategy 5 Encourage, prepare and implement feral deer planning.

4. **The community and land managers have available the most current information on feral deer impacts and management techniques.**

Strategy 6 Continuously improve feral deer management practices.

Strategy 7 Increase understanding of the ecology, biology, populations and impacts of feral deer in Queensland.

5. **Feral deer management in Queensland is supported by adequate resourcing.**

Strategy 8 Obtain cooperation and support from stakeholders in resourcing their components of this strategy.

Strategy 9 Coordinate education, awareness and research resources.

1 Introduction

Background

Definitions

The following definitions are used in this strategy.

- **Best practice** is a superior method or an innovative practice that contributes to improved performance of a process. Best practice may incorporate, but is not limited to:
 - (a) expert review
 - (b) clearly superior results
 - (c) results that are a breakthrough in efficiency/effectiveness
 - (d) agreement from multiple sources that the practice is superior
 - (e) use of latest technology
 - (f) a high number of satisfied repeat users.
- A **declared pest** is a live animal or plant listed as a declared pest under section 36 or section 37(2) of the *Land Protection (Pest and Stock Route Management) Act 2002*.
- An **environmentally significant area**, as defined under section 78(8) of the *Land Protection (Pest and Stock Route Management) Act 2002*, is any of the following:
 - (a) a protected area
 - (b) land dedicated as a reserve for environmental purposes under the *Land Act 1994*, section 31
 - (c) a World Heritage Area listed under the World Heritage Convention
 - (d) an area supporting a critically endangered or endangered ecological community in the list established under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth), section 181
 - (e) a declared Ramsar wetland under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
 - (f) an area of high nature conservation value under the *Vegetation Management Act 1999*
 - (g) an area other than state-controlled land identified in a local government's pest management plan as an area that has special environmental significance for native wildlife
 - (h) a wild river area.
- A **feral deer**, as defined under the *Land Protection (Pest and Stock Route Management) Regulation 2003*, is a deer that:
 - (a) is living in a wild state
and
 - (b) is not being farmed or kept for any other purpose within a deer-proof enclosure, cage or other structure.
- **Peri-urban** landscapes are those that combine urban and rural activities. These areas commonly contain a mixture of land usages including suburban pockets, rural residential lots and small to medium agricultural holdings.

Scientific nomenclature used in this strategy is taken from Wilson and Reeder (2005).

The history of feral deer in Queensland

Deer were introduced from Europe and Asia and released into the wild by the Queensland Acclimatisation Society and private individuals in the late nineteenth and early twentieth centuries.

Four deer species—chital or axis deer (*Axis axis*), red deer (*Cervus elaphus*), rusa deer (*Cervus timorensis* or *Rusa timorensis*) and fallow deer (*Dama dama*)—became established in the wild as a result of this. See Appendix 1 for a brief description of each species and the history of their establishment in Queensland.

For most of the past 100 years, the established deer species have been common in limited areas around the sites of their introduction (historical distribution). Since the 1970s and particularly during the 1990s, however, escapes from deer farms and deliberate translocations of deer have seen the numbers and geographic range of deer increase significantly.

In addition to the herds listed in Appendix 1, there are small populations of feral deer in many peri-urban areas (the result of deer farm escapes).

Species distribution and potential threats

The current distribution of deer in Queensland suggests that the major herds are still centred on historic distributions (see Figures 1 and 2). However, there is anecdotal evidence that deer abundance is increasing in certain areas. It is estimated that there are now about 30 000 feral deer in Queensland in at least 20 populations.

One primary factor influencing the distribution of a species is climate. Areas of Queensland where climate appears suitable for the four species of feral deer in Queensland were predicted using Climatch (Bureau of Rural Sciences 2009), as shown in Appendix 1. These models suggest that, based purely on climatic parameters alone, the four feral deer species in Queensland could expand their existing ranges. This prediction seems to be supported by anecdotal evidence of increasing abundance and range. Final range and abundance will, of course, be also influenced by factors other than climate (e.g. land use, predators).

There is a considerable body of evidence indicating that large deer populations can have significant agricultural, environmental and social impacts. These impacts include:

- competing with livestock for pasture
- carrying pests and diseases that can affect livestock
- damaging crops
- grazing of certain native plants, causing changes to floristic composition and structure
- crossing roads and causing motor vehicle accidents
- damaging reforestation, landscaping, gardens and parks.

The exact nature and extent of deer impacts in Queensland has not been fully quantified. However, it is reasonable to predict that potential (long-term) impacts could be comparable to impacts documented overseas and interstate. A range of studies on deer impacts have been summarised by Jesser (2005) and Dolman and Wäber (2008).

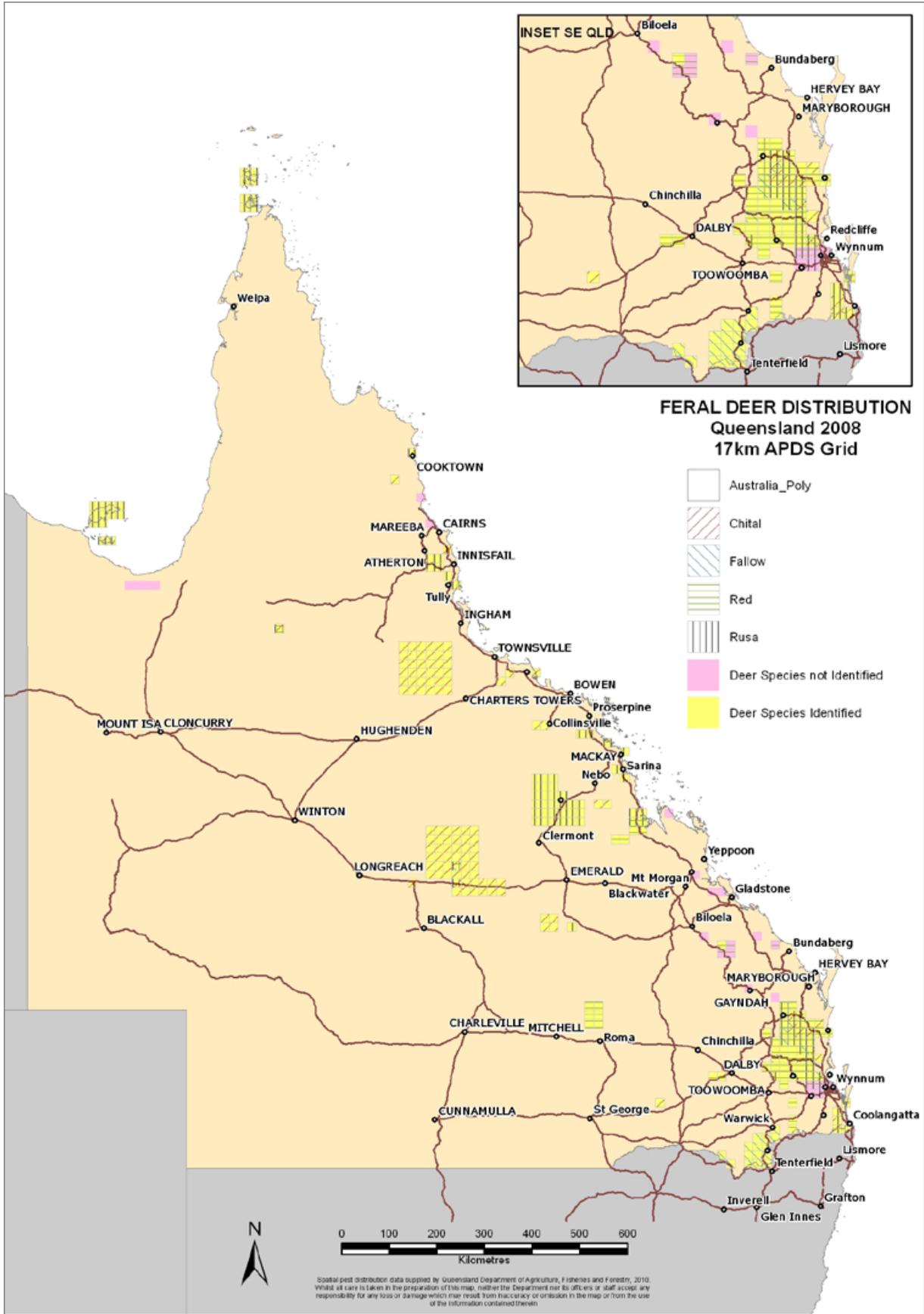


Figure 1 Feral deer distribution in Queensland

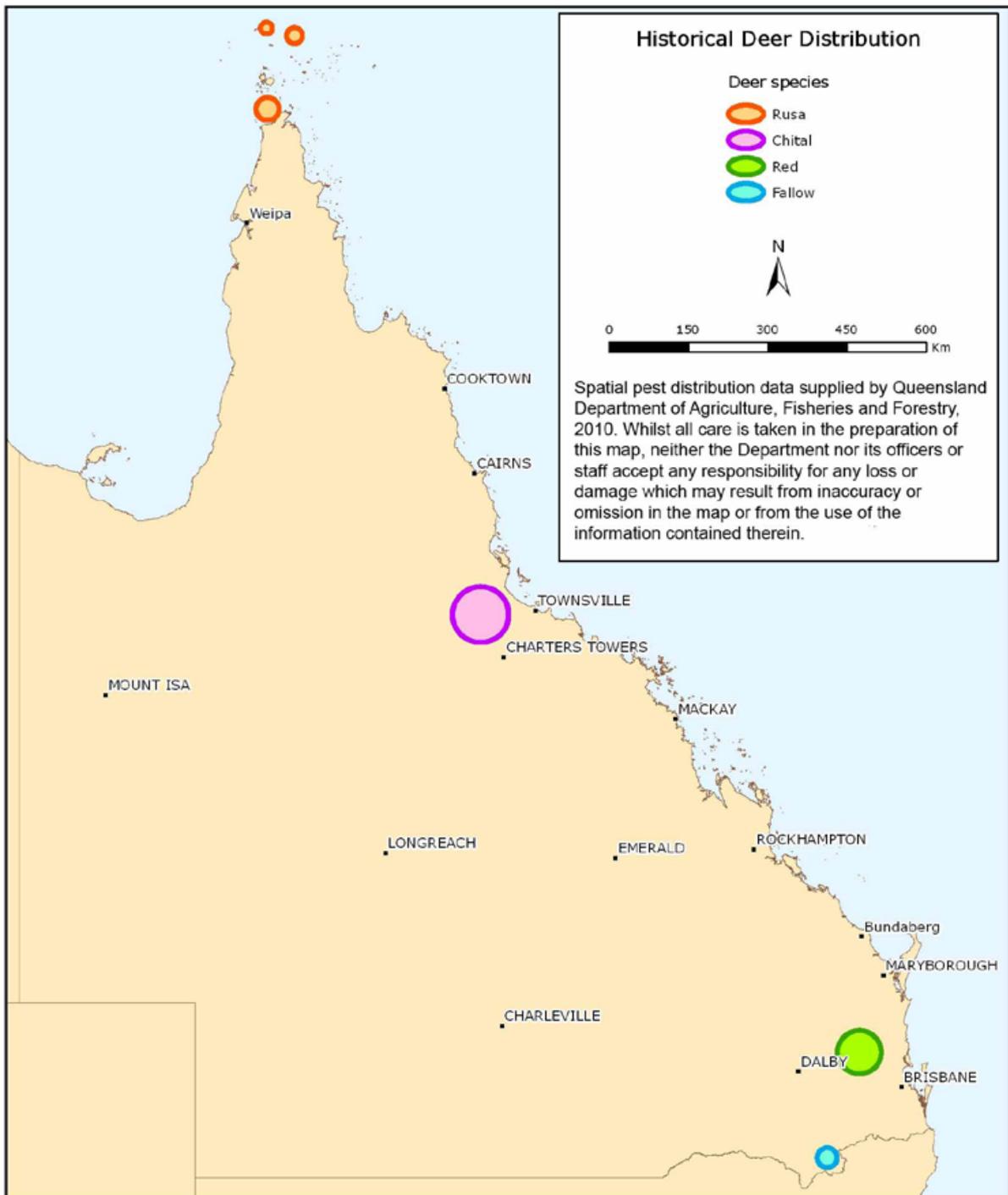


Figure 2 Historical ranges of four deer species from herds established in the late 1800s (chital, red deer and fallow deer) and early 1900s (rusa deer)

Legislation

All feral deer are declared pest animals under the *Land Protection (Pest and Stock Route Management) Act 2002* (the Act). There are three classes of declared pests:

- **Class 1 declared pests**—Deer that are declared Class 1 pests are not known to occur in the wild in Queensland. They are subject to eradication if found in Queensland. These deer species cannot be kept without a declared pest permit issued by the Department of Agriculture, Fisheries and Forestry (DAFF). It is a serious offence to introduce, keep (without a permit) or supply a Class 1 pest. It is also a serious offence to release a Class 1 animal into the environment; the maximum penalty is \$88 000. Class 1 declared deer include:
 - hog deer (*Axis porcinus*)
 - sambar (*Cervus unicolor* or *Rusa unicolor*)
 - all other species of deer except for Class 2 and Class 3 declared deer.
- **Class 2 declared pests**—It is an offence to introduce, keep, feed, supply or release Class 2 pest animals without a permit issued by DAFF. (However, this excludes owned deer confined within a deer-proof enclosure.) Landowners must take reasonable steps to keep land free of deer that are declared Class 2 pests. Class 2 declared deer include:
 - feral rusa deer (*Cervus timorensis* or *Rusa timorensis*)
 - feral chital or axis deer (*Axis axis*).
- **Class 3 declared pests**—It is an offence to introduce, feed, supply or release Class 3 pest animals without a permit issued by DAFF. (However, this excludes owned deer confined within a deer-proof enclosure.) Landholders in or adjacent to an environmentally significant area as defined under section 78(8) of the *Land Protection (Pest and Stock Route Management) Act 2002* may be required to control Class 3 pests. Class 3 declared deer include:
 - feral red deer (*Cervus elaphus*)
 - feral fallow deer (*Dama dama*).

Local governments are empowered under section 78 of the Act to issue a noncomplying landholder with a notice to control feral deer. A notice can be issued for Class 2 feral deer (rusa deer and chital) when the landholder is not taking reasonable steps to control the feral deer. A notice can be issued for Class 3 feral deer (red and fallow deer) when the local government reasonably believes that the feral deer are impacting or have the potential to impact on an environmentally significant area or land adjacent to an environmentally significant area.

The maximum penalty for not complying with this notice is \$44 000 (Class 2 feral deer) or \$22 000 (Class 3 feral deer). The Act also provides for penalties for the feeding or release of feral deer.

It is proposed that feral deer will be ‘restricted’ pests under the Biosecurity Bill currently being developed. Subordinate legislation such as a code of practice may be developed to define feral deer management obligations.

Under current legislation, all landholders (including the state government) are responsible for the control of Class 2 feral deer (chital and rusa deer) on lands that they manage.

The Class 3 declaration of feral red and fallow deer allows local government to issue a notice to landholders for the control of these species in circumstances where numbers are impacting on an environmentally significant area.

Many landholders will not have an obligation to control feral red and fallow deer, but the Class 3 declaration allows the prompt removal of recently established populations or populations that threaten environmentally significant areas.

Landholders in or adjacent to environmentally significant areas are encouraged to proactively keep populations of Class 3 feral deer in check so that they do not impact on environmentally significant areas.

Keeping deer

A rusa deer, chital, red deer or fallow deer that is contained within a deer-proof enclosure is not defined as a feral deer; however, a deer that has escaped from captivity is defined as a feral deer.

Deer farmers and safari park operators are encouraged to communicate with neighbours and local government to prevent destruction of farmed deer that have escaped due to genuine misadventure. However, captive deer that are not adequately confined on a permanent basis would be defined as feral deer and can be subject to control. Conventional livestock fencing does not adequately confine deer.

Generally the minimum escape-proof enclosure for farmed deer or an exclusion fence for feral deer is a well-maintained high netting fence or equivalent. An example of an effective deer fence is one that:

- is 2.1 metres high
- has strainers and posts made of heavy-duty material (such as hardwood or metal) set deeply into the ground no more than 9 metres apart
- has netting of 17/190/15 or 13/190/30 (for red deer), supported by well-strained top, bottom and belly wires and pegged securely to the ground
- has gates of similar standard and the same height
- has cleared fence lines to minimise the chance of trees falling on the fence.

Note that this is an example only and fence construction should be appropriate for the individual circumstances.

Impacts

While the impacts of feral deer in Queensland have not been fully studied or quantified, there are community reports that impact is significant in certain parts of the state, generally where deer abundance is high. Impacts elsewhere in Queensland tend to be unknown or minor. Overseas experience suggests impact increases in proportion to population size and abundance (Smathers & Stratton 1995, Côté et al. 2004), so if feral deer population expands in Queensland, more significant impacts are likely to develop.

Primary production

Reports from Victoria indicate that feral deer damage young trees, pasture, fruit and vegetable crops and fences, and foul water (Lindeman & Forsyth 2008).

In Queensland, damage to forestry seedlings, agricultural and horticultural crops, commercial flower crops, orchards, irrigation systems and fences has been reported. In orchards, feral deer sometimes selectively consume new growth and ringbark trees, leading to reduced orchard viability. In dry seasons, feral deer can compete with cattle for pasture and supplementary feed.

Social amenity and human safety

Feral deer cause damage to public parks and private gardens. Due to their size, they also have the potential to cause serious traffic accidents. There are several areas in Queensland where feral deer regularly pose a traffic hazard. Residents have reported numerous collisions and near misses and some major roads have been closed to remove deer. Peri-urban residents are occasionally frightened by deer moving through their backyards.

Stags in rut can be aggressive. There have been reports of animals being seriously gored by rutting stags in Queensland.

Environment

There is a body of evidence, from Australia and overseas, indicating that feral deer can damage the natural environment. Negative impacts reported include consumption of native vegetation, damage to trees, dispersal of weed seeds and fouling of water.

Negative impacts include defoliation (young and/or old leaves), removal of shoots, bark stripping and destruction or consumption of plant reproductive material, which could cause a reduction in plant population viability (Keith & Pellow 2005). In the Royal National Park (New South Wales), rusa deer cause localised soil erosion and varying degrees of impact on 69 different plant species. Similarly, in Queensland, feral deer eat bunya nuts (*Araucaria bidwillii*) and pose a threat to bunya seedling recruitment (Smith 2011, pers. comm., Smith et al. 2007). In Victoria, feral deer are considered a major threat to the endangered shiny nematolepis plant, *Nematolepis wilsonii* (Murphy et al. 2006). In East Gippsland (Victoria), sambar damage native plants by browsing, rubbing their antlers on plants and consuming particular plant species. Their grazing is believed to have caused the removal of certain plant species with flow-on effects to local plant community structure and floristic composition. Most importantly, prolonged grazing appears to have caused widespread prevention of plant regeneration, with the potential for loss of entire plant communities in some areas (Peel et al. 2005).

Research has confirmed a degree of dietary overlap between deer and macropods (Hamilton 1981; Moriarty 2004). However, the degree to which feral deer affect macropod populations is unknown.

The New South Wales Scientific Committee (Adam 2004) reviewed literature on the environmental impacts of feral deer and concluded that feral deer could threaten species, populations and ecological communities. Also, herbivory and environmental degradation caused by feral deer was listed as a key threatening process in Schedule 3 of the *Threatened Species Conservation Act 1995* (NSW).

Disease risk

Like other feral animals (such as pigs), feral deer pose a risk to Queensland's livestock industries and human health, by either carrying or amplifying endemic and exotic diseases.

Feral deer in Queensland are known to carry cattle ticks (McKenzie et al. 1985; Cutulle et al. 2009) and may carry them into tick-free areas, transferring them to cattle. Similarly, antibodies to leptospirosis are widespread in feral deer in Queensland (Presidente & Westbury 1984) and feral animals are recognised as reservoir species for leptospirosis (Levett 2001). People could contract leptospirosis through direct contact with the urine of infected animals such as feral pigs or feral deer (Levett 2001).

Bovine Johne's disease is a production disease of cattle that has a very low prevalence in Queensland. However, it can spread between domestic and wild ruminants (Stevenson et al. 2009).

The *Australian veterinary emergency plan* (AUSVETPLAN) has been developed to manage exotic disease outbreaks. The plan lists feral deer as being susceptible to a range of exotic diseases including Aujeszky's disease, surra, brucellosis, bovine tuberculosis, foot-and-mouth disease, rabies and bluetongue. If there was an outbreak of exotic disease, feral deer in an infected area would require epidemiological assessment in line with AUSVETPLAN (Animal Health Australia 2010).

Benefits of feral deer

There are some economic benefits associated with recreational deer hunting and the wild venison trade.

Landholders may charge fees for access to hunt feral deer, and hunting guides and professional outfitters may generate income by servicing recreational deer hunters. In some areas there are also opportunities for professional harvesters to supply the wild venison trade for both human consumption and the pet meat market.

All field harvesters processing feral deer for sale must be accredited by Safe Food Production Queensland and operate to an approved quality assurance program. Exemptions apply for harvesting of feral deer meat for personal use.

Markets for feral deer meat have to date been small and periodic, and only a few accredited harvesters would normally be involved in regular feral deer harvesting for sale.

Control operations

The aim of control is to minimise the impacts of existing populations of feral deer, limit the spread of these populations and prevent the establishment of new populations.

Hone et al. (2010) have used modelling techniques to estimate the percentage of a population that needs to be removed annually to stop the population increasing. There is significant variation depending on conditions, but the estimates give some guidance in determining what percentage of the population should be removed. The model shows that the proportion of animals to remove each year to stop population growth is 34% for fallow deer, 46% for rusa deer and 49% for chital. (The model does not cover red deer.) Removal of mature stags alone will not adequately limit population growth.

Feral deer are highly mobile and may graze and browse across a large area. Control efforts are most successful when they are conducted cooperatively with all landholders in an area.

Under the *Land Protection (Pest and Stock Route Management) Act 2002*, local governments must have pest management plans to guide management of pests in their areas.

Control methods

Control methods are limited for feral deer and it is essential that best practice methods are used. Deer are wary and may become more difficult to manage when subject to ineffective control.

The choice of control methods is influenced by concerns for animal welfare, non-target impacts, public safety, and occupational health and safety, and by restrictions (legislative and practical) on applying some techniques (e.g. use of firearms on small landholdings). Effective control requires an assessment of each individual situation and the circumstances surrounding each problem.

Table 1 (pages 10–11) gives an overview of the available methods for controlling feral deer, along with their relative strengths and weaknesses.

There are no toxin, biocontrol or fertility control agents available for feral deer.

Landholders who use recreational hunters for feral deer control should ensure that their public liability insurance is appropriate.

The integration of feral deer control with other pest animal control ensures adequate use of resources and maximises return for effort. Also, it may have environmental gains; for example, feral pig and feral deer control could minimise impacts on environmentally or culturally significant waterholes.

Preventive measures

Many populations of feral deer in Queensland are the result of escapes from deer farms or the deliberate translocation for aesthetic or hunting purposes.

It is important to prevent release of domesticated deer into the wild. Deer farmers need to be aware of the legislation in relation to releasing animals. Deliberate translocation of feral deer has been successfully prosecuted in South Australia and similar legislation is available in Queensland.

Table 1 Methods for controlling feral deer in Queensland

Control method	Features
<p>Trapping—single (clover) or pen traps Used to catch single or small groups of feral deer</p>	<p>Advantages Target specific if done correctly Allows release of non-target animals unharmed Can be done in closely settled areas Effective in wet tropics (Dorney 2010) Allows commercial use</p> <p>Disadvantages Animal welfare implications if best practice not used Labour and skill intensive Time-consuming Requires access to trap and bait materials</p>
<p>Trapping—corral trap Used to trap larger numbers of feral deer prior to field shooting</p>	<p>Advantages Allows release of non-target animals unharmed Has potential to remove larger numbers of feral deer</p> <p>Disadvantages High initial cost to build corral</p>
<p>Ground shooting Requires adherence to firearms legislation</p>	<p>Advantages Target specific Allows commercial use</p> <p>Disadvantages Can be costly for large numbers Difficult in thick vegetation Labour and skill intensive Restrictions in closely settled areas</p>
<p>Aerial shooting</p>	<p>Advantages Effective over large areas Effective for integrated pest animal control</p> <p>Disadvantages High cost Cannot be used in closely settled areas</p>

(continued)

Table 1 Methods for controlling feral deer in Queensland (continued)

Control method	Features
<p>Bowhunting Requires trained, skilled and experienced bowhunters (organisations such as the Australian Bowhunters Association offer training and accreditation programs to ensure competency)</p>	<p>Advantages Target specific</p> <p>Disadvantages Labour and skill intensive Not suitable for large numbers Animal welfare implications if best practice is not used</p>
<p>Fencing</p>	<p>Advantages Low impact on non-target animals Effective in peri-urban areas</p> <p>Disadvantages Requires constant maintenance High initial cost Shifts the problem May impede movement of non-target species</p>
<p>Dogging May be necessary for deer control in dense vegetation (otherwise, should not be used)</p>	<p>Disadvantages Animal welfare concerns May displace deer rather than capture them Controls only part of the population</p>
<p>Aversion Making the animal wary, cautious or afraid (not commonly used, but has some application for feral deer control in peri-urban areas)</p>	<p>Advantages May be suitable for peri-urban areas</p> <p>Disadvantages Potential animal welfare issues Aversion technologies (lights, noises) may cause discomfort to humans and domestic animals</p>

Humaneness of control techniques

The *Animal Care and Protection Act 2001* provides for the control of pest animals only when the control is done in a way that causes the animal as little pain as is reasonable.

A model for assessing the relative humaneness of pest animal control methods has been developed under the *Australian animal welfare strategy* (Sharp & Saunders 2008). The model is designed to allow a judgement to be made about the impact of a specific control method on the target animal. The model can be applied to a range of different methods so that they can be compared, then a decision can be made taking into account the relative humaneness of each method. The model can be used as a guide to assess the following techniques.

Exclusion fencing is generally regarded as a humane alternative to lethal control methods. It acts as a barrier to feral deer, but it can have negative effects on non-target species by altering dispersion and foraging patterns, and can also be a hazard to wildlife during bushfire.

Shooting can be a humane method of destroying feral deer when it is carried out by experienced, skilled and responsible shooters. Wounded deer must be located and dispatched as quickly and humanely as possible. For species with defined breeding seasons, control should not occur when there are expected to be young at foot. If lactating females are present, dependent young should be shot first.

Trapping (using **single or pen traps**) should follow these guidelines to improve animal welfare outcomes:

- Aim to trap single deer rather than groups, as the flight response of deer makes groups more likely to injure themselves.
- Use trap alert systems to provide a rapid response to trapped deer. (Although trapping deer singly is preferred, where this is impractical, using pens with trap alerts and immediate response is acceptable.)
- Place traps in the shade and do not use them during adverse weather.
- Construct traps so that deer cannot put their heads or legs through the traps and risk bruising and fractures.
- Minimise handling of the deer.

In most cases, trapping and destruction in the trap is preferred to trapping and translocation to a deer farm or abattoir, as translocation of feral deer can be inherently stressful to the deer and significant numbers of translocated deer die from capture myopathy (Beringer et al. 1996, Cromwell et al. 1999). Best welfare outcomes are achieved when the deer are promptly shot in the trap by experienced operators who are able to approach the deer quietly.

Anecdotal evidence indicates that **permanent enclosure traps** (or **corral traps**) can be effective and provide good animal welfare outcomes. They should follow these guidelines:

- Make the traps large (e.g. 2–4 hectares) and at a site that deer are known to frequent, preferably in a shady area with as much natural vegetation as possible.

- Make sure the fencing forms both a physical and a visible barrier to minimise the potential for injuries. Construct the external fence using 2-metre deer netting on wooden posts with 3 strands of plain wire on top, making the final height of the fence 2.5 metres. Attach hessian to all fences to a height of 2 metres.
- Provide water, food and shelter in appropriate quantities.
- Use a trail of bait to lure deer inside the trap yard. This may need to be a few hundred metres long. Suitable baits include lucerne, whole grain oats and molasses.
- Check the trap each day, preferably in the afternoon, from a raised and concealed position. If deer are inside the yard, close the entrance gates after moving quietly from the observation position. Always approach the trap from the direction of the gates. This will prevent the deer being forced into the gate area of the trap, where they will escape.
- Allow the deer to settle in the trap prior to removal or shooting.

Traps can be left at permanent sites with the gates open and reactivated when further trapping is required (Sharp & Saunders 2007).

Purpose

This strategy aims to provide an integrated set of strategic directions, agreed to by stakeholders, for the future management of feral deer in Queensland.

This strategy has been developed from the results of consultation on feral deer management during 2008. This consultation involved government officers, academics and environmental, primary industry and recreational hunting groups. It has been expanded through additional input from DAFF extension and operational staff, and interstate experts. A workshop on feral deer strategy issues held with representatives from these groups on 9 November 2009 delivered a clear set of objectives and provided a framework.

A draft strategy was released for public consultation in October 2010 and submissions on the draft were used to modify the draft. A final draft was sent to key stakeholders in May 2013 and final changes made in response to submissions.

This strategy is one of a group of strategies that aim to establish statewide planning frameworks to provide clear direction to government, the community, industry and individuals on the management of pest animals and weeds across Queensland.



Vegetation response to feral deer exclusion over an 8-year period at the Royal National Park, New South Wales

Scope

This strategy has been established to address all feral deer impacts within Queensland. It is linked to other planning frameworks (see Table 2), is consistent with the *Queensland biosecurity strategy 2009–14* and draws on activities at the property level.

Table 2 Context and relationship of the *Feral deer management strategy 2013–18* to planning initiatives at other levels

	Natural resource management	Biosecurity management	Pest management	Species
National	<i>National strategy for ecologically sustainable development</i> <i>National strategy for the conservation of Australia's biological diversity</i> <i>National principles and guidelines for rangeland management</i>	Intergovernmental Agreement on Biosecurity <i>Australian animal welfare strategy</i>	<i>Australian pest animal strategy</i>	
State	<i>Queensland biodiversity policy framework: sustaining our natural wealth</i>	<i>Queensland biosecurity strategy 2009–14</i>	<i>Queensland pest animal strategy 2002–06</i> (currently under review)	<i>Feral deer management strategy 2013–18</i>
Regional/catchment	Regional natural resource management (NRM) plans Catchment management plans	Regional biosecurity plans	Regional/catchment pest management plans	Regional/catchment pest species management plans
Local government			Local government area pest management plans	Local government feral deer management plans
Property	Property management plans	Property biosecurity plans	Property pest management plans	Property feral deer management plans

Implementing the strategy

Benefits and opportunities

Implementation can potentially provide a basis for:

- improved communication mechanisms
- improved general awareness
- wider understanding of responsibilities
- coordination of management efforts
- optimum use of resources
- improved participation in and acceptance of control
- improved data collection and research
- economic benefits to landholders.

Challenges

Significant challenges that may constrain stakeholders from managing feral deer include:

- limited or untimely funding and resources
- competing stakeholder expectations, priorities and resources
- lack of commitment or cooperation with respect to control programs
- differences in management priorities based on conflict between the benefits arising from feral deer (e.g. recreational hunting and game harvesting) and their negative impacts
- lack of efficient and cost-effective control measures
- emotional arguments against feral deer control or use from some sectors of the community
- lack of pest management on lands controlled by absentee landholders
- the need for coordinated action and management to address the mobility of feral deer, particularly species categorised as Class 1 and Class 2 pests.

These challenges have been considered in developing the strategy and are addressed either directly or indirectly.

Principles of pest management

The development and implementation of this strategic plan is based on pest management principles (see Table 3, page 17). These principles provide the basis for pest animal and weed management in Queensland.

Table 3 Pest management principles

Pest management principle	Comments
Integration	Pest management is an integral part of managing natural resources and agricultural systems
Public awareness	Public awareness and knowledge of pests must be raised to increase the capacity and willingness of individuals to control pests
Commitment	Effective pest management requires a long-term commitment by the community, industry groups and government
Consultation and partnership	Consultation and partnership arrangements between local communities, industry groups, state government agencies and local governments must be established to achieve a collaborative approach to pest management
Planning	Pest management planning must be consistent at local, regional, state and national levels to ensure that resources target the priorities for pest management identified at each level
Prevention	Preventative pest management is achieved by: <ul style="list-style-type: none"> • preventing the spread of pests and viable parts of pests, especially by human activity • early detection and intervention to control pests
Best practice	Pest management must be based on ecologically and socially responsible pest management practices that protect the environment and the productive capacity of natural resources
Improvement	Research about pests and regular monitoring and evaluation of pest control activities is necessary to improve pest management practices

2 Strategic plan

This strategy was developed through a stakeholder consultation process. Stakeholders include:

- individual farmers and graziers
- peak bodies such as AgForce
- managers of state lands such as national parks
- local government authorities
- state and local government departments
- recreational deer hunters and harvesters
- community and conservation groups.

The strategy is structured around an overall vision of feral deer management in Queensland and five interrelated desired outcomes that have been identified to realise the vision. Strategies and actions to achieve each of the desired outcomes (including who will undertake them) have also been developed.

Vision

To minimise the spread and impact of feral deer in Queensland.

Desired outcomes

1. The community understands that feral deer management has positive outcomes for the community.
2. Feral deer populations are managed effectively.
3. Resources are used effectively and strategically through collaborative and coordinated pest management planning.
4. The community and land managers have available the most current information on feral deer impacts and management techniques.
5. Feral deer management in Queensland is supported by adequate resourcing.

Community awareness

Desired outcome

1. The community understands that feral deer management has positive outcomes for the community.

Background

To improve awareness of feral deer impacts, management and control techniques, specific communication strategies must target relevant segments of the community.

It is important that those undertaking management programs appreciate the attitudes of various community groups towards deer and the methods for their control, and take those concerns into consideration in their programs.

Many of the general public believe that feral deer are native animals. For the general public, an understanding of the status of feral deer and the need for control at times is the level of understanding required.

Landholders need to be aware of the legal status of feral deer, the difference between Class 2 and Class 3 feral deer, and how to fulfil their obligation to take reasonable steps to control them.

Strategy

Strategy 1 aims to improve community awareness.

Strategy 1 Develop and implement awareness programs to encourage adoption of effective feral deer management

Action	By whom?	By when?
1.1 Understand community perceptions about feral deer	Natural resource management (NRM) groups, local government, DAFF	July 2014
1.2 Develop landholder, industry and local government awareness programs	DAFF, local government, NRM groups	July 2015
1.3 Establish partnerships between government and supportive community, industry and NRM groups in order to harness their collective communication channels and support for feral deer control	DAFF, local government, industry and community groups	July 2014 and ongoing
1.4 Develop community awareness programs containing information on feral deer and convey what control is needed for each class	DAFF, NRM groups	July 2015
1.5 Develop community awareness on the illegality of translocating feral deer and the maximum penalties for translocation	DAFF	July 2014
1.6 Develop and promote targeted community awareness on the need for farmed and safari park deer to be held securely	DAFF, local government	July 2014

Effective management

Desired outcome

- Feral deer populations are managed effectively.

Background

To manage feral deer across the range of habitats and conditions found in Queensland, control techniques must be tailored to suit the particular needs of each region.

The aim is to prevent the formation of new populations and remove recently established populations promptly (while they are still small). Existing populations are targeted for removal only if they are having a significant impact. Examples of such populations are those in peri-urban areas, those damaging small crops or horticulture and those in remnant areas of natural vegetation (as part of integrated pest animal control).

Established Class 2 populations in historic areas should be controlled so that numbers do not increase and the range does not expand.

Recreational hunting groups can contribute to the long-term management of Class 3 feral deer in historic ranges. They can also contribute by monitoring and controlling populations and ensuring they do not expand their range or exceed acceptable levels.

In general, recreational hunting and commercial harvesting alone have not been effective in limiting populations of pest animals or overabundant wildlife in Australia (Gentle et al. 2011, Grigg & Pople 2001, Pople & Froese 2012, Pople & Grigg 1998) or overseas (Simard et al. 2013, VerCauteren et al. 2011, Sinclair 1997). However, in certain circumstances, with knowledge of and careful adherence to deer population dynamics and management techniques, targeted recreational hunting may be effective in keeping populations in check (Hall & Gill 2005).

Strategy

Strategies 2, 3 and 4 aim to achieve effective management of feral deer.

Strategy 2 Remove all feral deer from recently established populations and areas where feral deer are having a significant impact

Action	By whom?	By when?
2.1 Identify areas for local eradication programs—discrete or recently established populations or populations with high local impact	Landholders, Queensland Parks and Wildlife Services (QPWS), Department of Natural Resources and Mines (DNRM), local government, NRM groups	March 2015
2.2 Remove identified recently established populations of feral deer and defined populations of significant impact	QPWS, DNRM, local government, NRM groups, landholders	Commencing June 2014
2.3 Coordinate removal of any populations of Class 1 deer	DAFF, QPWS	Ongoing
2.4 Fence areas of high production and conservation value and maintain fencing	QPWS, DNRM, NRM groups	Ongoing

Strategy 3 Adopt best practice management techniques and procedures for feral deer control and prevention of new populations

Action	By whom?	By when?
3.1 Promote best practice humane procedures for feral deer control	DAFF, local government	December 2014 and ongoing
3.2 Provide training in humane feral deer management to local government	DAFF, QPWS	December 2014
3.3 Provide training for recreational hunters	Recreational hunting groups	Ongoing
3.4 Develop procedures to prosecute translocation of feral deer or release of captive deer	DAFF	Commencing June 2015
3.5 Prosecute translocation of feral deer or release of captive deer	Local government (DAFF to assist)	Ongoing
3.6 Provide feral deer management information to state government, local government, catchment and regional NRM groups	DAFF	Ongoing

Strategy 4 Implement feral deer management

Action	By whom?	By when?
4.1 Coordinate control programs aimed at removal of defined populations of significant impact	QPWS or DNRM, local government	Ongoing
4.2 Control Class 2 (rusa deer and chital) populations in historic areas to stop ranges expanding in accordance with local government area pest management plans	Landholders, recreational hunting groups	Ongoing
4.3 Monitor Class 3 (red deer and fallow deer) populations in historic areas and pre-emptively control if populations are expanding into areas in or adjacent to environmentally significant areas	Landholders, recreational hunting groups	Ongoing

Effective collaboration and coordination

Desired outcome

- Resources are used effectively and strategically through collaborative and coordinated pest management planning.

Background

Planning will play a crucial role in successful management of feral deer. Planning is needed for various tenures of land and at various scales. Local circumstances are important in planning feral deer management and the local government pest management planning process is integral to this. Additionally, regional working groups that incorporate neighbouring local governments, community networks, state land managers, recreational hunting groups, animal welfare organisations and landholders have proven effective interstate and are forming in Queensland.

Strategy

Strategy 5 aims to achieve effective collaborative and coordinated pest management planning.

Strategy 5 Encourage, prepare and implement feral deer planning

Action	By whom?	By when?
5.1 Develop resources to help local government, state government, catchment and property pest management planning	DAFF	March 2015
5.2 Develop local government area pest management plans that are consistent with this strategy and its actions	Local government	As plans are revised
5.3 Develop coordinated management plans for Class 2 deer	State agencies, regional and catchment groups, landholders	March 2015
5.4 Develop plans to monitor and control Class 3 deer when populations are expanding	Local government, landholders, recreational hunting groups	March 2015

Informed management

Desired outcome

4. The community and land managers have available the most current information on feral deer impacts and management techniques.

Background

We need to research the impacts and populations of feral deer and quantify their resource potential. As we build on this knowledge, we may need to develop (or modify) best practice techniques.

Strategy

Strategies 6 and 7 aim to achieve informed management solutions.

Strategy 6 Continuously improve feral deer management practices

Action	By whom?	By when?
6.1 Evaluate and document best practice humane procedures using an adaptive management approach	DAFF	Every 2 years
6.2 Review existing control technologies and identify gaps in control technology and areas for improvement in existing technology in terms of effectiveness, efficiency and humaneness	DAFF, Cooperative Research Centres (CRCs), James Cook University (JCU), The University of Queensland (UQ)	March 2015
6.3 Support the development of, encourage the adoption of and cooperate in refining and implementing the latest technologies in controlling feral deer (e.g. traps)	All stakeholders	Ongoing
6.4 Contribute to the evaluation of the effectiveness of recreational shooting for controlling feral deer numbers under Queensland conditions	Recreational hunting groups	2018

Strategy 7 Increase understanding of the ecology, biology, populations and impacts of feral deer in Queensland

Action	By whom?	By when?
7.1 Quantify economic, environmental and social impacts on a regional and industry basis	DAFF, industry, CRCs, JCU, UQ	December 2015
7.3 Develop, implement and refine accurate and consistent monitoring techniques for population and impact monitoring	DAFF, industry, CRCs, JCU, UQ	March 2015
7.5 Conduct regular population assessments of feral deer numbers and impacts across Queensland and report twice each year	LG, NRM groups, DAFF	Ongoing (post-March 2015)

Resourcing

Desired outcome

- Feral deer management in Queensland is supported by adequate resourcing.

Background

For this strategic plan to be fully implemented and the potential benefits achieved, all resources (both financial and human) must be coordinated and used effectively.

Strategy

Strategies 8 and 9 aim to achieve adequate resourcing to support feral deer management.

Strategy 8 Obtain cooperation and support from stakeholders in resourcing their components of this strategy

Action	By whom?	By when?
8.1 Promote this strategy	DAFF	March 2014
8.2 Increase interagency links via the State Land Pest Management Committee	DAFF, all state land managers	March 2014
8.3 Investigate opportunities for pooling of resources	DAFF, NRM groups, industry, local government	Ongoing

Strategy 9 Coordinate education, awareness and research resources

Action	By whom?	By when?
9.1 Establish a network of stakeholders for information and resource sharing	DAFF	March 2015
9.3 Facilitate the coordination of state, local and interstate feral deer management programs	DAFF	Ongoing

3 Implementation

Planning at property, local government and regional levels is the first step in implementation. Experience has shown that coordinated control programs over wide areas have better long-term success rates than those over smaller areas.

The primary responsibility for pest animal management rests with the land manager, but collective action and coordination of feral deer control at the landscape level on a nil tenure basis has significant benefits. If necessary, enforcement measures may be used to ensure land managers fulfil their duty of care in controlling declared animals on their land. Normally, enforcement is undertaken only after other avenues have failed.

4 Monitoring and evaluation

Review

This strategy will be reviewed in 2017 by the Invasive Plants and Animals Committee.

Key performance indicators

The following key indicators will be reviewed.

General indicators

- Baselines for key performance indicators established
- Community acceptance of and participation in feral deer management
- Coordinated management groups
- No new populations of feral deer
- Small, recently established populations of feral deer removed
- Feral deer populations not expanding
- Complaints to local governments reduced (adjusted for increased awareness)
- Greater understanding of the local economic, environmental and social impacts of feral deer and reduction of these impacts
- Timely responses to sudden changes in feral deer numbers, recently established populations and disease outbreaks

Individual rural enterprise indicators

- Incorporation of feral deer management into general property management

Rural industry organisation indicators

- Commitment to agreed direction for feral deer management
- Provision of information on feral deer impacts and issues of concern to government

Conservation indicators

- Reduced impacts on native species and habitats, especially in environmentally sensitive areas
- Control of feral deer undertaken annually in areas of high conservation value

Community/interest group indicators

- Increased knowledge of feral deer and their impacts
- Increased understanding and acceptance of feral deer control techniques

5 Stakeholder responsibilities

All stakeholders will need to help develop site-specific management plans. The general responsibilities of each of the major stakeholders in feral deer management are listed below.

Land managers

(This includes private and public land managers, such as managers of Commonwealth and state lands.)

- Ensure control of feral deer is undertaken in accordance with the local government area pest management plan.
- Participate in organised groups for coordinated control.
- Adhere to all direct and indirect legislative requirements for feral deer management and use of control techniques.
- Conduct population and damage assessments for their lands.
- Conduct control programs when required using the most appropriate and effective methods available.
- Monitor the effectiveness of control techniques.

Industry groups

- Promote the availability and conditions for use of control techniques.
- Promote the need for, and help with, the formation or operation of landholder groups for coordinated control.
- Raise awareness of control issues with the media.
- Contribute to the coordination of feral deer management.
- Promote the responsible keeping of captive deer.

Community and conservation groups

(This includes regional NRM groups.)

- Review and participate in education, information, conservation and planning processes.
- Contribute to the coordination of feral deer management.

Recreational hunting groups

(This includes the Australian Deer Association, the Sporting Shooters Association of Australia, and Research into Deer Genetics and Environment.)

- Assist landholders with monitoring and control of Class 3 feral deer.
- Promote best practice methods of hunting to members.
- Contribute to the evaluation of recreational hunting as a measure to control feral deer.
- Ensure members do not translocate feral deer.

Local government

- Incorporate feral deer issues into local government area pest management plans.
- Contribute to the coordination of feral deer management.
- Ensure feral deer control is undertaken when necessary.
- Assist with the formation of landholder groups and organise coordinated campaigns if required.
- Provide advice on various feral deer control techniques.
- Coordinate and monitor control campaigns for Class 2 and Class 3 feral deer.
- Prosecute the release of deer (translocation or release from captivity).

DAFF

- Undertake policy development and planning.
- Foster cooperation with departments managing public lands.
- Monitor research into feral deer control techniques.
- Foster links and communication between internal and external stakeholders.
- Support implementation of this strategy.
- Undertake feral deer extension activities that include advice on control techniques.
- Develop policy and procedures to prosecute the release of feral deer.
- Encourage the formation of landholder groups to control feral deer.
- Investigate complaints.
- Seek greater local and regional cooperation from departments managing public lands.

DNRM/QPWS

- Participate in cooperative control initiatives with other state government agencies, local governments, catchment groups and neighbouring landholders.
- Conduct control programs on state land assets DNRM/QPWS administer, using the most appropriate and effective methods available.
- Undertake population and damage assessments and collect impact data.

Other state government agencies responsible for state lands

- Participate in cooperative control initiatives with other state government agencies, local governments and catchment groups.

Research organisations

- Monitor effectiveness of control techniques.
- Investigate additional control techniques.
- Assess feral deer impacts to assist in cost–benefit analyses.

Appendix 1 Summary of the biology and ecology of feral deer species in Queensland

Naturalised species

Fact sheets for these species are available at www.daff.qld.gov.au.

Chital or axis deer (*Axis axis*)

Adult height at shoulder:	Stags up to 95 cm, hinds smaller.
Weight:	Stags 75–100 kg, hinds up to 50 kg.
Colour:	Reddish to dark brown with white spots.
Distinguishing features:	Prominent white throat.
Social structure:	Form large herds consisting mainly of females and their young, together with 2 or 3 stags.
Breeding season:	Non-seasonal—it is possible for stags to rut at any time of the year. The majority of calves are born from September to November, but calving has also been observed in April and May.
Number of offspring:	Multiple births are not uncommon in native habitats, but in Australia fertility may be influenced by the environment. In good seasonal conditions, hinds may display post-partum oestrus and produce 3 calves in 2 years.
Gestation:	About 234 days.



Chital calf



Chital hind (photograph courtesy of Brisbane City Council)

Establishment history

The area around Charters Towers supports a population of at least 10 000 head, arising from the initial release at Maryvale station. It is a high-quality riparian habitat with access to permanent water, which the species requires.

Five new populations have established from deer farm escapes or translocations around Townsville and Charters Towers.

Seven populations have established through translocations in the Gulf of Carpentaria and throughout central and southern Queensland.

There is a population of about 2000 on Rita Island, which lies at the mouth of the Burdekin.

Populations in the hundreds have been identified in the Gulf and near Texas on the southern border.



Chital stag

Fallow deer (*Dama dama*)

Adult height at shoulder:	Bucks up to 90 cm, does around 80 cm.
Weight:	Bucks around 90 kg, does around 45 kg.
Colour:	Variable; white, tan or fawn with variable spotting; chocolate to black with no spotting.
Distinguishing features:	Heart-shaped rump patch.
Social structure:	Normally found in groups of 3 or 4 in denser habitats, but large groups occur in open country. Mature bucks live apart from the does until the start of the rut, when they compete to gather harems of females and hold them against rivals.
Breeding season:	Usually begins in April and lasts 6–8 weeks, with males remaining aggressive until early August. Calves are born from late November to December.
Number of offspring:	Usually a single fawn.
Gestation:	About 230 days.



Fallow fawns (photograph courtesy of Brisbane City Council)



Fallow doe (photograph courtesy of Brisbane City Council)



Fallow buck (photograph courtesy of Brisbane City Council)

Establishment history

Fallow deer were released at Westbrook and Warwick on the Darling Downs between 1870 and 1872. The Pikedale population, south-west of Warwick, is now the major wild fallow deer herd in Queensland. This herd has around 2800 animals and merges with larger numbers of fallow deer on the New England Tableland in New South Wales.

Other smaller fallow populations have been identified in southern Queensland, Rockhampton and the Wide Bay area.

Red deer (*Cervus elaphus*)

Adult height at shoulder:	Stags up to 120 cm, hinds around 100 cm.
Weight:	Stags up to 220 kg, hinds up to 100 kg.
Colour:	Reddish brown to brown, can be grey in winter; calves spotted until around 3 months old.
Distinguishing features:	Cream to straw-coloured patch on rump of mature deer.
Social structure:	Females and immature animals form small groups for most of the year. Mature stags live apart from the hinds until the start of the rut, when they compete to gather harems of females and hold them against rivals.
Breeding season:	Mating occurs from March to April. Mature males compete to gather harems of females and hold them against rivals. Calves are born from late November to December.
Number of offspring:	Usually a single calf.
Gestation:	About 233 days.



Red hind



Red group (photograph courtesy of Daniel Garcia, Seqwater)

Establishment history

Red deer were released at Cressbrook near Esk in 1873 and protected from hunting pressure during the early stages of their establishment. This population (10 000 – 15 000 head) has spread across the upper reaches of the Brisbane River valley and into the headwaters of the Mary and Burnett rivers.

In recent years, two other red deer populations in Queensland have been established by translocations—one in the Rockhampton region (with a population of fewer than 100 animals) and one in the Roma–Injune–Mitchell area (with a population numbering between 100 and 500).



Red stag

Rusa deer (*Cervus timorensis* or *Rusa timorensis*)

Adult height at shoulder:	Stags up to 110 cm, hinds up to 95 cm.
Weight:	Stags about 120 kg, hinds up to 80 kg.
Colour:	Grey to greyish brown; calves red.
Distinguishing features:	Light chest and throat; line of dark hair visible on chest between forelegs.
Social structure:	Rusa are gregarious and form herds.
Breeding season:	Non-seasonal—rutting may take place at any time but the tendency is for breeding from June to October. Most fawns are born in March and April. In good seasonal conditions, hinds may display post-partum oestrus and produce 3 calves in 2 years.
Number of offspring:	Usually a single calf, occasionally twins.
Gestation:	About 252 days.



Rusa hind and calf



Rusa stags (photograph courtesy of Brisbane City Council)

Establishment history

Rusa deer were released on Friday Island in the Torres Strait in 1912, and later swam or were transported to other islands. Prince of Wales Island now supports the major population of at least 500 animals. The people of Torres Strait have come to regard the rusa as an important resource.

Other populations established by translocations are in the coastal areas between Townsville and Rockhampton, and near Stanthorpe. The Rockhampton population and one of the southern Queensland populations are estimated to be between 100 and 500 animals. The remaining populations are estimated to number fewer than 100 animals.

There are anecdotal reports of 600 rusa being released into a floodplain environment in the Gulf of Carpentaria.

Potential distribution

Climate-matching software called Climatch (Bureau of Rural Sciences 2009) was applied to predict areas of Queensland where climate appears to be suitable for the four species of deer naturalised in Queensland.

Chital

The model presented in Figure A1 suggests that tropical areas of northern Queensland provide favourable climate for chital. Areas of central Queensland appear ‘marginal’ in terms of climatic suitability, whereas areas in southern Queensland appear unsuitable.

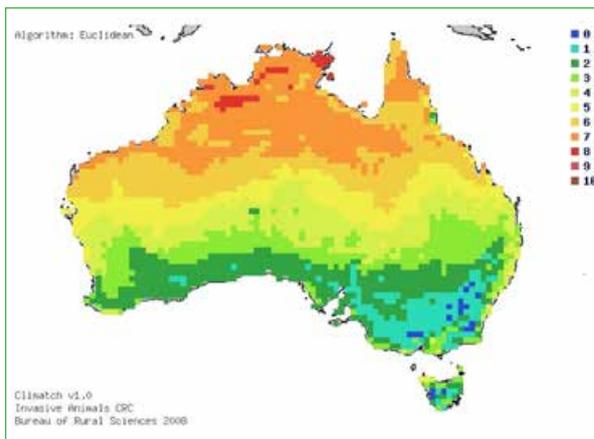


Figure A1 The area of Australia where the climate appears suitable for the survival of chital: red or orange = climate similar to that across the native and naturalised range of the species; yellow = ‘marginal’ habitat; green or blue = climatically unsuitable

Fallow deer

The model presented in Figure A2 suggests that subcoastal areas of southern Queensland provide favourable climate for fallow deer, with upland (cool) parts of south-eastern Queensland providing the most favourable climate. Areas to the north, including coastal and inland central Queensland, appear ‘marginal’ in terms of climatic suitability, whereas areas in tropical northern Queensland appear to be unsuitable (too hot). This species of deer may still persist within marginal climate zones, but in low numbers. The species is expected to reach its highest abundance in cooler, upland areas of southern Queensland. Of course, abundance within this climatic envelope will be determined by a range of factors (such as land use, habitat and predator activity) as well as climate.

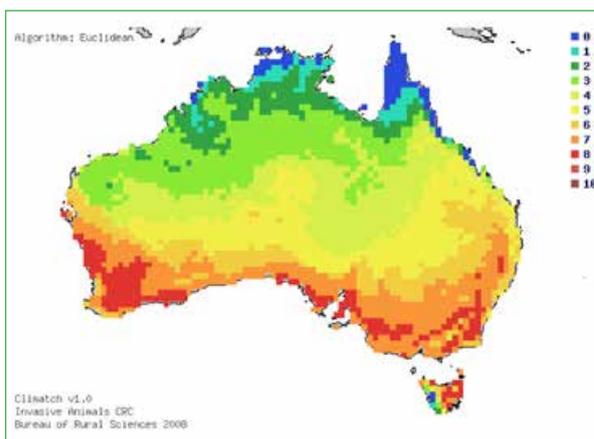


Figure A2 The area of Australia where the climate appears suitable for the survival of fallow deer: red or orange = climate similar to that across the native and naturalised range of the species; yellow = ‘marginal’ habitat; green or blue = climatically unsuitable

Red deer

The model presented in Figure A3 is very similar to that presented for fallow deer (Figure A2). Therefore, the two species have the climatic potential to spread over similar areas (although final abundance and range will depend on other habitat factors).

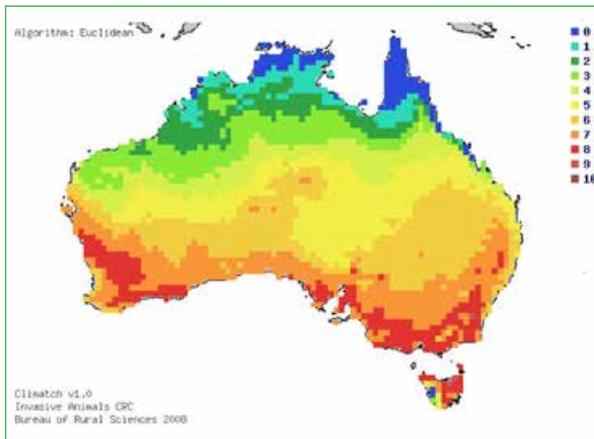


Figure A3 The area of Australia where the climate appears suitable for the survival of red deer: red or orange = climate similar to that across the native and naturalised range of the species; yellow = ‘marginal’ habitat; green or blue = climatically unsuitable

Rusa deer

The model presented in Figure A4 suggests that tropical, coastal areas of northern Queensland provide favourable climate for rusa deer. Subcoastal northern Queensland appears ‘marginal’ in terms of climatic suitability, whereas areas across much of southern Queensland appear unsuitable.

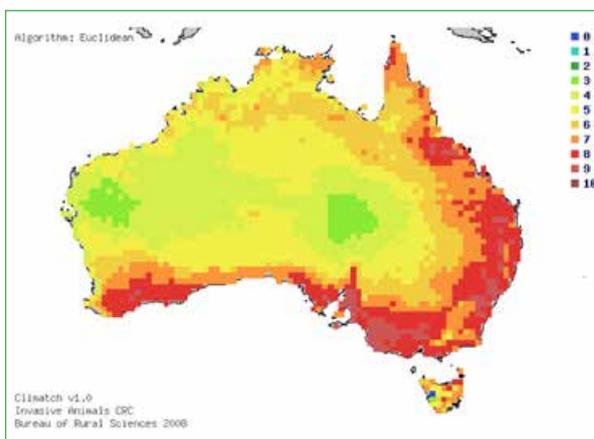


Figure A4 The area of Australia where the climate appears suitable for the survival of rusa deer: red or orange = climate similar to that across the native and naturalised range of the species; yellow = ‘marginal’ habitat; green or blue = climatically unsuitable

Appendix 2 Feral deer species not known to be in Queensland

Knowing the factors that helped establish existing exotic species allows us to predict the threat posed by new species that may be introduced into Queensland. Sambar and hog deer are not yet officially known to be established in the wild in Queensland, but are of particular concern as they are already established in other parts of Australia.

Adaptability is one attribute that is shared by all the deer species currently in Australia. Tropical species have shown an ability to acclimatise to cooler conditions in Australia, and temperate species have acclimatised in subtropical environments. This demonstrated adaptability is a key reason for pest declarations and for the need to eradicate emerging populations.

Sambar (*Cercus unicolor* or *Rusa unicolor*)

Sambar are well established in the forests of the Great Dividing Range and the fringes of Gippsland farming areas in eastern Victoria. They are slowly expanding their range northwards along the Great Dividing Range, with the front of the expansion wave now near the Australian Capital Territory. Sambar also occur on the Cobourg Peninsula in the Northern Territory.

Sambar are a tropical species originating from Asia, but have acclimatised successfully to the cool conditions of the Victorian high country. This provides a strong indication of their potential adaptability.



Sambar (photograph courtesy of the Department of Conservation, New Zealand—Crown copyright)

Until recently, sambar were not thought to be in Queensland, but there is increasing anecdotal evidence of sambar translocations. As they are solitary animals, they favour dense cover and may be hard to find in the wild. As a tropical species, sambar could be expected to establish quickly in suitable Queensland environments such as the wet tropics, where they would be extremely difficult to eradicate.

Sambar utilise a range of tropical forest habitats, especially forest adjacent to grassland. There is concern that sambar populations could persist in grassy areas adjacent to remnants of Queensland's wet tropics rainforests, since this region appears climatically and ecologically suitable. Also, since sambar are known to consume fallen berries and fruits, Jesser (2005) expressed concern that they might compete for fallen fruit with locally native species including the endangered cassowary.

Sambar have been declared as Class 1 pest animals in Queensland—the objective is to prevent establishment of the species and eradicate any emergent population.

Hog deer (*Axis porcinus*)

Hog deer are the smallest of the deer species established in Australia. They are native to India and Sri Lanka, where they inhabit swamp and wetland areas. In Australia they are established in cooler coastal wetland areas in Victoria.

Like sambar, hog deer are a tropical species that could also be expected to flourish in the tropical and subtropical environments of Queensland. Anecdotal reports from the hunting community suggest that hog deer may have been released in Queensland in recent years, possibly in wetland areas around the Sunshine Coast.

Hog deer have been declared as Class 1 pest animals in Queensland—the objective is to prevent establishment of the species and eradicate any emergent population.



Hog deer (photographs courtesy of David Young)

Appendix 3 Statutory framework for feral deer management

State legislation

Animal Care and Protection Act 2001

42 Feral or pest animals

- (1) This section applies for an offence if the act that constitutes the offence is—
 - (a) an act done by a person to control a feral animal or pest animal, including, for example, by killing it; and
 - (b) the act does not involve the use of a prohibited trap or spur.
- (2) It is an offence exemption for the offence—
 - (a) if the act is done in a way that causes the animal as little pain as is reasonable; and
 - (b) the control complies with any conditions prescribed under a regulation.
- (3) In this section—

feral animal means an animal living in a wild state that is a member of a class of animals that usually live in a domestic state.

Examples of classes of animals that usually live in a domestic state—buffalo, cats, dogs, donkeys, goats, horses and pigs

pest animal means any of the following—

- (a) a non-indigenous animal generally regarded as being a pest;
Examples—black rats, brown rats and cane toads
- (b) noxious fisheries resources under the *Fisheries Act 1994*;
- (c) an animal declared under a regulation made under this or another Act to be a pest;
- (d) an animal required to be controlled under an Act;
- (e) an animal the subject of a measure or program to control disease under the *Fisheries Act 1994*, *Stock Act 1915*, *Exotic Diseases in Animals Act 1981* or another Act.

Land Protection (Pest and Stock Route Management) Act 2002

s. 6(2)—Where a person does something that is required or permitted under this Act, but would have committed an offence under the *Nature Conservation Act 1992* and the *Forestry Act 1959*, then they have not committed that offence.

s. 9—Outlines the principles of pest management.

ss. 10–16—Provides a legislative head of power for the development of strategies and guidelines for the management of pests in Queensland.

ss. 17–24—Pest management on state lands.

ss. 25–35—Local government area pest management planning.

ss. 77–82—Private landholders to control pests on their lands. Penalties for noncompliance, notices may be issued, costs recovered.

ss. 183—Local governments are to ensure declared pests are managed within their areas in accordance with the Act and the principles of pest management.

ss. 39–42, 44—Offences for the introduction, feeding, keeping, release and supply (sale) of declared pests without permit.

ss. 213–236—Provides for pest operational boards.

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