THREAT ABATEMENT PLAN
for competition and land degradation by rabbits

2008

Department of the Environment, Water, Heritage
and the Arts

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Assistant Secretary
Biodiversity Conservation Branch
Department of the Environment, Water, Heritage
and the Arts
GPO Box 787
Canberra ACT 2601

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1 Introduction

This threat abatement plan (TAP) establishes a national framework to guide and coordinate Australia's response to the impacts of rabbits on biodiversity. It identifies the research, management and other actions needed to ensure the long-term maintenance of native species and ecological communities affected by competition and land degradation caused by rabbits. It replaces the threat abatement plan for feral rabbits published in 1999 (EA 1999a).

This plan should be read in conjunction with the publication *Background document for the threat abatement plan for competition and land degradation by rabbits* (DEWHA 2008). The background document provides information on rabbit characteristics, biology and distribution; impacts on environmental, economic, social and cultural values; and current management practices and measures.

1.1 Threat abatement plans

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Australian Government develops TAPs and facilitates their implementation. To progress the main strategic development actions, the Department of the Environment, Water, Heritage and the Arts (DEWHA) assesses the potential for partnerships and co-investment with other government agencies, industry and other stakeholders. An important part of implementation of the TAP is ensuring that knowledge of improved abatement methods is disseminated to potential users.

Mitigating the threat of invasive species is a matter of developing, applying and integrating a number of control methods, not relying on one method. It also requires understanding and addressing social and economic factors; for example, through supporting the efforts of private landholders and leaseholders to manage invasive species on their lands for biodiversity conservation and primary production. In addition, research and development programs for controlling pest species need to integrate the interests of both primary production and environmental conservation.

Regional natural resource management plans and site-based plans provide the best scale and context for developing operational plans to control invasive species. They allow primary production and environmental considerations to be jointly addressed, and control to be integrated across the local priority vertebrate pests within the scope of other natural resource management priorities.

The national coordination of pest animal control activities occurs under the Australian Pest Animal Strategy, released in 2007 by the Natural Resource Management and Primary Industries Ministerial councils. The Vertebrate Pests Committee, comprising representatives from all Australian, state and teritory governments, has responsibility for implementation of the strategy. This TAP provides guidance for the management of rabbits within that broader context.

1.2 Threat abatement plan for rabbits

1.2.1 The threat

The European rabbit (*Oryctolagus cuniculus*) was deliberately released on the Australian mainland in the mid to late 1800s, and is now widely distributed over a large part of the Australian mainland, in Tasmania and on many offshore islands. Rabbits are well adapted to climatic conditions in much of Australia and occur in all states and territories. Rabbits, along with foxes and cats, are considered to be Australia's most serious vertebrate pests; rabbits are the country's most abundant small mammal (with the possible exception of the introduced house mouse) and severely affect native flora and fauna, vegetation communities, landforms, geomorphic processes and sensitive sites, as well as primary industries. This situation continues despite the availability and application of chemical and physical control methods, and the release of the biological control agents myxomatosis and rabbit haemorrhagic disease (RHD).

Competition and land degradation by feral rabbits are listed as a key threatening process under the EPBC Act and pose a threat to a large number of native species (see Appendix A), although impacts from rabbits are not restricted to these species.

1.2.2 The impacts

Rabbits have a number of characteristics that help to explain their invasiveness and the magnitude of their impact. For example, their warrens protect them from predators and climatic extremes. Other attributes include their extreme fecundity and their ability to colonise a wide range of habitats.

Rabbits have direct impacts on native flora and fauna; for example, by grazing on native vegetation and thus preventing regeneration, and by competing with native fauna for food and shelter. They also have indirect and secondary effects, such as supporting populations of introduced cats and foxes, denuding vegetation and thereby exposing fauna species (e.g. burrowing petrels) to increased predation, and digging and browsing leading to a loss of vegetation cover and consequent slope instability and soil erosion.

1.2.3 Managing the threat

As rabbits are so widely established in Australia, the focus of management is generally on abating their impacts rather than prevention or eradication. However, eradication may be achievable in isolated areas such as small reserves and offshore islands; for example, a program for the eradication of rabbits and rodents from Macquarie Island has been initiated. In many areas, such as the rangelands, rabbit control is heavily dependent on biocontrol. Sustained control of rabbits is feasible and has been achieved in some large areas using integrated control that combines well-planned, timely poisoning, warren ripping and warren fumigation, after rabbits have been reduced by drought or disease (Cooke 1993). Control efforts should be targeted to protect sites where rabbits pose the greatest threat to biodiversity. At these sites, rabbit populations must be suppressed and managed.

Interactions between pest species mean that control of rabbits can have effects on other invasive animals, such as foxes and cats. For example, a study in inland Australia found that cat and fox numbers fell after a major reduction in rabbit numbers caused by RHD (Bowen and Read 1998). Similarly, monitoring of sites across Australia for two years after the release of RHD found some recovery of native vegetation had occurred at most sites (Sandell and Start 1999). In contrast, eradication of cats from some islands has led to

an increase in the rabbit population, resulting in extreme environmental damage.[1]

Progress in rabbit control must be monitored to ensure that objectives are met, and to allow management options to be adapted to changing circumstances. Best-practice management of rabbits must involve reduction of the threat not only to targeted threatened species, but also to all native plant and animal species that may be affected by rabbit competition and land degradation.

1.2.4 The review of the 1999 TAP

In accordance with the requirements of the EBPC Act, the original TAP for feral rabbits (EA 1999a) was reviewed in 2004–05 by the Bureau of Rural Sciences (BRS) (Hart 2005) as part of a broader review encompassing the TAPs for foxes (EA 1999b), cats (EA 1999c) and goats (EA 1999d).

The BRS review found that it was difficult to accurately determine the extent to which the TAPs had reduced the impacts of rabbits on biodiversity. This reflects the current paucity of nationally consistent data on the ranges and densities of rabbits and their impacts, and the difficulties of linking outcomes in population changes to the outputs of the rabbit TAP. The invasive species indicator data to be produced under the National Monitoring and Evaluation Framework (NRMMC 2003) should improve the availability of continental overview data over the next year or so.

The BRS surveyed a broad range of stakeholders and assessed a range of projects commissioned by the Department of the Environment and Heritage (now the Department of the Environment, Water, Heritage and the Arts) that were developed under the auspices of the existing TAPs. This has helped to identify actions that will need to be initiated or continued into the future. The review concluded, however, that the rabbit-related projects that were assessed had positively contributed to reducing the impacts of rabbits. Furthermore, projects have addressed specific pest control needs in high-priority locations. Of the 26 actions in the 1999 TAP for rabbits, many were targeted by at least one project, and almost half the rabbit actions had been fully completed through one or more projects. The general breakdown of project types fell into the categories of research and development, on-ground control and a small number of extension projects.

The BRS review proposed a number of changes to the actions in the original TAP, but recommended that the objectives remain substantially unchanged. The review suggested that the implementation of the revised rabbit TAP should give priority to improved national engagement, integrated pest animal control, flexibility in implementation, setting priorities for research, follow-through with research and development, and establishment of a new advisory panel for vertebrate TAPs. The review also recommended that the revised plan include measures to enhance existing processes through, for example, regional processes, control and monitoring techniques that support on-ground management, and monitoring of key projects according to national protocols.

This document replaces the 1999 TAP. It incorporates the knowledge gained in the intervening years and has been modified in line with recommendations from the review. The TAP aims to guide the responsible use of public resources and the best outcome for native species and ecological communities threatened by competition and land degradation caused by rabbits. The plan seeks to achieve these outcomes by recognising the opportunities and limitations that exist, and ensuring that field experience and research are used to further improve management of rabbits. The activities and priorities under the TAP will need to adapt to changes as they occur.

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[1] See, for example, http://www.parks.tas.gov.au/factsheets/parks_and_places/MacquarieIslandRabbits.pdf

1.2.5 Involvement of stakeholders

The successful implementation of this TAP will depend on a high level of cooperation between landholders, community groups, local government, state and territory conservation and pest management agencies, and the Australian Government and its agencies. Success will depend on all participants assessing rabbit impact and allocating adequate resources to achieve effective on-ground control of rabbits at critical sites, improve the effectiveness of control programs, and measure and assess outcomes. Various programs in natural resource management, at national, state and regional levels, can make significant contributions to implementing the plan.

Objectives and actions

The goal of this TAP is to minimise the impact of rabbit competition and land degradation on biodiversity in Australia and its territories by:

- protecting affected native species, broadscale vegetation and ecological communities, and
- preventing further species and ecological communities from becoming threatened.

To achieve this goal, the plan has five main objectives, developed through the review of the previous TAP (Hart 2005) and consultation with experts. These objectives are to:

1. prevent rabbits from occupying new areas in Australia and eradicate rabbits from high- conservation-value 'islands'
2. promote the maintenance and recovery of native species and ecological communities that are affected by rabbit competition and land degradation
3. improve knowledge and understanding of rabbit impacts and interactions with other species and other ecological processes
4. improve the effectiveness, target specificity, integration and humaneness of control options for rabbits, and
5. increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control and manage rabbits.

Each objective is accompanied by a set of actions, which, when implemented, will help to achieve the goal of the plan. Performance indicators have been established for each objective. Progress will be assessed by determining the extent to which the performance indicators have been met.

The sections below provide background on each objective, followed by a table listing the actions required to meet the objective. Fifteen actions have been developed to meet the five objectives.

Priorities for each action are given in the tables below, categorised as 'very high', 'high' or 'medium'. Also, each action has been assigned a timeframe within which the outcome could be achieved once the action has commenced. Timeframes are categorised as short term (i.e. within three years), medium term (i.e. within three to five years) or long term (i.e. five years or beyond).

☐ **Objective 1**

Prevent rabbits from occupying new areas in Australia and eradicate rabbits from high-conservation-value 'islands'

Key actions for Objective 1 include identifying 'islands' of high conservation value, ranking the risk to such areas posed by rabbits, and developing and implementing management plans to protect such areas from rabbit damage. The actions are designed to prevent rabbits from extending their range in Australia and to remove them from high-conservation-value 'islands' if eradication is feasible. An important activity in achieving this is to monitor rabbit distribution at the edge of their current extent. The actions focus on offshore islands and on mainland 'islands' that are isolated or currently do not have rabbits but may become potential habitats due to factors such as climate change. An example of a mainland 'island' is the Darling Downs Rabbit Board protection area in southeast Queensland. Most of these actions are of high to very high priority. DEWHA is establishing a national database of introduced animals across Australian offshore islands

that will complement this work.

Action 1.1 focuses on collating data on conservation values of 'island' areas, the likelihood of significant biodiversity impacts from rabbits, and the risk that colonisation by rabbits will become a threat in these areas.

Action 1.2 involves developing contingency plans for monitoring, preventing and, if an incursion occurs, containing and eradicating rabbits in areas with high conservation values. Assessment of invasion risk by rabbits should use population genetic approaches to identify past invasion routes. Action 1.3 implements these contingency plans. Action 1.4 involves eradicating established populations of rabbits from those 'islands' considered of high conservation value, depending on feasibility and cost-effectiveness of eradication. These actions cannot be implemented until Action 3.1 is complete. All planning and implementation work needs to recognise that rabbits are one of many pests facing land managers and therefore should be undertaken within the context of integrated management activities.

Performance indicators

- No further establishments of rabbits on offshore islands or in other rabbit-free areas.
- Successful eradication of isolated populations of rabbits where this is attempted.
- Increased populations of affected native species in areas from which rabbits, and other invasive species, have been eradicated.

Action	Priority and timeframe
1.1 Collate data on all islands and on isolated mainland 'islands', assess their conservation value, the likelihood of significant biodiversity impacts from rabbits and, if there are no rabbits present, rank the level of risk of rabbits being introduced and establishing populations.	High priority, short term
1.2 Develop management plans to prevent, monitor and, if incursions occur, contain and eradicate any rabbit incursion, for 'islands' with high conservation values and into potential new habitats with high conservation values.	Medium priority, medium term
1.3 Implement management plans for high-conservation-value 'islands', including prevention and monitoring actions, and containment or eradication actions if incursions occur.	Very high priority, medium term
1.4 Eradicate established populations of rabbits from 'islands' with high conservation values where this is cost-effective, feasible and a high conservation priority.	Very high priority, medium–long term

☐ **Objective 2**

Promote the maintenance and recovery of native species and ecological communities that are affected by rabbit competition and land degradation

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Key actions for Objective 2 include identifying priority areas for rabbit control, implementing and supporting regional control programs, and applying incentives for promoting and maintaining control programs in areas adjacent to priority areas. Actions 2.1–2.3 focus programs in rabbit control on the maintenance and recovery of native species and ecological communities affected by rabbit competition and land degradation. Actions 2.1 and 2.2 are of very high priority and will have to be ongoing for the foreseeable future.

Broadscale eradication of rabbits from Australia is not feasible using the methods and resources currently available, although integrated control methods have been effective on a relatively large scale; for example, the Bounceback program in South Australia. Abatement of the damage that rabbits cause must initially be undertaken in discrete, manageable areas. These are selected based on scientific evidence of the significance of the population of native species or the ecological community being damaged, and the importance of rabbit damage relative to other processes such as livestock grazing. In addition, cost–benefit analyses of control programs, which cannot focus solely on environmental gains, must be considered. These activities are covered by Action 2.1. Identification of priority areas can involve mapping the distributions of susceptible species, high-risk habitats and rabbits to produce a national overview of priority regions (e.g. using the approach outlined in Dickman [1996] and NSW NPWS [2001]).

Once priority areas have been identified, the next step is to implement regional control programs and support existing control programs, as described in Action 2.2. Organisations implementing control programs will be encouraged to focus on areas where rabbit control will help to reduce the threat to native species. The success of control programs should be monitored, applying national monitoring protocols as soon as these are available (see Action 3.1).

It is important to promote the control of rabbits in both priority areas and adjacent areas to prevent immediate reinvasion. Action 2.3 focuses on incentives for such actions on private and leasehold lands.

Performance indicators

- Priority areas, where rabbit control is to protect important affected flora and fauna, have been identified and are a focus for rabbit control programs.
- Rabbit control work involves pre and post-control monitoring of rabbit populations and key native species, according to national protocols, to measure the outcome of control operations.

Action	Priority and timeframe
2.1 Identify priority areas for rabbit control based on: • the significance of the regional population of the affected native species or of the ecological community • the degree of threat posed by rabbits to species and ecological communities relative to other threats • the cost-effectiveness of maintaining rabbit populations below an identified ‘damage threshold’ in the region • the feasibility of effective remedial action, and • the possibility of eradicating the rabbit population.	Very high priority, medium term
2.2 Conduct and monitor regional rabbit control, through new or existing	Very high priority, long term

programs, in priority areas identified in Action 2.1.	
2.3 Apply existing and new incentives to promote and maintain on-ground rabbit control on private or leasehold lands within or adjacent to priority sites identified in Action 2.1.	Medium priority, medium term

☐ Objective 3

Improve knowledge and understanding of rabbit impacts and interactions with other species and other ecological processes

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Key actions for Objective 3 focus on ensuring rabbit control does not lead to unintended effects, through better understanding of the impacts of rabbits and their interactions with other species. The actions include development of simple, cost-effective methods for monitoring impacts; improving knowledge of interactions between rabbits and wild cats, foxes and wild dogs; and identifying unintended effects of broadscale rabbit control, including the possible increase of weeds or undesirable plants once the rabbit grazing is reduced. These actions are of high to very high priority and most could be achieved within the next three to five years, although some will require a long-term commitment. A range of available genetic marker analyses may be useful to this work in improving understanding and management of rabbits. These techniques can be used, for example, to identify likely invasion routes and monitor population dynamics.

To determine the effectiveness of rabbit control programs, Action 3.1 is to develop simple, cost-effective methods for monitoring rabbit populations, and the impact of this invasive species on affected species and ecological processes relative to other kinds of impact. Monitoring methods need to be reliable for different densities of both rabbits and the native species with which they compete or which they deprive of resources. Areas for investigation include the feasibility and practicality of individual identification by genotyping scats or hairs, to help estimate abundance, particularly at low densities. This action is very high priority.

Interactions between rabbits and other species need to be considered when undertaking control programs. Action 3.2 is to investigate interactions between rabbits, feral cats, foxes and wild dogs so that control activities for these four species can be more effectively integrated (e.g. certain fences used to exclude rabbits can also exclude other pest species).

Action 3.3 is to identify any unintended effects that rabbit control may have if it is not integrated with other management activities, such as weed control. These unintended effects could include weed outbreaks, ‘prey-switching’ or a decline in prey for native predators.

Performance indicators

- Reliable rabbit monitoring techniques have been developed.
- Integration of control methods for rabbits, other pests and weed species are improved.
- The unintended effects of rabbit control are minimised.

Action	Priority and timeframe
3.1 Develop simple and cost-effective methods for monitoring rabbit populations and the impacts of rabbits relative to other kinds of impact.	Very high priority, short term
3.2 Identify the importance of rabbits for maintaining feral cat, fox and wild dog numbers, and the potential effects of the removal of predators, so that control of these species can be integrated to minimise risks to native species.	High priority, medium term
3.3 Identify any unintended effects that rabbit control may have if conducted in isolation from other management activities.	High priority, medium term

☐ Objective 4

Improve the effectiveness, target specificity, integration and humaneness of rabbit control options

Key actions for Objective 4 include: increasing the integration of available control options such as the use of baits, warren destruction and fumigation; training land managers to make the best use of control methods; and increasing the adoption of standard control methods. Actions 4.1–4.4 focus on increasing the effectiveness of rabbit control through better use of existing techniques and the development of new techniques, including those for monitoring success of control in the field. These actions are of medium or high priority, and most will require a long-term commitment.

Poisoning, warren ripping and warren fumigation can be used in combination (although not at the same time) to control rabbits effectively. Action 4.1 is to support research to ensure these management options are effective, target specific and humane. For example, a more humane alternative to the fumigant chloropicrin is required. An alternative to chloropicrin may be supported by industry on occupational health and safety grounds as operators must be trained to use it safely.

To improve the effectiveness of control programs, Action 4.2 is to develop training programs to help land managers to evaluate and adopt eradication or control methods appropriate for local conditions, and determine in what circumstances and times they should be used. This is important because of the lack of skills in this area, especially as many younger land managers have not yet experienced high rabbit numbers due to the success of RHD. Encouraging adoption of new and appropriate control methods by managers should reduce impacts on non-target species, and the likelihood that rabbits will develop genetic and behavioural resistance to toxins and baits.

Action 4.3 is to research ways of maximising the effectiveness of biocontrols such as myxomatosis, RHD and immunocontraception through integration with other control methods, and investigate potential new biocontrol agents. Initial emphasis should be on increasing the effectiveness of RHD in high-rainfall areas.

To ensure that rabbit management follows best practice, Action 4.4 is to continue to promote the adoption and adaptation of the relevant model codes of practice and standard operating procedures for the effective and humane management of rabbits. This includes their recognition as a reference under the National Competency Standards for Vertebrate Pest Management (NTIS 2007).

Performance indicators

- Maximised effectiveness of RHD and integrated use with other biological control agents and conventional control options.
- Widespread use of improved rabbit baiting tools and methods.
- Increased adoption and adaptation of the model codes of practice and standard operating procedures for humane management of rabbits, including their recognition as a reference under the National Competency Standards for Vertebrate Pest Management.

Action	Priority and timeframe
4.1 Enhance current methods for poisoning, warren ripping and warren fumigation to ensure they are effective, target specific and humane, and develop alternatives as required.	High priority, long term
4.2 Develop programs to help land managers adopt locally appropriate control methods, including a process to prioritise warren ripping areas in the rangelands.	Medium priority, short term
4.3 Conduct research to maximise the effectiveness of existing biocontrols, and investigate new biocontrols.	High priority, long term
4.4 Continue to promote the adoption of the model codes of practice and standard operating procedures for effective and humane management of rabbits.	Medium priority, long term

☐ **Objective 5**

Increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control and manage rabbits

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Action 5.1 focuses on ensuring that the TAP actions are better communicated to interested parties by preparing and distributing extension materials. The extension materials will help to promote knowledge and understanding of the 14 actions listed in Objectives 1–4, of the techniques used in rabbit control, and why competition and land degradation by rabbits are listed as a key threatening process. This action has a high priority and will require a long-term commitment.

Performance indicators

- Widespread use of current best-practice techniques in rabbit control.
- Increased awareness of the threat posed by rabbits.
- Increased awareness of the TAP actions and objectives.

Action	Priority and timeframe
5.1 Promote: • broad understanding of the threat to biodiversity posed by rabbits and support for their control • support for the actions to be undertaken under this plan • the use of humane and cost-effective rabbit control methods • best-practice effective rabbit control in all tenures, and • understanding of competition and land degradation by rabbits as a key threatening process.	High priority, long term

3 Duration, cost, implementation and evaluation of the plan

3.1 Duration and cost of the plan

This plan reflects the fact that the threat abatement process is likely to be ongoing, as there is no likelihood of nationally eradicating all rabbits in the wild in the foreseeable future. In general, most current rabbit control programs aim for long-term suppression of rabbit populations, and a reduction in damage to the environment and production in the most cost-efficient manner (Williams et al. 1995).

Investment in many of the TAP actions will be determined by the level of resources that stakeholders commit to management of the problem. The total cost of implementation therefore cannot be quantified at the time of writing. Figures for the amount spent on rabbit control are, to varying degrees, available from states and territories. For example, in New South Wales, funding for operational programs for rabbit control was $84 000 in 2000–01 and $108 000 in 2001–02 (English and Chapple 2002). The total labour cost for rabbit control in Australia over the period 1998–2003 was estimated at between $0.8 million and $1.4 million (Reddiex and Forsyth 2004, Reddiex et al. 2004). However, these figures are low because they were collected in the period when RHD was having its greatest impact. A significant increase in rabbit numbers is inevitable as rabbit populations begin to recover over wide areas as a result of such factors as a decrease in the effectiveness of RHD (B Cooke, Invasive Animals Cooperative Research Centre, pers comm, January 2007).

This TAP provides a framework for undertaking targeted priority actions. Budgetary and other constraints may affect the achievement of the objectives of this plan, and as knowledge changes, proposed actions may be modified over the life of the plan. Australian Government funds may be available to implement key national environmental priorities, such as relevant actions listed in this plan and actions identified in regional natural resource management plans.

3.2 Implementing the plan

DEWHA will work with other Australian Government agencies, state and territory governments and national and regional industry and community groups, to facilitate the implementation of the plan. There are many different stakeholder interests and perspectives to take into account in managing rabbits. For example, Indigenous communities' views need to be fully considered. It will be important to consult and involve the range of stakeholders in implementing the actions in this plan. Greater integration between agricultural/pastoral and other control efforts will be encouraged.

The Australian Government will implement the plan as it applies to Commonwealth land.

DEWHA will support a TAP implementation team to assist and advise on the implementation of the plan. The team will draw on expertise in vertebrate pest management from state and territory agencies, and non-government organisations.

This TAP will operate under the overarching framework of the Australian Biosecurity System for Primary Production and the Environment (AusBIOSEC) and in the context of the Australian Pest Animal Strategy, both of which aim to reduce the impacts of invasive species on native species and ecosystems.

3.3 Evaluating implementation

of the plan

It will be difficult to assess directly the effectiveness of the plan in abating the impacts of rabbits on Australia's biodiversity. However, the Natural Resource Management Monitoring and Evaluation Framework (NRMMC 2003) established a program to provide national information about resource condition on a range of biophysical matters, including threats from vertebrate species such as rabbits. As part of this work, a range of indicators will provide information on the extent of the impact of priority vertebrate species on biodiversity, as well as national trends on their distribution and abundance.

Appendix A: Species affected by rabbits

The species in the table below may be adversely affected by rabbit competition and land degradation (that is, there is scientific proof, anecdotal evidence or the potential for impact). The threatened species included are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The list is indicative and not comprehensive.

Information for species listed under the EPBC Act is available from the Species Profile and Threats Database: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
Birds	*Acanthiza iredalei iredalei*	Slender-billed thornbill (western)	Vulnerable
	Amytornis barbatus barbatus	Grey grasswren (bulloo)	Vulnerable
	Amytornis textilis modestus	Thick-billed grasswren (eastern)	Vulnerable
	Amytornis textilis myall	Thick-billed grasswren (Gawler Ranges)	Vulnerable
	Cacatua pastinator pastinator	Muir's corella (southern), western long-billed corella (southern)	Vulnerable
	Calyptorhynchus lathami halmaturinus	Glossy black-cockatoo (South Australian), glossy black-cockatoo (Kangaroo Island)	Endangered
	Diomedea exulans	Wandering albatross	Vulnerable
	Geophaps scripta scripta	Squatter pigeon (southern)	Vulnerable
	Halobaena caerulea	Blue petrel	Vulnerable
	Leipoa ocellata	Malleefowl	Vulnerable
	Neophema chrysogaster	Orange-bellied parrot	Critically endangered
	Pachyptila turtur subantarctica	Fairy prion (southern), fairy prion (Macquarie Island)	Vulnerable

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Pedionomus torquatus	Plains-wanderer	Vulnerable
Birds (continued)	*Pezoporus occidentalis*	Night parrot	Endangered
	Poephila cincta cincta	Black-throated finch (southern)	Endangered
	Polytelis alexandrae	Princess parrot, Alexandra's parrot	Vulnerable
	Pterodroma mollis	Soft-plumaged petrel	Vulnerable
	Pterodroma neglecta neglecta	Kermadec petrel (western)	Vulnerable
	Xanthomyza phrygia	Regent honeyeater	Endangered
Mammals	*Burramys parvus*	Mountain pygmy-possum	Endangered
	Dasycercus byrnei	Kowari	Vulnerable
	Dasycercus cristicauda	Mulgara	Vulnerable
	Dasycercus hillieri	Ampurta	Endangered
	Lagorchestes hirsutus unnamed subsp.	Mala, rufous hare-wallaby (central mainland form)	Endangered
	Macrotis lagotis	Greater bilby	Vulnerable
	Notomys fuscus	Dusky hopping-mouse, wilkiniti	Vulnerable
	Perameles gunnii unnamed subsp.	Eastern barred bandicoot (mainland)	Endangered
	Petrogale lateralis lateralis	Black-flanked rock-wallaby	Vulnerable
	Petrogale lateralis MacDonnell Ranges race	Warru, black-footed rock-wallaby	Vulnerable

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Petrogale penicillata	Brush-tailed rock-wallaby	Vulnerable
	Petrogale xanthopus xanthopus	Yellow-footed rock-wallaby (SA and NSW)	Vulnerable
	Pseudomys australis	Plains rat	Vulnerable
Reptiles	*Ophidiocephalus taeniatus*	Bronzeback snake-lizard	Vulnerable
	Tympanocryptis pinguicolla (listed as *Tympanocryptis lineata pinguicolla*)	Grassland earless dragon	Endangered
Insects	*Synemon plana*	Golden sun moth	Critically endangered
Plants	*Abutilon julianae*	Norfolk Island abutilon	Critically endangered
	Acacia araneosa	Spidery wattle, Balcanoona wattle	Vulnerable
	Acacia awestoniana	Stirling Range wattle	Vulnerable
	Acacia carneorum	Needle wattle, dead finish, purple-wood wattle	Vulnerable
	Acacia cretacea	Chalky wattle	Endangered
	Acacia enterocarpa	Jumping-jack wattle	Endangered
	Acacia glandulicarpa	Hairy-pod wattle	Vulnerable
	Acacia insolita subsp. *recurva*	Yornaning wattle	Endangered
	Acacia latzii	Latz's wattle	Vulnerable
	Acacia peuce	Waddy, waddi, waddy-wood, Birdsville wattle	Vulnerable

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Acacia pickardii		Vulnerable
	Acacia rhamphophylla	Kundip wattle	Endangered
	Acacia rhetinocarpa	Neat wattle, resin wattle (SA)	Vulnerable
	Acacia subflexuosa subsp. *capillata*		Endangered
	Achyranthes margaretarum		Critically endangered
	Arachnorchis amoena (listed as *Caladenia amoena*)	Charming spider-orchid	Endangered
	Arachnorchis argocalla (listed as *Caladenia argocalla*)	White-beauty spider-orchid	Endangered
	Arachnorchis audasii	McIvor spider-orchid, Audas spider-orchid	Endangered
	Arachnorchis busselliana (listed as *Caladenia busselliana*)	Bussell's spider-orchid	Endangered
	Arachnorchis concolor	Crimson spider-orchid, maroon spider-orchid	Vulnerable
	Arachnorchis conferta	Coast spider-orchid	Endangered
	Arachnorchis formosa (listed as *Caladenia formosa*)	Elegant spider-orchid, blood-red spider-orchid	Vulnerable
Plants (continued)	*Arachnorchis gladiolata* (listed as *Caladenia gladiolata*)	Bayonet spider-orchid, clubbed spider-orchid	Endangered
	Arachnorchis lowanensis (listed as *Caladenia lowanensis*)	Wimmera spider-orchid	Endangered

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Arachnorchis macroclavia	Large-club spider-orchid	Endangered
	Arachnorchis robinsonii (listed as *Caladenia robinsonii*)	Frankston spider-orchid	Endangered
	Arachnorchis rosella (listed as *Caladenia rosella*)	Rosella spider-orchid, little pink spider-orchid	Endangered
	Arachnorchis tensa (listed as *Caladenia tensa*)	Greencomb spider-orchid, rigid spider-orchid	Endangered
	Arachnorchis thysanochila (listed as *Caladenia thysanochila*)	Fringed spider-orchid	Endangered
	Arachnorchis versicolor (listed as *Caladenia versicolor*)	Candy spider-orchid	Vulnerable
	Arachnorchis xanthochila (listed as *Caladenia xanthochila*)	Yellow-lip spider-orchid	Endangered
	Asterolasia nivea	Bindoon starbush	Vulnerable
	Austrostipa nullanulla	Club spear-grass	Vulnerable
	Ballantinia antipoda	Southern shepherd's purse	Endangered
	Banksia cuneata	Matchstick banksia, Quairading banksia	Endangered
	Banksia oligantha	Wagin banksia	Endangered
	Barbarea australis	Native wintercress	Critically endangered
	Boronia capitata subsp. *capitata*		Endangered

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Borya mirabilis	Grampians pincushion-lily	Endangered
	Brachyscias verecundus	Ironstone brachyscias	Critically endangered
	Brachyscome muelleri		Endangered
Plants (continued)	*Caladenia bryceana* subsp. *bryceana*	Dwarf spider-orchid	Endangered
	Calectasia arnoldii	Stilted tinsel lily	Vulnerable
	Calonema wanosa		Vulnerable
	Calonemorchis elegans (listed as *Caladenia elegans*)		Endangered
	Calotis glandulosa	Mauve burr-daisy	Vulnerable
	Chamelaucium sp. Gingin (NG Marchant s.n. 4/11/1988)	Gingin wax	Endangered
	Chorizema humile	Prostrate flame pea	Endangered
	Conostylis dielsii subsp. *teres*	Irwin conostylis	Endangered
	Conostylis drummondii	Drummond's conostylis	Endangered
	Conostylis micrantha	Small-flowered conostylis	Endangered
	Conostylis rogeri	Kulin conostylis, single-flowered conostylis	Vulnerable
	Cynanchum elegans	White-flowered wax plant	Endangered
	Darwinia carnea	Mogumber bell	Endangered

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Darwinia sp. Carnamah (J Coleby-Williams 148)	Harlequin bell	Endangered
	Dichanthium setosum		Vulnerable
	Drakonorchis drakeoides	Hinged dragon orchid	Endangered
	Eremophila viscida	Varnish bush	Endangered
	Eucalyptus cadens	Warby Range swamp gum	Vulnerable
	Eucalyptus gunnii subsp. *divaricata*	Miena cider gum	Endangered
	Eucalyptus morrisbyi	Morrisbys gum	Endangered
	Frankenia parvula	Short-leaved frankenia	Endangered
	Gastrolobium lehmannii	Cranbrook pea	Vulnerable
	Grevillea althoferorum	Split-leaved grevillea	Endangered
	Grevillea curviloba subsp. *incurva*	Narrow curved-leaf grevillea	Endangered
Plants (continued)	*Grevillea maccutcheonii*		Endangered
	Grevillea scapigera	Corrigin grevillea	Endangered
	Gyrostemon reticulatus	Net-veined gyrostemon	Critically endangered
	Hakea aculeata	Column hakea	Vulnerable
	Hakea maconochieana		Vulnerable
	Hakea pulvinifera		Endangered

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Hemiandra gardneri	Red snakebush	Endangered
	Lepidium aschersonii	Spiny pepper-cress	Vulnerable
	Lepidium hyssopifolium	Basalt pepper-cress	Endangered
	Lepidium monoplocoides	Winged pepper-cress	Endangered
	Lepidium peregrinum		Endangered
	Minuria tridens	Minnie daisy	Vulnerable
	Oligochaetochilus despectans (listed as *Pterostylis despectans*)	Lowly greenhood	Endangered
	Philotheca basistyla	White-flowered philotheca	Endangered
	Pomaderris subplicata	Concave pomaderris	Vulnerable
	Prasophyllum correctum	Gaping leek-orchid	Endangered
	Prasophyllum frenchii	Maroon leek-orchid, slaty leek-orchid, stout leek-orchid, French's leek-orchid	Endangered
	Prasophyllum goldsackii	Goldsack's leek-orchid	Endangered
	Prasophyllum morganii	Mignonette leek-orchid, Cobungra leek-orchid, dense leek-orchid	Vulnerable
	Prasophyllum pallidum	Pale leek-orchid	Vulnerable
	Prasophyllum subbisectum	Pomonal leek-orchid	Endangered
	Prostanthera calycina		Vulnerable
	Prostanthera eurybioides	Monarto mintbush	Endangered

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Pterostylis arenicola	Sandhill greenhood orchid	Vulnerable
Plants (continued)	*Pterostylis basaltica*	Basalt greenhood	Endangered
	Pterostylis bryophila	Hindmarsh Valley greenhood	Critically endangered
	Pterostylis cheraphila	Floodplain rustyhood	Vulnerable
	Pterostylis gibbosa	Illawarra greenhood, rufa greenhood, pouched greenhood	Endangered
	Pterostylis sp. (Northampton) (SD Hopper 3349)	Northampton midget greenhood	Endangered
	Pterostylis sp. Halbury (R Bates 8425)	Halbury greenhood	Endangered
	Pterostylis sp. Hale (R Bates 21725)	Hale dwarf greenhood	Endangered
	Pterostylis xerophila	Desert greenhood	Vulnerable
	Ptilotus beckerianus		Vulnerable
	Ptilotus fasciculatus	Fitzgerald's mulla-mulla	Endangered
	Ranunculus anemoneus	Anemone buttercup	Vulnerable
	Rulingia sp. Trigwell Bridge (R Smith s.n. 20/6/1989)	Trigwell's rulingia	Endangered
	Rutidosis heterogama		Vulnerable
	Senecio garlandii		Vulnerable
	Senecio macrocarpus	Large-fruit fireweed, large-fruit groundsel	Vulnerable

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Senecio megaglossus	Superb groundsel	Vulnerable
	Stachystemon nematophorus	Three-flowered stachystemon	Vulnerable
	Stackhousia annua	Annual stackhousia, annual candles	Vulnerable
	Swainsona murrayana	Slender Darling-pea, slender swainson, Murray swainson-pea	Vulnerable
	Swainsona pyrophila	Yellow swainson-pea	Vulnerable
	Synaphea quartzitica	Quartz-loving synaphea	Endangered
	Tetratheca deltoidea	Granite tetratheca	Endangered
Plants (continued)	*Tetratheca gunnii*	Shy Susan	Critically endangered
	Thelymitra epipactoides	Metallic sun-orchid	Endangered
	Thelymitra mackibbinii	Brilliant sun-orchid	Vulnerable
	Thomasia glabripetala	Sandplain thomasia	Vulnerable
	Tribonanthes purpurea	Granite pink	Vulnerable
	Verticordia fimbrilepis subsp. *fimbrilepis*	Shy featherflower	Endangered
	Verticordia spicata subsp. *squamosa*	Scaley-leaved featherflower, scaly-leaved featherflower	Endangered
	Verticordia staminosa var. *cylindracea* (listed as *Verticordia staminosa* subsp. *cylindracea* var. *cylindracea*)	Granite featherflower	Endangered

Type/category	Scientific name	Common name	Current status
Listed threatened species that may be adversely affected			
	Verticordia staminosa subsp. *staminosa*		Endangered
	Westringia crassifolia	Whipstick westringia	Endangered
Unlisted species or taxa that could be adversely affected			
Plants	*Cullen parvum*	Small scurf-pea	
	Hemigenia exilis		
	Huperzia australiana		
	Menkea draboides		
	Nematoceras dienemum		
	Nematoceras sulcatum		
	Phlegmatospermum drummondii	Drummond's phlegmatospermum	
	Poa cookii		
	Polystichum vestitum		
	Triodia bromoides		
Listed critical habitat			
Diomedea exulans (Wandering albatross) — Macquarie Island			

Glossary

Biocontrol	Control of pests by disrupting their ecological status through the use of organisms that are natural predators, parasites or pathogens.
Critically endangered	Under the EPBC Act, a native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	Under the EPBC Act, a native species is eligible to be included in the endangered category at a particular time if, at that time, (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Fecundity	Potential rate at which an organism reproduces.
Feral	An introduced animal, formerly in domestication, with an established, self-supporting population in the wild.
Genotyping	The process of determining the genotype (i.e. the genetic makeup) of an individual with a biological assay.
Invasive species	A species occurring as a result of human activities beyond its accepted normal distribution and which threatens valued environmental, agricultural or personal resources by the damage it causes (Beeton et al. 2006).
Key threatening process	Under the EPBC Act, a process that threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community.
Myxomatosis	A disease caused by the myxoma virus that was introduced to Australia as a biological control agent for rabbits. The disease is effective in reducing rabbit populations in areas of moderate and high rainfall (Williams et al. 1995).
Performance indicator	A criterion or measure that provides information on the extent to which a policy, program or initiative is achieving its outcomes.
Pest animal or species	Any non-human species of animal that causes trouble locally, or over a wide area, to one or more persons, either by being a health hazard or a general nuisance, or by causing damage to agriculture, wild ecosystems or natural resources.
Rabbit haemorrhagic disease	A viral disease exotic to Australia that causes high death rates in rabbits. Also called rabbit calicivirus disease (Williams et al. 1995).
Threat abatement plan	Under the EPBC Act, a plan providing for the research, management, and any other actions necessary to reduce the impact of a listed key threatening process on affected species and ecological communities.
Threatened species	A species under the EPBC Act listed as critically endangered, endangered, vulnerable or conservation dependent.
Vulnerable	Under the EPBC Act, a native species is eligible to be included in the vulnerable category at a particular time if, at that time, (a) it is not critically

endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Acronyms and abbreviations

BRS	Bureau of Rural Sciences
DEWHA	Australian Government Department of the Environment, Water, Heritage and the Arts
EPBC Act	the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
RHD	rabbit haemorrhagic disease
TAP	threat abatement plan

References

Beeton RJS, Buckley KI, Jones GJ, Morgan D, Reichelt RE and Trewin D (2006). *Australia state of the environment 2006*, independent report to the Australian Government Minister for the Environment and Heritage, Australian Government Department of the Environment and Heritage, Canberra.

Bowen ZE and Read JL (1998). Factors influencing breeding and survivorship of rabbits in the Roxby Downs region. *Wildlife Research* 25:655–662.

Cooke BD (1993). Integrated control of rabbits. In: *Australian rabbit control conference,* Cooke BD (ed), Australian Rabbit Control Conference, Adelaide, 2–3 April 1993, Anti-Rabbit Research Foundation of Australia, 14–17.

DEWHA (Department of the Environment, Water, Heritage and the Arts) (2008). *Background document for the threat abatement plan for competition and land degradation by rabbits,* DEWHA, Canberra.

Dickman CR (1996). *Overview of the impact of feral cats on Australian native fauna,* report to the Australian Nature Conservation Agency, Canberra. http://www.deh.gov.au/biodiversity/invasive/publications/cat-impacts/index.html (Accessed December 2006)

EA (Environment Australia) (1999a). *Threat abatement plan for competition and land degradation by feral rabbits,* EA, Canberra.

EA (Environment Australia) (1999b). *Threat abatement plan for predation by the European red fox,* EA, Canberra.

EA (Environment Australia) (1999c). *Threat abatement plan for predation by feral cats,* EA, Canberra.

EA (Environment Australia) (1999d). *Threat abatement plan for predation by feral goats,* EA, Canberra.

English A and Chapple R (2002). *A report on the management of feral animals,* New South Wales National Parks and Wildlife Service. http://www.nationalparks.nsw.gov.au/PDFs/english_report_pest_animal_progs_fullreport.pdf (Accessed December 2006)

Hart Q (2005). *A review of the Commonwealth Government's threat abatement plans for feral goats, feral rabbits, feral cats and the European red fox,* final report for the Australian Government Department of the Environment and Heritage, Bureau of Rural Sciences, Canberra.

NRMMC (Natural Resource Management Ministerial Council) (2003). *National natural resource management monitoring and evaluation framework.* http://www.nrm.gov.au/publications/frameworks/me-framework.html (Accessed August 2007)

NSW NPWS (New South Wales National Parks and Wildlife Service) (2001). *Threat abatement plan for predation by the red fox* (Vulpes vulpes), NSW NPWS, Hurstville.http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Predation+by+the+red+fox+-+final+threat+abatement+plan (Accessed December 2006)

NTIS (National Training Information Service) (2007). *National competency standards for vertebrate pest management* (RTD1501A, RTD4406A, RTD5402A). http://www.ntis.gov.au/Default.aspx?/TrainingPackage/RTE03/volume/RTE03_4/importedunit (Accessed November 2007)

Reddiex B and Forsyth DM (2004). *Review of existing red fox, feral cat, feral rabbit, feral pig and feral goat control in Australia. II. Information gaps,* Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Melbourne. http://www.deh.gov.au/biodiversity/invasive/publications/information-gaps/pubs/information-gaps-final.pdf (Accessed December 2004)

Reddiex B, Forsyth DM, McDonald-Madden E, Einoder LD, Griffioen PA, Chick RR and Robley AJ (2004). *Review of existing red fox, wild dog, feral cat, feral rabbit, feral pig, and feral goat control in Australia. I. Audit,* Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Melbourne. http://www.deh.gov.au/biodiversity/invasive/publications/feral-audit/summary.html (Accessed December 2006)

Sandell PR and Start AN (1999). *Rabbit calicivirus disease program report 4: implications for biodiversity in Australia,* Group RM, Bureau of Rural Sciences, Canberra.

Williams K, Parer I, Coman B, Burley J and Braysher M (1995). *Managing vertebrate pests: rabbits,* Bureau of Resource Sciences and CSIRO Division of Wildlife and Ecology, Australian Government Publishing Service, Canberra.