



Proposed Tasmanian wild fallow deer management plan

Submission by the
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About the Invasive Species Council

The Invasive Species Council was formed in 2002 to advocate for stronger laws, policies and programs to keep Australian biodiversity safe from weeds, feral animals, exotic pathogens and other invaders. It is a not-for-profit charitable organisation with over 3000 supporters, funded predominantly by donations from supporters and philanthropic organisations.

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Contents

1. Introduction	1
2. The population and distribution of feral deer	2
Trends to date	2
Predicted future trends.....	2
3. The impacts of feral fallow deer	4
Environmental impacts	4
Economic impacts	4
Road safety impacts	5
4. Management priorities	6
Goals and priorities for the management plan	6
Management methods.....	8
Policy reforms	10
Research and monitoring	10
5. List of recommendations	11
6. References	13

1. Introduction

This submission is a response to the invitation by the Department of Primary Industries, Parks, Water and Environment to provide feedback on the proposal to develop a 'Wild Fallow Deer Management Plan', which the department says will capture current accepted management practices, existing government policy and commitments relevant to deer management, including the Tasmanian Government's response to the 2017 Legislative Council inquiry, as well as articulating additional strategies and actions.

The natural environment and agricultural businesses are now bearing the brunt in Tasmania (and elsewhere) of a blinkered, antiquated approach to deer management that prioritises the interests of a relatively small number of recreational hunters. Only about 5,000 game licences to hunt deer are issued each year in Tasmania [1].

As we outline here, the results of this approach are a feral fallow deer population 'set to explode' [2], invasion of the World Heritage area, and escalating damage to the natural environment and farming business. Any basic cost-benefit analysis is likely to find that the costs of these consequences far exceed any benefits (even in simple economic terms).

A full appreciation of the risks and costs of expanding fallow deer populations and distribution should drive a new approach to deer management in Tasmania. Therefore, we urge the Tasmanian Government to develop a management plan in the public interest and specify policies and actions that will most effectively protect the natural environment, farmers and motorists from the impacts of deer. Recreational hunters would play an essential role in this, but their interests should no longer dominate at the expense of nature, farming and people. There will inevitably continue to be ample hunting opportunities no matter how rigorous the management.

2. The population and distribution of feral deer

If we allow for geographic spread and an increase in density, half a million deer or more in Tasmania is not implausible over the next few decades

Ecologist Professor Chris Johnson (2020) [3].

We're sitting on a biological powder keg. These animals want to expand their range. They want to reproduce as fast they can.

Ecologist Professor David Bowman (2020) [4]

Trends to date

Fallow deer were imported from England into Tasmania in the 1830s, and apparently none have been imported since [5]. Wild populations established due to deliberate releases for hunting and escapes and releases from deer farms. There were reportedly more than 100 deer farms in the early 1990s, but now there are just five commercial farms (as well as dozens of hobby farms) [5,6].

By 1863, there were said to be 600–800 fallow deer in the wild [7]. About a century later, in 1972, an estimated 7,000–8,000 feral deer occupied about 400,000 hectares in the central and eastern Midlands [8]. They were 'beginning to cause conflicts between farmers and hunters', but their impacts on the natural environment were 'relatively unknown' [8]. There have been various population estimates since then: 16,000–20,000 in 1990, 30,000 in the mid-2000s, and 20,000 in the late 2000s [1].

An aerial survey in 2019 recorded some 54,000 deer (\pm about 10,000) across the 2 million hectare survey area, an average density of 2.7 deer/km² [1]. In contrast there were only about 30,000 forester kangaroos, making fallow deer the most numerous large animal in Tasmanian ecosystems [1]. The total number of deer in Tasmania is likely to be higher than the 2019 census found – it wasn't comprehensive and occurred towards the end of the hunting and crop protection season, when the population was likely to be near its lowest. Even so, on the numbers presented, the population appears to have more than doubled just in the past decade (Figure 1).

The distribution of feral deer has also expanded dramatically – about 5-fold, from 0.4 million hectares in the 1970s to more than 2 million hectares 3 decades later [9].

Predicted future trends

Whatever the current population, the clear population trend, illustrated in Figure 1, indicates that Tasmania faces a major challenge to prevent escalating damage. The exponential growth curve shows that the number of deer being added to the population each year is rapidly increasing. This accelerating growth trajectory indicates that the current policies are inadequate to deal with the deer threat and that they will become increasingly inadequate.

The 2019 census report says that from 2006 to 2019 the feral deer population increased on average by about 5.4% per year (based on annual spotlight surveys) [1]. This was despite the killing of 10,000 to 30,000 deer a year for hunting and crop protection [1]. The numbers killed clearly have suppressed population growth – without it, the annual growth rate from 2006 to 2019 would have been about 27% a year [1]. But even if the 5.4% average could be maintained (requiring a significant

increase in numbers killed), the population would almost double again within a decade and exceed a quarter of a million by mid-century.

Most of Tasmania, including much of the Tasmanian Wilderness World Heritage Area, is climatically suitable for fallow deer [10]. Maximum carrying capacities documented elsewhere in the world have ranged from 26–150/km² in high-quality habitat [10], but the density of fallow deer in their core range in Tasmania currently averages only 2.7/km², suggesting high potential for much higher densities. Modelling published in 2015 indicated the potential for the Tasmanian population to exceed a million by mid-century based on the following assumptions: a current population of 40,000, a maximum carrying capacity of 50/km², a population growth rate of 0.45, and the removal of about 15,000 a year [10].

While the exact numbers and rates of population growth are uncertain, the trends of accelerated population growth are clear. It is thus defying biology to expect that the current policies and approaches in Tasmania will be adequate to deal with the growing deer problem.

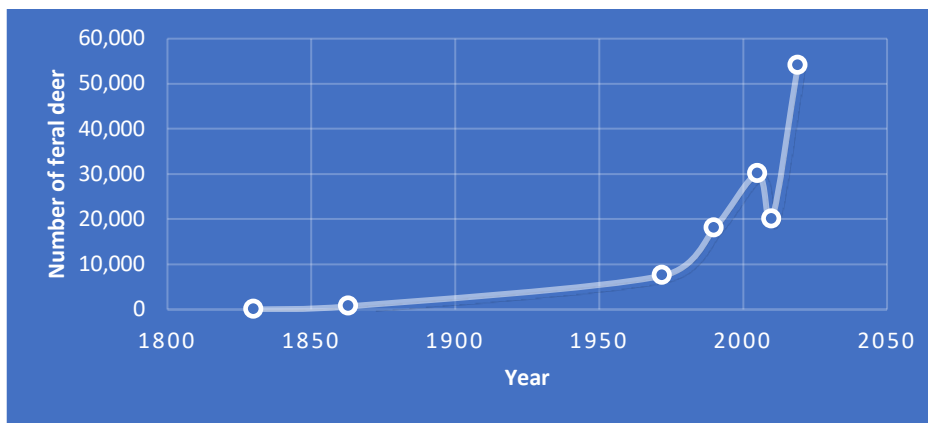


FIGURE 1. ESTIMATES OF FERAL FALLOW DEER POPULATIONS IN TASMANIA, 1830–2019

Sources: [1,7,8].

3. The impacts of feral fallow deer

It's hard to predict exactly what they would do to the World Heritage area if they got into it, but it would almost certainly be significant damage.

Ecologist Professor Chris Johnson (2020) [3]

Environmental impacts

Due to a lack of research, the impacts of feral fallow deer on Tasmania's natural environment are poorly known. But as the 'ecologically predominant large wild herbivore in Tasmanian ecosystems', deer will undoubtedly have major impacts as densities increase and they spread into more sensitive locations [3]. In general, deer can be highly destructive by over-browsing plants (including rare plants) and preventing regeneration (including after fire), trampling plants and animals, ringbarking trees by antler rubbing, fouling waterholes, eroding soil and spreading weeds.

As medium to large herbivores, deer eat large volumes of plant matter. The sheer amount of herbivory can alter the structure of plant communities, with implications for birds and other wildlife that depend on particular vegetation structures [11]. As selective feeders, deer target particular preferred plants, so it should not be assumed that deer impacts are simply proportional to their density [11].

One major concern in Tasmania is deer preventing the regeneration of plants, particularly after fire or in restoration programs. As Professor David Bowman told the federal senate inquiry into feral deer, pigs and goats, large fires in the Tarkine could alter 'the relationship of habitat and deer, because the deer will be able to find a new food resource – it'll be more open – and be able to expand very rapidly' [4]. In such situations, erupting deer populations are likely to impede or prevent recovery in sensitive communities, particularly in the World Heritage Area [3].

Fallow deer impede the restoration of grassy woodlands in the Midlands by browsing tree seedlings, ringbarking stems and smashing the branches of saplings, requiring expensive mitigation measures [12]. In adjacent woodlands, deer 'are thrashing native understorey shrubs and ringbarking naturally regenerating saplings of native trees' [12].

Other environmental impacts arise from the government's wildlife officers and conservation budgets being diverted from nature conservation priorities to protecting deer and monitoring hunting compliance instead [13].

Economic impacts

Feral deer are massively increasing the costs of restoration in the Midlands and will undermine the ability of Tasmania to attract investment in carbon offset schemes [12]. '[W]e can offer 10 times more outcomes in areas with lower density deer than we can in places such as Tasmanian Midlands, where we have higher density of deer,' says Greening Australia's science and planning manager Dr Elisa Raulings [14]. It means that Tasmania is not competitive with sites on mainland Australia in attracting investment for carbon offsetting. The green carbon economy is expected to 'boom' over the next decade, so Tasmania risks missing out on substantial offset funding and jobs due to feral deer [14].

The high costs of deer control will also discourage farmers from undertaking environmental restoration on their properties and limit their opportunities for income diversification. Farmers are already spending a lot of money to protect crops and pastures from feral deer. The Tasmanian

Farmers and Graziers Association (TFGA) told the senate inquiry that feral deer are costing Tasmanian farmers \$10 million to \$80 million a year [15]. The TFGA's policy officer Kylie Donaghy told the inquiry:

All it takes for a crop to be decimated is for deer to leave their effluent on the crop. Once that happens, the crop needs to be pulled. It can't be sold in any way whatsoever. ... If the deer numbers were controlled to a good level, then that sort of crop decimation would be lessened quite significantly.

In a survey of farmers by the TFGA, 90% of respondents said they wanted deer classified as a feral pest and not as a partly protected animal [15].

Feral deer could also 'play a significant role in the epidemiology of multiple livestock diseases' [16]. Five diseases have been assessed as having a high risk of transmission to Australian livestock, including bovine tuberculosis and foot and mouth disease.

One grazier has provided some details of the costs of deer to his operation. Simon Cameron estimated in 2016 that feral deer cost him \$36,000–58,000 a year on his small sheep grazing property in the Midlands (about a third of which is under a conservation covenant). In addition, he has to buy lucerne (at a cost of \$20,000 that year) that he would grow himself if not for deer. The government-assessed deer population on his property was 300 (a figure he says should be higher) and he had been culling 220–270 deer a year for the previous 3 years.

The Tasmanian Land Conservancy (TLC) has also outlined the costs of having fallow deer on their properties [17]. From 2011 to 2016, 62 recreational hunters shot on average 60 fallow deer a year, a number that is unlikely to have reduced the population, and paid TLC about \$7,500 a year for access. But the costs incurred in an example year (2015–16) exceeded \$48,000 (not counting the costs of ecosystem alteration, competition to native species, lost productivity etc), leading to a net loss of more than \$40,000. Much of that was spent on administering and managing recreational hunting, and \$12,000 worth of carbon stocks were lost. The TLC's preference is to remove all deer from their properties – 'no landowner should be compelled to hold or protect ... fallow deer for the benefit of neighbouring landholders or recreational user groups' [17].

These few examples indicate the major economic costs and foregone economic opportunities that will be borne by landholders unless Tasmania enacts effective policies and programs to reduce and contain feral deer populations. The reported economic benefits of hunting are paltry by comparison. The Tasmanian Deer Advisory Committee noted in 2019 an economic value of \$2.2–2.6 million from recreational deer hunting based on interviews of 3,200 licence-holders in 1990, and \$327,000 generated by recent licence sales [18]. The licence revenue raised does not cover the government's costs of administering and managing deer hunting [13]. As noted, strengthening the management of feral deer will not deprive hunters of hunting opportunities.

Road safety impacts

Feral deer will become an increasing hazard to motorists as their range and densities increase. There have been few studies in Australia. The Wollongong City Council reported in 2018 that about 5% of residents in deer-affected areas had collided with a deer and some 30% had almost collided with a deer [19]. Analysis by the Invasive Species Council of collisions in the Illawarra region reported to NSW Police revealed that during the 13 years from 2005 to 17, 90 collisions with deer were rated by police as serious, including 1 resulting in a death and 28 resulting in injuries [20]. We recommend that the current hazards of deer to motorists be assessed by consulting Tasmanian police and RACT collision records.

4. Management priorities

Goals and priorities for the management plan

The primary goal of the management plan should be to advance the public good by protecting the natural environment, farming businesses and other assets in Tasmania from the harmful impacts of feral deer. To date, the primary goal of deer management in Tasmania has been to protect deer as a hunting resource. The focus of 'quality deer management' is mainly to maintain an ample supply of prized hunting targets (eg males with large antler racks) rather than prevent deer damage. This has enabled deer to expand their range and increase in densities. Managing deer as an invasive species requires a different approach and therefore different policies and programs.

The invasion curve illustrated below demonstrates the well-accepted principle in biosecurity policy that it is far more effective and cost-effective to prioritise management approaches in the following order: prevention over eradication over containment over long-term management (Figure 2). This should guide the management priorities for fallow deer. Otherwise, the task of protecting Tasmania's natural environment and farming businesses will become much more expensive and difficult over time.

The proposed fallow deer management plan should specify the goals (eradication, containment, management) applying to particular deer populations or locations and develop a zoning plan.

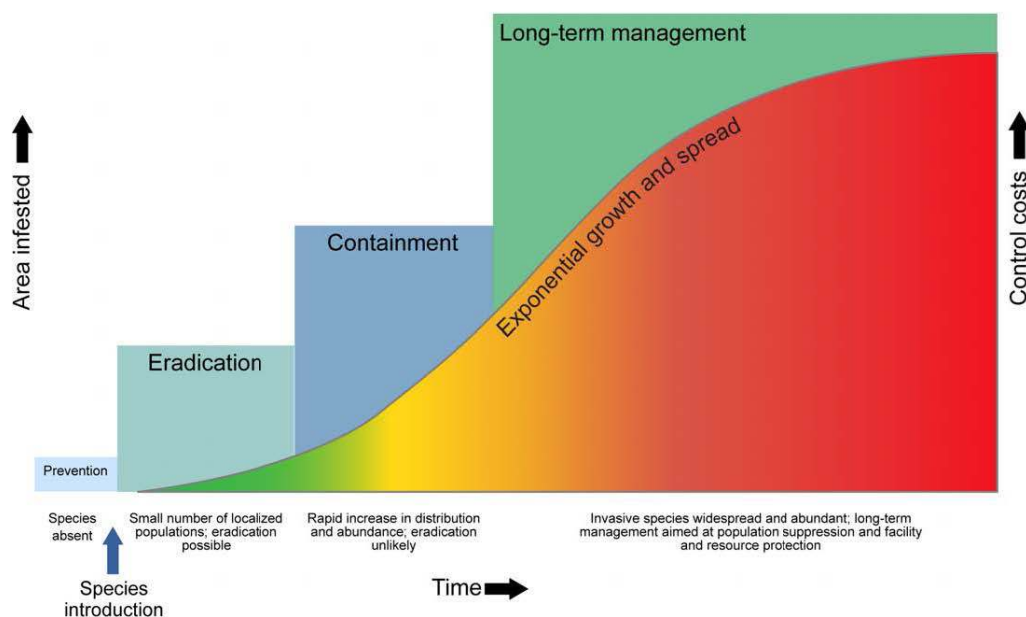


FIGURE 2. THE INVASION CURVE

Eradication priorities

Unless action is taken soon to eradicate satellite populations of fallow deer, such as those in the World Heritage area, while it is still technically feasible, the government is likely condemning future Tasmanians to diminishing natural values, and the everlasting expense and difficulty of trying to suppress deer populations and save sensitive species and ecological communities from the impacts of deer.

A high priority focus in the management plan should be to eliminate satellite populations before they become abundant, particularly in ecologically important locations. Priority locations for eradication include the following:

- Tasmanian Wilderness World Heritage Area (TWWHA)
- Bruny Island
- south of Hobart
- north-west Tasmania
- near Temma
- other small populations.

The biggest worry is about the effect that deer could have on vegetation on the World Heritage area, especially in the uplands.

Ecologist Professor Chris Johnson (2020) [3]

In particular, we emphasise that eliminating feral deer from the TWWHA and other high-value conservation areas should be accorded the very highest priority. The recently released draft *Tasmanian Wilderness World Heritage Area Biosecurity Strategy 2021–2031* says that although deer were ‘previously assessed as low-risk’, they ‘may now present a higher risk due to changing environmental conditions or new knowledge about their impacts’. But it appears there has been little or no action to respond to this threat. Comprehensive surveys are needed to determine the extent of deer encroachment into the TWWHA as a basis for urgently developing an eradication plan.

The Tasmanian Government has said it supports the objective to ‘eradicate deer populations in World Heritage and other areas classified as conservation land’ (in response to the 2017 Legislative Council inquiry into wild fallow deer). It also said it would consider using recreational hunters for this purpose. As we argue below, this would be a mistake, except if supervised demonstrably skilled hunters are used to supplement professional control. It should not be used as an excuse to expand hunting options. The 2011 *Statement of Current Management Practices* noted that attempted eradications of satellite populations using recreational hunters had failed and would likely be possible only if departmental officers were responsible for and involved with control operations [6].

Containment

It should be a high priority to prevent any further spread of feral deer. Any new deer populations outside the ‘traditional’ area should be rapidly eliminated. This will help discourage illegal translocations and releases. The current approach of ignoring satellite populations rewards those who translocate deer to establish new hunting opportunities. There should also be concentrated control efforts along the boundaries of the core area to suppress densities and reduce the risks of natural spread.

Management

Where deer have been long established and have medium–high population density, it is likely not feasible to eradicate them with current control techniques. However, numbers can be strongly suppressed, particularly by aerial shooting (see below), which should then enable ongoing suppression by recreational hunters or control by farmers. High priority should be accorded to protecting high-value conservation areas (such as national parks and threatened species habitats) and agricultural assets. As management techniques for deer improve in Australia, management goals can become more ambitious.

Management methods

Overall, the evidence from international control programs indicates that ground- and aerial-based shooting by professional shooters is likely to be the most widely applicable approach for controlling deer across large-scale ...management units in Australia.

Dr Naomi Davis and others (2016) [21]

Codes of practice for feral animal control programs require that they be carefully planned and coordinated to meet defined objectives of desired environmental or economic outcomes [22]. They should adhere to standard operating procedures, using effective and humane methods. Any shooting should be carried out by skilled operators. Programs should be monitored to assess whether objectives are met. Effective programs should reduce ‘the need to cull large numbers of animals on a regular basis’ [23].

There is not as yet an Australian model code of practice for the humane control of wild deer, but there is a standard operating procedure for ground shooting (see <https://pestsmart.org.au/toolkit-resource/ground-shooting-of-feral-deer/>), which should be adopted as a standard for the proposed management plan, whether or not shooters are professional or voluntary. A code of practice will be developed as part of the planned national deer control strategy.

Under ideal conditions, fallow deer may be able to increase their population numbers by an estimated 45% annually (however, the 95% ‘Bayesian credible interval’ for that calculation is 13–118%, so it could be considerably higher or lower) [24]. This means that to stop population growth could require the annual removal of up to an estimated 34% of a population (with a 95% credible interval of 12–69%) [24]. Research is needed to determine the minimum level of removal needed to reduce fallow deer populations in Tasmania.

Skilled recreational shooters can and do sometimes contribute to control programs for feral animals. However, it is important to be realistic about the serious limitations of recreational hunting as a pest control method (see Box 1) and recognise the differences between professional pest control and hunting.

To achieve eradications, in particular, and to protect sensitive sites from deer, the Tasmanian Government should primarily use professional pest controllers, with the potential for deploying recreational hunters who demonstrate high proficiency deployed where they can provide supplementary control under direction and supervision. Effective and humane pest control requires a high level of skills. Professional controllers must be demonstrably proficient and can use equipment and methods not available to amateurs (such as semi-automatic rifles and spotlight hunting).

Aerial shooting is generally the most effective method of control except where visibility is constrained. In a 2002 trial at Gum Lagoon Conservation Park in South Australia, one helicopter shooter shot more than 4 times as many deer in 4 hours (182 deer) as 65 recreational hunters did in 4 days (44 deer) by stalking and spotlighting (Tony Peacock, Invasive Animals CRC, personal communication 2009). The aerial shooting killed an estimated 90% of the population.

In a more scientific study in New Zealand, deer abundance declined with increasing helicopter-based shooting but did not change with increasing ground-based hunting (although the results were confounded by other forms of control and immigration) [25]. Helicopter-based shooting is considered highly effective in grasslands and shrublands, and this study showed it may also be more effective than ground hunting in many forests [25].

Aerial shooting has long been used for deer harvest or control in New Zealand and is considered the most cost effective method in both montane and non-montane habitats [21]. It is increasingly being used on the Australian mainland in national parks and other areas. In the Granite Belt area in Queensland, for example, a recent program removed about 1,000 fallow deer from an agricultural area, reducing the population by about 90% (based on camera trap monitoring), to a level where recreational hunting can probably limit population growth [26].

Box 1. The limitations of recreational hunting for feral deer control

The pressure exerted by recreational hunters has clearly been insufficient to deal with Tasmania's deer problems. The very few reportedly successful programs involving recreational hunters target low-density populations in small areas in highly accessible environments [27,28].

For all sorts of invasive animals – pigs, goats, foxes – recreational shooting is generally ineffective for controlling feral animals, because too few are killed to overcome the capacity of their populations to rebound – due to immigration, survival of individuals that would normally die due to starvation or disease, and rapid reproduction [29]. The Victorian government recently concluded that 'opportunistic ground shooting alone is generally an ineffective means of invasive animal management' [30].

One reason that hunting is not effective as a primary or sole means of control is that ground shooting as a method, particularly by day, is not efficient, except with skilled hunters in small accessible areas with good visibility or when used in conjunction with other methods [29]. The limitations imposed by access were shown in a New Zealand study that found little hunting effect on deer populations more than 1.5 km from a road [31,32].

Hunters also have highly variable skill levels (no skills tests are conducted for licensing). In New Zealand's Blue Mountains, just 3.5% of 1284 hunters accounted for more than half the deer killed recreationally in 1984–85 [31]. Just one deer was killed on average per 48 hours hunted in an area with 7.5 deer/km² forest.

The goals of recreational hunting and feral animal control are often different. Hunters are often motivated to maintain feral animal populations for future hunting and leave the young and females. 'Hunters have a very proud history of maintaining sustainable populations of game species that they wish to utilise,' said the former president of the Sporting Shooters Association [33]. Hunters often prefer to kill trophy males (with antlers), which does not assist with population control in polygamous species such as deer, because the remaining males can inseminate all the females.

In sum, skilled hunters can contribute to effective feral animal control mainly in the following circumstances:

- when they participate in professional control programs, to supplement professional shooters or other methods of control such as aerial shooting or baiting
- when they exert sustained pressure over small, accessible areas.

Policy reforms

The status of feral deer

Fallow deer currently receive greater protection than some native Tasmanian species. We strongly recommend that feral deer be managed like other harmful invasive animals as they are in all mainland states other than Victoria. The New South Wales Government recently removed the protected 'game' status for feral deer on all private land and have listed the damage caused by deer as a key threatening process.

Fallow deer should be removed from Schedule 4 of Tasmania's Wildlife (General) Regulations 2010 as 'partly protected wildlife'. There should be no restrictions on controlling them (such as a requirement for a permit, closed seasons and a limit on numbers) other than those that would apply to other invasive animals. Landholders should be able to manage deer on their properties all year round.

Deer management should be led by a multi-agency taskforce from Biosecurity Tasmania, the invasive species branch of the Department of Primary Industries, Parks, Water and Environment, and the Parks and Wildlife Service, advised by the Scientific Advisory Committee (Threatened Species), Game Services Tasmania, and a cross-sectoral body including ecologists, conservationists, farmers and recreational hunters.

Deer farms

Given that deer farm releases or escapes have been a source of new deer populations in Tasmania (eg Bruny Island and Temma) and elsewhere, any new deer farms should be restricted to areas with long-established deer populations. There should be a review of fencing requirements to ensure they minimise the potential for escapes from deer farms, a strong compliance focus, and strong penalties for any deliberate or negligent release of deer.

Research and monitoring

Until recently, there has been almost no research on feral deer in Australia except as a game animal. A 2016 review nominated the following research priorities [21]:

- long-term changes in plant communities caused by deer
- interactions of deer with other fauna
- impacts on water quality
- economic impacts on agriculture (including as disease vectors)
- changes in distribution and abundance.

Research projects currently being undertaken by the Centre for Invasive Species Solution and several state agencies will improve the information base available for deer control in Tasmania.

We need a much better understanding of the distribution, ecology and impacts of feral deer in Tasmania – including the relationships between deer densities and the extent of damage – and the efficacy of deer management techniques. This includes investigating the minimum level of removal needed to reduce the deer populations in various locations. We recommend that a research plan be developed identifying priority ecological and economic projects.

As is recommended for all pest control programs, there should be monitoring (and public reporting) of control efforts to determine their effectiveness. There should also be more detailed surveys in sensitive locations to determine deer distribution and density.

5. List of recommendations

Management goals and priorities

1. Prioritise the protection of natural values, farming businesses and motorists' safety in the proposed fallow deer management plan
2. To prevent a worsening and more expensive problem in future, apply the risk-based principles of the invasion curve to feral deer management – that is, eradicate deer populations where feasible and otherwise contain their spread and suppress populations to protect environmental and economic assets.
3. Prepare a zoning map indicating populations to be eradicated, the 'core' area (where deer have long been established) beyond which the aim will be to prevent feral deer establishing.
4. Prioritise the eradication of feral deer from the Tasmanian Wilderness World Heritage Area and establish a substantial containment zone around the TWWHA.
5. Identify other priority populations for eradication (subject to feasibility), including Bruny Island, Temma, the north-west, and south of Hobart.
6. Identify priority areas (such as threatened species habitats) for protection by population management.

Management techniques

7. Apply best practice methods (such as the standard operating procedure for ground shooting of deer) to deer management programs for all deer control, whether by professional or voluntary shooters, in government-managed control programs.
8. Primarily use professional pest controllers for government-managed control programs, particularly in conservation reserves, with recreational hunters who demonstrate high proficiency deployed under supervision where they can provide supplementary control.
9. Use helicopter-based shooting where this is likely to be the most effective method for eradicating or substantially suppressing deer numbers.

Policy reform

10. Remove fallow deer from Schedule 4 of Tasmania's Wildlife (General) Regulations 2010 as 'partly protected wildlife' and treat them a highly threatening invasive species.
11. Remove restrictions on controlling feral deer on public and private lands other than those that apply to other invasive animals.
12. Establish a multi-agency taskforce to manage feral deer led by Biosecurity Tasmania, the invasive species branch of the Department of Primary Industries, Parks, Water and Environment, and the Parks and Wildlife Service, advised by the Scientific Advisory Committee (Threatened Species), Game Services Tasmania, and a cross-sectoral body including ecologists, conservationists, farmers and recreational hunters.
13. Restrict any new deer farms to areas with long-established deer populations. Review fencing rules, rigorously enforce regulations to limit the risks of further deer escapes, and apply strong penalties to deliberate or negligent release of deer.

Research and monitoring

14. Develop a feral deer research plan for Tasmania identifying priority ecological and economic topics, including the following:
 - a. ecological impacts and the species at risk from deer impacts
 - b. economic impacts, including on farming businesses and restoration programs
 - c. distribution and abundance, and the relationships between deer densities and the extent of damage

- d. the minimum level of removal needed to reduce deer populations in sensitive locations
 - e. modelling to project deer spread or contraction and changes in densities under different management scenarios.
15. Require regular monitoring and public reporting of deer populations and distributions and the effectiveness of control programs.

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