FERAL FALLOW DEER ON KANGAROO ISLAND

A Strategy For Future Management

A report prepared for the
Kangaroo Island Natural Resources Management Board

by
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March 2006
Feral Fallow Deer on Kangaroo Island

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**Foreword**

This project is a component of the Kangaroo Island Integrated Natural Resources Management Board’s ‘Here to Stay’ Investment Strategy. The following Program Outcomes, Actions, Resource Condition Targets and Management Action Targets from the Strategy are relevant to the project.

**Program:**
Repel the Invaders: Effectively manage feral pigs, deer and cats

**Program outcome:**
Feral pig, deer, and cat threats to natural resources on Kangaroo Island are managed, controlled, monitored, and where appropriate, eradicated through an integrated program.

**Project component:**
Repel the Invaders: Current Pest Management Program

**Relevant Resource Condition Targets:**
8.1.E Pests and diseases eliminated, contained, managed and no further species introduced by 2020
9.1.A Priority pests and diseases eliminated, contained, managed on primary production land by 2020

**Relevant Management Action Target:**
8.4.9 Implement ongoing research into improved, targeted methods for control of the regions pests and diseases by 06/08
9.1.3 25% of land managers applying best practice management techniques for pests & diseases by 06/08.
9.1.10 Develop & implement programs to provide up-to-date information to land managers and develop skills for pest and disease management by 06/08.
Acknowledgements

A large number of people have contributed to the information compiled in this plan including the landholders and hunters of Kangaroo Island, employees of government agencies including the South Australian Department for Environment and Heritage, and Primary Industries and Resources of South Australia, the Kangaroo Island Animal and Plant Control Board and South Australian Animal and Plant Control Commission (now Dept for Water, Land and Biodiversity Conservation). Discussions with professionals dealing with deer management in other regions have also been invaluable including Clark McGhie, (professional hunter), Don McKenzie (New Zealand Department of Conservation), John Parkes Landcare Research, New Zealand, and Andrew Glover (NSW Rural Lands Protection Board). Thanks to Colin Wilson for editing this report.

Abbreviations

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<tr>
<td>APCC</td>
<td>Animal and Plant Control Commission</td>
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<tr>
<td>DWLBC</td>
<td>Department for Water Land and Biodiversity Conservation</td>
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<td>DEH</td>
<td>Department for Environment and Heritage (South Australia)</td>
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<td>KI NRMB</td>
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Part 1: General Background

1.1 Distribution and abundance across South Australia

Six deer species, fallow (*Dama dama*), red (*Cervus elaphus*), sambar (*Cervus unicolor*), chital (*Axis axis*), rusa (*Cervus timorensis*) and hog deer (*Axis porcinus*) have formed wild populations in Australia in habitats ranging from arid woodland to rainforest and are a growing management issue. In South Australia deer were first released in the late 1800s and naturalised populations currently occur in parts of the South East, Mid North and Mt Lofty Ranges (APCC 2004). Until recently, deer were thought to survive in small pockets on the edge of pasture and control was limited to that undertaken by recreational and professional shooters (APCC 2004). The recent rapid increase in feral deer numbers and distribution has resulted in the Animal and Plant Control Commission developing a strategy for deer management in South Australia.

1.2 South Australian State Strategy for Deer Management

A strategy relating to deer management has been developed and was adopted by the South Australian Animal and Plant Control Commission in 2005. The strategy has the following objectives to improve management of domestic and wild deer:

1. All deer farmers compliant with the NRM Act and regulations relating to the security of their animals by July 2006.

2. Negligent or willful liberations of deer investigated and appropriate legal action taken on an ongoing basis.

3. Eradication programs enforced on all private and public land where there are isolated localised feral deer populations.

4. All private and public landowners with known abundant feral deer populations complying with the requirement under NRM Regulations to control feral deer by December 2006.

5. Improve community and stakeholder appreciation of the issues related to feral deer and the need to undertake effective control programs.

1.3 Legislation relevant to deer management

There are a number of Acts and policies which together establish the framework for the management of deer on public lands and provide for the management of deer on private lands. Deer are listed as a proclaimed species under the Natural Resources Management Act 2004 and as such, a number of sections of the Act apply. The relevant legislation is as follows:

**Deer Keepers Act 1987**: this requires that the number of animals on the property to be declared and registered with PIRSA and those animals be properly confined.

**Livestock Act 1997**: an act to regulate matters relating to registration and disease control of livestock.

**Policy on Feral Deer in South Australia 2004**. The keeping of deer is prohibited on all off-shore Islands in SA with the exception of Kangaroo Island

**The Natural Resources Management Act 2004**

Deer are listed as declared species and as such the following sections of the Act apply.

- **Section 179: Offence to release animals or plants**
- **Section 180: Notification of presence of animals or plants**
- **Section 181: Requirement to control certain animals or plants**
- **Section 182: Owner of land to take action to destroy or control animals or plants**
- **Section 183. Requirement to implement action plan** This section relates to deer as a feral animal and the requirement of the landholder to control the feral population residing on their land. Refer to Appendix 1 for more details relating to these sections of the Act.

**Part 2: Fallow Deer on Kangaroo Island**

Fallow deer escaped from a deer farm on the western end of Kangaroo Island. The number which escaped is unknown, however, it is estimated between 80 and 300 individuals escaped with a consensus that most were female.

A co-ordinated control strategy was undertaken in 2000-2001 and a minimum 70 deer were shot by December 2001. A grant of $5,707 was received for deer control and this was used to trial hunters and hound dogs from Victoria as a management technique. This action took place in spring 2002 but did not prove to be as successful as hoped, with only a further 20 deer being shot.

2.1 Current Situation

Throughout the control campaign no records have been kept on the population characteristics of shot deer and there have been no comprehensive records kept of the number of deer shot since 2002. It is therefore difficult to determine the level of deer control undertaken from 2002-2005. The information obtained from the major
landholders in the region now occupied by fallow deer gives an estimated minimum number of 41 deer destroyed in 2005. At a recent public meeting the landholders estimated the number of deer culled per year since 2002 has been around thirty. Substantial hunting pressure has been maintained on a number of properties particularly on the Great Southern Blue Gum plantations. On Laterite Hills, a property close to the escape site, 14 deer were recorded shot during intensive control operations for wallabies and possums. A further two deer have been hit by road vehicles.

The current feral deer population on Kangaroo Island is estimated to be between 50 and 150 individuals, with a sex ratio strongly biased towards females. Following their release in 1999, feral fallow deer have spread at a rapid rate covering an area of around 92,000 ha (2005 records) (Figure 1). However, it is thought that the breeding population is still predominantly within 15 km of the release area. Anecdotal evidence suggests the reproductive output is high at around 90% of adult females, with some individuals raising twins.

Residents generally support the notion of eradication of deer on Kangaroo Island but, due to the low numbers to date, most landholders are unaware of the potential impacts and are more concerned about feral pigs. However, hunting pressure continues to be maintained.

**Fig 1:** Distribution of fallow deer on Kangaroo Island up to and including 2005. In 2006 a more intensive search for deer sign confirmed the population is still predominantly in the same area with records south of the Playford Highway to be confirmed.
2.2 Ecology and Habitat

Deer like margins between agricultural land and areas of vegetation. Fallow Deer benefit from forestry plantations, particularly in earlier years when browse and pasture is available. Mature forests act as corridors for movement and areas to camp adjacent to pastures. They prefer open forest with access to denser cover for escape and pastures for feed.

On Kangaroo Island deer are still concentrated in the area of original release, but as already discussed, there have been sightings across a third of the Island including the West End Highway and on tracks within Flinders Chase National Park. More recent sightings have been recorded adjacent to pine forests on the Bark Hut Road.

Fallow deer are a medium sized deer with bucks 90 cm at the shoulder, weighing about 90 kg and does 76 cm at the shoulders and weighing around 40 kg. They have a range of colours including black, white and brown. In summer they generally have a light to reddish brown coat with white spots. This colour is referred to as Menil and is the most common colour of Kangaroo Island deer.

The buck’s antlers are very complex with the most striking feature being the broad palm-like blades with trailing points which develop on the end of the main antler beams. They have exceptional eye sight and can detect movement at a great distance making them difficult to find, particularly after heavy hunting pressure.

Fallow deer mate in mid autumn and one calf per female is born in spring (November to January). To date the information relating to reproductive success is limited to anecdotal evidence from a hunter who thought that around 85% of females were pregnant in 2001 when he was undertaking control. The sex ratio of offspring appears to be about 1:1.

Males form groups in December, when they are in full velvet. By February they are spread out and solitary, usually lying away in the thick vegetation and hard to find. During the rut or mating season (March-May) the males take up rutting areas and vocalize to attract the females. Quality feed is scarce and paddocks dry at this time and herds congregate around the best pastures making them easier to find.

2.3 Impacts

The impacts caused by deer are yet to be fully realized on Kangaroo Island but will undoubtedly be substantial if the population is allowed to increase and spread unhindered. Impacts listed from other areas where deer densities are high include the following:
Environmental
- Damage to areas of bushland through trampling, grazing and ring barking trees.
- Soil erosion along trails and creeklines
- Weed dispersal
- Fouling waterholes
- Potential to graze threatened plant species
- Spread of plant diseases such as *Phytophthora cinnamomi*.
- Reduced invertebrate biodiversity (Allombert et al 2005).

Social
- Increased levels of illegal hunting
- Automotive and aviation collisions
- Destruction of ornamental plantings

Primary Production
- Competition with stock
- Spread of disease: Johnes disease, Bovine Tuberculosis
- Ring bark trees including pines, particularly during the rut
- Damage to agricultural crops through trampling and grazing.
- Destruction of vineyards.

Future social, ecological and economic costs on Kangaroo Island are predicted to be substantial based on the known impacts of deer in other regions of Australia.

2.4 Registered deer farms
There are five registered deer farms on the Island: all have predominantly fallow or red deer, with one deer farm crossing red deer with Canadian elk.
Part 3: Kangaroo Island strategy for Deer Management

3.1 Management options

Control of fallow deer can be undertaken using one of three strategies:

1. Retain the status quo
2. The development of a sustainable control program where impacts are managed to a target level
3. Eradication.

The positive and negative issues relating to each approach are discussed below.

Retain the Status Quo

This action leaves the control of deer to landholders and recreational hunters and is likely to slow population growth but not lead to eradication. Hence, densities and the area impacted are likely to increase. This action postpones control to a later date and is likely to be more expensive in the long term.

Sustainable control

This action needs ongoing management to ensure the feral deer population is managed to a level where damage is minimal. This will require an understanding of the impacts, the growth of the feral deer population, and the level of control needed. Resources for such a program would be substantially greater than eradication in the long term because such management is ongoing.

Eradication

Numbers of feral deer are still low and the area affected currently has substantial although patchy hunting pressure. With a coordinated and integrated strategy it may be possible to maintain the death rate above the birth rate. At this stage it is difficult to determine if all animals are at risk and a monitoring program is being developed to determine the distribution and abundance of the species. Being an Island, re-infestation from other areas can only occur from deliberate release and farm escapes. As the population size is still small, eradication could be trialed while the effort required is relatively low.

For the successful eradication of a pest animal population the following criteria are essential (Myers et al. 2000) and will be addressed by the Feral Animal Management Program:

- The socio-political environment supports eradication.
  Past actions indicate eradication is supported by the Island community. A recent public meeting concluded that eradication was worth trialing and would be
supported. Representatives of the cattle industry regard eradication as the preferred option due to the threat of feral deer spreading Johnes disease to cattle studs.

- **Immigration can be prevented.**
  With a good biosecurity strategy and farm control this action is possible as Kangaroo Island is separated by 14 km of water.

- **Deer can be killed at a faster rate than they can replace themselves.**
  This will require an understanding of the population size and structure, hunting pressure, and reproductive rate. Some hunters on the Island have kept good personal records of the age, reproductive status and sex of destroyed deer. This information may be able to provide the above.

- **All reproductive individuals are at risk from the available techniques.**
  Techniques will need to be trialed and an understanding of deer distribution and habitat use refined.

- **Deer can be monitored at very low densities.**
  There are a number of monitoring techniques that will be implemented which allow for the detection of individuals at low densities. Improved communication with the community and a good reporting process of sightings are needed.

- **The high costs of eradication can be justified.**
  At this stage we have not estimated the cost for eradication due to a limited understanding of the extent of the problem, however, control operations over the next 12 months will clarify future costs. If eradication is not achieved in the next few years then control operations and impacts in the long term will be much greater.

### 3.2 Regional Management Objectives

The Regional Management Objectives comply with the State Management Objectives (Government South Australia 2005) and are specific to the social, political, economic and environmental context of Kangaroo Island. Future control operations will need the financial and operational support of the KI NRM Board and DEH, because the lower the number of remaining deer, the greater the time and effort required to eliminate each animal.

The objectives for deer management on Kangaroo Island are as follows:

**Objective 1**
All deer farmers compliant with the *NRM Act 2004* and regulations relating to the security of their animals by July 2006 and a protocol in place for the retrieval of any future escapes.

**Objective 2**
Assess the current procedures in place for importing deer onto the Island and implement processes that will ensure minimal biosecurity risks.
Objective 3
Develop an effective communication strategy allowing for the exchange of information among all participants.

Objective 4
Establish monitoring and evaluation programs by December 2006.

Objective 5
Develop an understanding of the ecology of feral fallow deer on Kangaroo Island by collecting information on movements, habitat use, and group dynamics.

Objective 6
Develop and implement effective destruction techniques.

Objective 7
Develop predictive models of population changes under different management scenarios.

Objective 8
Assess the cost and feasibility of the eradication program.

Milestones relating to these objectives are listed in Appendix 2.

3.3 Eradication Techniques
There are limited techniques available to destroy feral deer. No poisons are registered for deer control in Australia. Trapping, and ground and aerial shooting are the only options available. Of these techniques, ground shooting at night with a spotlight is regarded as the most practical and cost-effective method. Stalking during the day may also be effective for skilled deer hunters.

The use of ‘Judas deer’ carrying radio collars has not been widely used in Australia but has been trialed with some success in New Zealand. This technique is being assessed for a trial on Kangaroo Island but may not be successful because deer have only been seen in small groups of three or less. Aerial shooting has been used in New South Wales to effectively mop up residual deer herds on private land after ground shooting. This could be very effective when combined with use of Judas animals, however, the thickness of the bush and low density of herds may render this management option unsuccessful on Kangaroo Island.
The initial strategy for control on Kangaroo Island will focus on hunting. Recreational hunting per se is considered to be an ineffective control method with regard to the objectives of eradication. Casual hunters can make deer wary and are unlikely to have the time and resources to hunt deer at very low densities.

**Part 4: Detailed Management Actions**

A more strategic action plan has been proposed by Clark McGhie, (Australian Wild Country Adventures) Queensland. The actions proposed are based on evidence suggesting the number of adult males in the population is small.

McGhie proposes the following strategy.

**Bucks First**

As it appears there is a limited number of bucks on the Island, they should be targeted first. The proposal to destroy females in preference to males because they produce the young and are not restricted to one male is sound, however the sex ratio is already strongly skewed towards females and any buck fawn dropped must still survive another 15 months before reaching reproductive maturity.

**Deer First**

Promote the idea to landowners and hunters that it is preferable to inspect for feral deer and destroy all deer found before targeting other pest species such as pigs.

**Rut Shooting**

Selected hunters should be trained in techniques to specifically target bucks during the rut as they begin to work rut stands and start to roar.

**Pig Shooting**

As the landowner will see far more benefit in the short term from pig shooting, it needs to be stressed that hunters included in this program will also destroy pigs at every possible opportunity, once an initial inspection has been made for deer.

**Data Collection**

Hunters included in the program will be issued with data collection sheets to record all deer sighted and destroyed, and dates, times, and sex. Jawbones from all deer taken are to be kept for determining age.

**Deer Movements**

Notes will be kept by hunters as to where deer are commonly seen entering or exiting properties, crossing roads, fawning or rubbing.
Landowner Involvement
Landowners will be kept well informed of the campaign and asked to assist with access and information on deer movements.

Part 5: Monitoring program
Deer are a difficult species to monitor due to their illusive and secretive habits. Spotlighting is difficult because deer move away from people, aircraft, spotlights and roads, making random sampling difficult. Recent studies have indicated that in areas where deer densities are relatively high, two methods of monitoring are best and should be implemented concurrently (Forsyth and Scroggie 2003). They include:

1. **Catch-per-unit-effort**
   - Easy to collect;
   - Non random; and
   - Dependant on the skills of the hunters.

2. **Pellet (scat) counts**
   - On Kangaroo Island, deer densities are still too low to use pellet counts, but tracks could be an alternative technique.

Monitoring will be undertaken using the following techniques.

- **Monitoring by the community**
  This will be a relatively informal monitoring program which will rely on the community to inform the Project Managers of any sightings of deer.

- **Catch-per-unit-effort (CPUE)**
  Targeted hunters will be asked to record the time spent hunting and the number taken within the area of known distribution.

- **Passive detection**
  A passive detection method using tracks has been implemented with sites located across the north-west section of the Island within and outside the current range of deer. Deer are in very low numbers and are best detected using tracks and rubs. At all location surveyed to date, an estimate of the number of deer using the area has been made with group size being three or less. Within a property dams and likely areas of occurrence, at a minimum distance of 500 m apart, are searched for sign for 15 minutes. The presence or absence of occurrence and estimated number of deer are recorded. These sites will be revisited at least annually depending on the amount of time available. Ideally each are targeted for control will be searched prior to control and following the control operation. All sites have been located on a map so they can be accurately located for future surveys.
Part 6: Threats to the success of the program

Although only a relatively small number of deer need to be destroyed, the task ahead is still substantial and will require coordination and support from the community and government agencies. Some of the threats to the program include:

- Lack of funding to implement and maintain management actions.
- Reduction of public support if the program is halted or stalled.
- Further releases of deer from deer farms or imported animals.

References


Appendix 1: Relevant Sections of the NRM Act 2004

179—Offence to release animals or plants

(1) A person must not release an animal of a class to which this subsection applies, or cause or permit an animal of that class to be released, in a control area for that class of animals.

Maximum penalty: $100,000 or imprisonment for 2 years.

(2) A person must not release a plant of a class to which this subsection applies, or cause or permit a plant of that class to be released, in a control area for that class of plants.

Maximum penalty: $100,000 or imprisonment for 2 years.

(3) Subject to subsection (4), it is a defence to a charge of an offence against subsection (1) if the defendant proves that the circumstances alleged to constitute the offence were not the result of a wilful or negligent act or omission on the defendant's part.

(4) The defence prescribed by subsection (3) does not apply if an authorised officer furnished to the defendant a notice in a form approved by the Minister—

(a) in a case relating to an animal or class of animals—

(i) requiring the defendant to keep the particular animal, or any animal of the relevant class, in captivity, or to take any other action relating to securing, controlling or managing the animal, or animals of that class; and

(ii) warning the defendant that if the animal, or an animal of that class, (as the case may be) were to be released into a control area then the defence would not apply;

(b) in a case relating to a plant or class of plants—

(i) requiring the defendant to keep the plant, or any plant of the relevant class, in a particular way, or to take any other action relating to securing, controlling or managing the plant, or plants of that class; and

(ii) warning the defendant that if the plant, or a plant of that class, (as the case may be) were to be released into a control area then the defence would not apply.

(5) Any reasonable costs or expenses incurred by the Minister, or an NRM authority, in the capture or destruction, or attempted capture or destruction, of an animal released in contravention of subsection (1) may be recovered as a debt from the owner of the animal or from the person who released it or caused or permitted it to be released.

(6) Any reasonable costs or expenses incurred by the Minister, or an NRM authority, in collecting, dealing with or destroying a plant released in contravention of subsection (2) may be recovered as a debt from the person who was in possession of the plant or from the person who released it or caused or permitted it to be released.

(7) An apparently genuine document purporting to be a certificate of the Minister or an NRM authority (as the case may be) stating the amount of any costs or expenses referred to in subsection (5) or (6) will, in the absence of proof to the contrary, be accepted as proof of the amount of those costs or expenses in any legal proceedings for their recovery.

(8) In this section—

release—
(a) in relation to an animal, means to set the animal at liberty or to release the animal from captivity or to allow (in any way) the animal to go at large;

(b) in relation to a plant, means to release the plant into the open environment, whether or not it is released with provision for limiting the dissemination or persistence of the plant, or any related plant material, in the environment.

180—Notification of presence of animals or plants

(1) If an owner of land within a control area for a class of animals or plants to which this section applies becomes aware of the presence of an animal or plant of that class on that land, the owner must, within the prescribed period, notify the NRM group for the area in which the land is situated (or, if there is no such group, the relevant regional NRM board) of the species of animal or plant and the locality in which it was seen or is to be found.

Maximum penalty: $10,000.

Expiration fee: $500.

(2) If an NRM authority becomes aware (other than by notification under subsection (3)) of the presence of an animal or plant of a class to which this section applies on land situated within both a control area for that class of animals or plants and its area or region, the NRM authority must, within 48 hours, notify the Chief Officer of the species of animal or plant and the locality in which it was seen or is to be found.

(3) If the Chief Officer becomes aware (other than by notification under subsection (2)) of the presence of an animal or plant of a class to which this section applies on land situated within a control area for that class of animal or plant, the Chief Officer must, within 48 hours, notify the NRM group for the area in which the land is situated, and the regional NRM board, of the species of the animal or plant and the locality in which it was seen or is to be found.

(4) In this section—

prescribed period means—

(a) in relation to a Category 1 animal or plant—24 hours;
(b) in relation to a Category 2 animal or plant—3 days;
(c) in relation to a Category 3 animal or plant—7 days.

181—Requirement to control certain animals or plants

(1) An owner of land within a control area for a class of animals to which this subsection applies must comply with any instructions of an authorised officer with respect to keeping any animal of that class on that land in captivity.

Maximum penalty:

(a) if the offence relates to a Category 1 animal—$50,000 or imprisonment for 1 year;
(b) if the offence relates to a Category 2 animal—$20,000 or imprisonment for 6 months;
(c) if the offence relates to a Category 3 animal—$10,000.

Expiration fee: If the offence relates to a Category 3 animal—$500.

(2) An owner of land within a control area for a class of plants to which this subsection applies must comply with any instructions of an authorised officer with respect to keeping any plant of that class within the boundaries of that land.

Maximum penalty:

(a) if the offence relates to a Category 1 plant—$50,000 or imprisonment for 1 year;
(b) if the offence relates to a Category 2 plant—$20,000 or imprisonment for 6 months;
(c) if the offence relates to a Category 3 plant—$10,000.

Expiation fee: If the offence relates to a Category 3 plant—$500.

(3) An instruction under subsection (1) or (2) must be given by notice in a form approved by the Minister.

182—Owner of land to take action to destroy or control animals or plants

(1) Subject to this section, an owner of land within a control area for a class of animals or plants to which this subsection applies must destroy all animals or plants of that class on that land.

(2) Subject to this section, an owner of land within a control area for a class of animals or plants to which this subsection applies must control and keep controlled all animals or plants of that class on that land.

(3) An owner of land within a control area for a class of animals or plants to which this subsection applies must—

(a) take any measures prescribed by the regulations or specified by a relevant authority in the prescribed manner for the control of all animals or plants of that class that are, or may be, on that land;

(b) take any measures prescribed by the regulations or specified by a relevant authority in the prescribed manner requiring that the land, or anything present on the land, be subjected to specified treatment.

(4) A relevant authority may, subject to such conditions as the relevant authority thinks fit, exempt a person from the requirements of subsection (1), (2) or (3).

(5) A relevant authority may, by notice in writing given to a person who has the benefit of an exemption under subsection (4), vary or revoke the exemption, or a condition of the exemption, or attach a further condition to the exemption.

(6) A person who breaches a requirement under subsection (1), (2) or (3) is not, on account of that breach alone, liable to any civil or criminal action, but—

(a) a person may be guilty of an offence if the person does not comply with any relevant requirements under section 183; and

(b) compliance with any of those subsections may be enforced by the issuing of a protection order under Chapter 9 Part 1.

(7) All NRM groups must carry out proper measures for the destruction of all animals or plants of a class to which subsection (1) applies and for the control of all animals or plants of a class to which subsection (2) applies on road reserves situated within both a control area for that class of animals or plants and the area of the NRM group (and, if there is no such group, the responsibility to take action under this subsection will rest with the relevant regional NRM board).

(8) In this section—

relevant authority means—

(a) the regional NRM board for the relevant area; or

(b) the Chief Officer; or

(c) a State authorised officer.
183—Requirement to implement action plan

(1) If an authorised officer considers that an owner of land has been, is, or is likely to be, in breach of section 182(1), (2) or (3), the authorised officer may, by notice in a form approved by the Minister, require the owner to prepare an **action plan** to address the breach.

(2) A notice under subsection (1) must specify a period (which must be at least 21 days) within which the relevant owner of land must prepare the action plan.

(3) An owner of land who receives a notice under subsection (1) may, within 21 days after receiving the notice, apply to the Chief Officer for a review of the notice.

(4) The Chief Officer may, on application under subsection (3) and after giving the applicant a reasonable opportunity to be heard and to place material before the Chief Officer, confirm, vary or set aside the notice.

(5) The Chief Officer must prepare and make available written reasons for his or her decision on an application under subsection (3).

(6) Subject to the outcome of any review under subsection (4) (and, if relevant, any appeal under Chapter 10), if an owner of land is required to prepare an action plan then the owner must submit such a plan to the authorised officer who issued the notice in accordance with the requirements of the notice.

(7) An action plan submitted under subsection (6) must set out in detail—

   (a) the measures that the owner proposes to take to address the breach, and to comply with section 182 in the future; and

   (b) the period or periods within which those measures are proposed to be taken.

(8) The authorised officer to whom the action plan is submitted should, within 28 days after receiving the plan—

   (a) approve the plan; or

   (b) after consulting with the owner, amend the plan,

   and must then notify the owner of his or her decision.

(9) If an owner of land—

   (a) fails to comply with a notice under this section; or

   (b) fails to implement an action plan in accordance with its terms,

   the following provisions will apply:

   (c) the owner is guilty of an offence and liable to a penalty not exceeding $20,000; and

   (d) the Chief Officer or an NRM authority may—

      (i) cause to be carried out such measures as appear to the Chief Officer or NRM authority (as the case may be) to be appropriate in view of the failure on the part of the owner (being, if an action plan has been agreed, measures contemplated by, or consistent with, that plan); or

      (ii) engage a suitably qualified person to devise and implement measures to address the problem or problems to which the relevant requirement relates (being, if an action plan has been agreed, measures contemplated by, or consistent with, that plan).
(10) A person taking action under paragraph (d) of subsection (9) may, after giving reasonable notice, enter the relevant land at any reasonable time (using any force that may be reasonably necessary in the circumstances) and carry out such measures as appear to be appropriate in view of the failure on the part of the owner.

(11) A person must not hinder or obstruct a person acting under subsection (9)(d) or (10). Maximum penalty: $10,000.

(12) The reasonable costs and expenses incurred by the Chief Officer or an NRM authority in taking action under subsection (9)(d) may be recovered as a debt from the relevant owner.

(13) If an amount is recoverable by the Chief Officer or an NRM authority under subsection (12), the Chief Officer or NRM authority (as the case may be) may, by notice in writing to the relevant owner, fix a period (which must be at least 28 days) within which the amount must be paid by the relevant owner and if the amount is not paid by the owner within that period, the owner is also liable to pay interest charged at the prescribed rate per annum on the amount unpaid.

(14) An authorised officer may, on his or her own initiative or on application by an owner of land, by notice in writing to the owner of land, vary or revoke an action plan under this section.

(15) However, an authorised officer must take reasonable steps to consult with the relevant owner of land before he or she takes action under subsection (14) (unless the authorised officer is acting at the request of the owner).
### Appendix 2: Objectives, Outcomes, Milestones and Timeframes of future actions for the Kangaroo Island Deer Control Program

<table>
<thead>
<tr>
<th>Objective</th>
<th>Outcome/Output</th>
<th>Key Responsibility</th>
<th>Timing year</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No deer escaping from farms</td>
<td>No deer escaping from farms</td>
<td>Authorised Officer, deer farmers, KINRMB</td>
<td>1</td>
<td>a) All fences checked annually</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2. Assess the process for deer imports onto Kangaroo Island and implement processes that will ensure minimize biosecurity risks.</td>
<td>Biosecurity policy on deer developed and implemented</td>
<td>KINRMB, KINRMB, DWLBI</td>
<td>1</td>
<td>a) Meeting with current deer farmers to determine their goals</td>
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<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3. Develop an effective communication strategy</td>
<td>Communication strategy</td>
<td>KINRMB, KINRMB, Clark McGhie, KINRMB, DEH</td>
<td>1</td>
<td>a) Regular contact with deer farmers, fence inspections, assistance with escapes</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>4. Implement a deer monitoring program</td>
<td>Estimate distribution and relative or absolute density of deer with the collection and collation of population information</td>
<td>KINRMB, KINRMB, KINRMB, KINRMB, KINRMB</td>
<td>1</td>
<td>a) Methodology developed for relative density</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>2</td>
<td></td>
</tr>
<tr>
<td>5. Collect information on movements, habitat use and group dynamics of deer</td>
<td>Movements, habitat use &amp; social structure of deer determined</td>
<td>Clark McGhie, KINRMB, DEH</td>
<td>1</td>
<td>a) Field observations to determine group size, tracks and habitat use by C. McGhie and KINRMB Officers (Feb)</td>
</tr>
</tbody>
</table>
| 6. The development of effective destruction techniques | Integrated action plan developed and implemented | KINRMB, DEH, IACRC | 1 | c) 10 deer radio-collared to determine movements and to act as possible Judas animals (preferably sterilized)  
d) Collect information on winter movements (July-Sep 06)  
e) Collect information on spring movements (Oct-Dec 2006)  
f) Collect information on summer movements (Jan-March 07)  
g) Collect information on autumn movements (April-June 07)  
h) Report on movements, habitat use and social structure of deer |
|-------------------------------------------------------------|--------------------------------------------------|-------------------|---|----------------------------------------------------------|
|                                                             |                                                   |                   |   | a) Pre-control population size estimated  
b) Discussions with local hunters for co-operative approach trialing the buck first strategy  
c) Assessment of the value of capture pens, feeders and attracters  
d) Identification of strategic hunting possibilities  
e) Assessment of potential to use Judas animals for eradication on KI  
f) Assessment of the value of incentives for control  
g) Initial collection of population information from destroyed animals  
h) Trial spotlight shooting at night  
i) Trial control through daylight stalking  
j) Develop destruction plan  
k) Implement destruction plan  
l) Costings developed  
m) Strategy reassessed & implemented |
| 7. Develop predictive models of population size & growth under different management scenarios | Population model  
Predictive capability of management actions | KINRMB, McGhie | 1 | a) Population parameters collected: population size, age structure, reproductive rate, sex ratio, death rate, rate of increase  
b) Development of a population model  
c) Predictions of population size under different management regimes  
d) Report written |
|                                                             |                                                   |                   |   | a) Cost of each control action determined  
b) Report on cost of control |
| 9. Identify group dynamics through genetic analysis of deer sub-populations | Report on the genetic variation in the population of KI | IA CRC student project | 2 | a) Collect genetic samples  
b) Analysis conducted  
c) Report written |