THREAT ABATEMENT PLAN
for predation by the European red fox

2008

Department of the Environment, Water, Heritage
and the Arts

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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 European red foxes on biodiversity. It identifies the research, management and other actions needed to ensure the long-term survival of native species and ecological communities affected by predation by European red foxes. It replaces the TAP for predation by European red foxes published in 1999 (EA 1999a).

This plan should be read in conjunction with the publication *Background document for the threat abatement plan for predation by the European red fox* (DEWHA 2008). The background document provides information on fox 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 not simply a matter of providing better technical solutions, such as improved baits for pest animal control. It also involves 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 vertebrate 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 for controlling 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 territory governments, has responsibility for implementation of the strategy. This TAP provides guidance for management of foxes within that broader context.

1.2 Threat abatement plan for the European red fox

1.2.1 The threat

The European red fox (*Vulpes vulpes*) was first brought to Australia by English settlers in the 19th century (Rolls 1984), and by the 1870s fox populations had become established in the wild. Today, foxes are widely distributed across the Australian mainland and are confirmed to be present in Tasmania (Saunders et al.

2006). However, the fox has not yet colonised the tropical far north and is not established on Kangaroo Island or on many other offshore islands. Factors driving abundance and distribution of foxes are not clear; for example, it is not known whether they have reached their northern limit (Saunders et al. 1995).

The fox is a serious vertebrate pest and is in the World Conservation Union's list of the 100 worst invasive species (Lowe et al. 2000). Predation by the European red fox is listed as a key threatening process under the EPBC Act. Foxes are a confirmed or perceived threat to a large number of threatened species (see Appendix A), although impacts from fox predation are not restricted to these species.

This TAP has been put into place as a feasible, effective and efficient way to abate the threat of predation by foxes.

1.2.2 The impacts

Foxes have a wide dietary range, and are threatened by few natural enemies or few serious diseases in Australia. They also have high reproductive rates and high rates of cub survival, which allows them to rapidly colonise areas although they only breed once a year over a short period. These attributes are important in making the fox a significant threat to biodiversity.

Foxes have direct impacts on a range of native animal species. They prey particularly on small to medium-sized, ground-dwelling and semi-arboreal mammals, ground-nesting birds and chelid tortoises.

1.2.3 Managing the threat

As foxes are so widely established in Australia, the focus of management is on abating impacts by established populations, except for offshore islands that are currently fox free and Tasmania where eradication is being attempted. Control of foxes is difficult; control methods include baiting, shooting, trapping, den fumigation or destruction, and exclusion fencing. However, apart from broadscale baiting, the methods are expensive, labour intensive, long term and of limited effectiveness (Saunders and McLeod 2007).

Interactions between pest species mean that control of other pest animals can have effects on foxes. For example, a study in inland Australia found that fox numbers fell after a major reduction in rabbit numbers through rabbit haemorrhagic disease (Bowen and Read 1998). An understanding of these interactions is important when designing and recommending pest animal control programs. In many situations, concurrent multi-species programs will be required. Integrating control techniques will maximise the success of control programs.

Continental eradication may be the ideal goal of a fox TAP, but is not feasible with current resources and techniques. Fox populations must therefore be suppressed and managed to mitigate impacts on affected native species. Progress in control programs must be monitored to ensure that objectives are met and to allow management options to be adapted to changing circumstances. Individual identification of foxes by scat genotyping has potential for monitoring abundance before and after control programs (Piggott and Taylor 2003). In addition, population genetic analysis may offer insights into invasion routes and population dynamics. The necessary background genetic database enabling data interpretation is being developed by the Invasive Animals Cooperative Research Centre.

1.2.4 The review of the 1999 TAP

In accordance with the requirements of the EPBC Act, the original TAP for foxes (EA 1999a) was reviewed in 2004–05 by the Bureau of Rural Sciences (BRS) (Hart 2005) as part of a broader review encompassing the original TAPs for cats (EA 1999b), goats (EA 1999c) and rabbits (EA 1999d). Anecdotal, circumstantial and experimental evidence shows that fox predation continues to be a major threat to the survival of native Australian fauna. The review identified a number of the actions that have been implemented by state

agencies; for example, New South Wales with its own TAP has undertaken local regional fox control to benefit threatened species.

The BRS review found that it was difficult to accurately determine the extent to which the TAP had reduced the impacts of foxes on biodiversity. This reflects the current paucity of nationally consistent data on the ranges and densities of foxes and their impacts, and the difficulties of linking outcomes in population changes to the outputs of the fox 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 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 fox-related projects that were assessed had positively contributed to reducing the impacts of foxes. Furthermore, projects have addressed specific pest control needs in high-priority locations, toxin development and biocontrol agents, and have provided considerable support for developing control techniques. Of the 27 actions in the 1999 TAP for foxes, many were targeted by at least one project, and almost a third of the fox actions had been fully completed.

The BRS review proposed a number of changes to the actions found in the original TAP, but recommended that the objectives remain substantially unchanged. The review suggested that the implementation of the revised fox 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 predation by foxes. 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 foxes. The activities and priorities under the TAP will need to adapt to changes as they occur.

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 allocating adequate resources to achieve effective on-ground control of foxes 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.

2 Objectives and actions

The goal of this TAP is to minimise the impact of foxes on biodiversity in Australia and its territories by:

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

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. Twenty 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'. Each action has also 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 foxes occupying new areas in Australia and eradicate foxes 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 foxes, and developing and implementing management plans to protect such areas from foxes. The actions are designed to prevent foxes from occupying new areas in Australia where they are likely to impact significantly on biodiversity, and to remove them from high-conservation-value 'islands' where this is feasible. Fox-free 'islands' can be isolated by means of fencing, geographical features or intensive management to protect and restore habitats and ecological processes. The fox is absent from large parts of Australia (e.g. northern Australia), and an important activity is to monitor their distribution at the edge of their extent. The actions are of high to very high priority and could be achieved within three to five years. 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 foxes, and the risk that predation by foxes will become a threat in these areas.

Action 1.2 develops contingency plans for preventing, monitoring and, if an incursion occurs, containing and eradicating foxes in areas with high conservation values. Assessment of invasion risk by foxes should use population genetic approaches for identifying past invasion routes. Action 1.3 implements these plans. Action 1.4 involves eradicating established populations of foxes from those 'islands' considered of high conservation value, depending on feasibility and cost-effectiveness. These actions follow on from implementation of Action 3.1. All planning and implementation work needs to recognise that foxes are only one possible pest, and therefore should be undertaken within the context of integrated management activities.

Performance indicators

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

Action	Priority and timeframe
1.1 Collate data on offshore islands and isolated mainland 'islands', assess their conservation value, the likelihood of significant biodiversity impacts from foxes and, if there are no foxes present, rank the level of risk of foxes 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 fox incursion, for 'islands' with high conservation values.	High 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 foxes from 'islands' with high conservation values (including Tasmania) where this is cost-effective, feasible and a conservation priority.	Very high priority, medium to long term

☐ Objective 2

Promote the maintenance and recovery of native species and ecological communities that are affected by fox predation

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Key actions for Objective 2 include identifying priority areas for investment in fox control, implementing and supporting regional control programs, and applying incentives for promoting and maintaining control programs adjacent to the priority areas. Actions 2.1–2.3 focus programs in fox control on the maintenance and recovery of native species and ecological communities affected by fox predation. Actions 2.1 and 2.2 are of high priority.

Fox populations need to be reduced over large areas because rapid population recovery, particularly by reinvasion, is a major problem. However, broadscale control of foxes throughout Australia is not feasible

using the methods currently available. Therefore, it is necessary to identify priority areas for control based on scientific evidence of the significance of the population of native species or the ecological community affected and the degree of impact posed by foxes, relative to other impacts. In addition, the cost-effectiveness of a control program must be considered. These activities are covered by Action 2.1. Identification of priority areas could involve mapping the distribution of susceptible species, high-risk habitats and foxes, 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, as described in Action 2.2. Organisations implementing control programs will be encouraged to focus on areas where fox control will have the greatest outcome in reducing the threats to local populations of significant native species. The success of control programs should be monitored, applying national protocols (see Action 3.1) as soon as they are available.

It is important to control foxes in priority areas and in adjacent areas, to prevent immediate reinvasion. Action 2.3 focuses on developing incentives for such actions on private and leasehold lands.

Performance indicators

- Priority areas, where fox control is required to protect important affected fauna, have been identified and are a focus for fox control programs.
- Fox control work involves pre and post-control monitoring of fox populations and key native species targeted for protection, according to national protocols, to measure the outcomes of control operations.
- Reliable native species population indicators are used to measure the outcome of reduced pest populations.

Action	Priority and timeframe
2.1 Identify priority areas for fox control based on: • the significance of the population of the affected native species or of the ecological community • the degree of threat posed by foxes to species and ecological communities relative to other threats • the cost-effectiveness of maintaining fox populations below an identified ‘damage threshold’ in the region, and • the feasibility of effective remedial action.	High priority, medium term
2.2 Conduct and monitor regional fox control, through new or existing programs, in priority areas identified in Action 2.1.	High priority, long term
2.3 Apply incentives (other than bounties), partnerships and negotiated agreements to promote and maintain on-ground fox 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 fox impacts and interactions with other species and other ecological processes

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Key actions for Objective 3 include developing simple, cost-effective methods for monitoring impacts; improving knowledge of interactions between foxes and native carnivores, and between foxes, cats and wild dogs; and identifying the unintended effects of fox control in isolation from other activities. Actions 3.1–3.4 focus on ensuring that fox control does not lead to unintended effects, through better understanding of the impact of foxes, non-target impacts of control measures and fox interactions with other species. These actions are mostly of medium priority and most will require a long-term commitment. A range of available genetic marker analyses may be useful in improving our knowledge of fox ecology and how best to manage them. Genetic markers can, for example, help improve understanding of invasion routes and population dynamics.

To determine the effectiveness of fox control programs, Action 3.1 is to develop simple, cost-effective methods for monitoring the impact of this invasive species on affected species and ecological processes relative to other sources of impact. Areas for investigation include the feasibility and practicality of individual identification of foxes by genotyping scats or hairs, to help estimate abundance, particularly at low densities.

Interactions between foxes and other species need to be considered when undertaking control programs. Action 3.2 is to investigate interactions between foxes and native carnivores to improve understanding of the impact of foxes on these species in terms of competition and predation. Similarly, Action 3.3 is to investigate interactions between foxes, feral cats, wild dogs and rabbits (competition and/or predation) so that control activities for these four species can be more effectively integrated. For example, certain fences used to exclude foxes can also exclude cats and wild dogs.

Action 3.4 aims to identify any unintended effects (e.g. ‘mesopredator release’) that fox control may have if it is not integrated with other management activities. This action depends on the results of Actions 3.2–3.3.

Performance indicators

- Reliable fox monitoring techniques have been developed.
- Integration of control methods for pest species.
- The unintended effects of fox control are minimised.

Action	Priority and timeframe
3.1 Develop simple and cost-effective methods for monitoring populations of foxes and the impacts of foxes, including reliable methods for monitoring foxes and key native species at different densities, including very low densities.	Medium priority, short term
3.2 Investigate interactions between foxes and native carnivores to identify the significance of competition and predation by foxes to these native species.	Medium priority, long term
3.3 Determine the nature of interactions between foxes, feral cats, wild dogs and rabbits to effectively integrate fox control activities for all four species.	Medium priority, long term
3.4 Identify any unintended effects that fox control may have if conducted in isolation from other management activities.	Medium priority, long term

3.5 Develop means for estimating the environmental and other associated costs of impacts arising from foxes.	Medium priority, short term

☐ Objective 4

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

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Key actions for Objective 4 include improving control methods, training land managers to make the best use of control methods, and increasing the adoption of standard control methods. Actions 4.1–4.5 focus on improving control of foxes through better use of existing techniques and development of new techniques, including those for monitoring success of control in the field. Many of these actions are a high priority and will require a long-term commitment.

Deficiencies in currently available baits and baiting systems create an obstacle to fox control. In response to this situation, Actions 4.1 and 4.2 are to conduct research and extension to improve existing baiting methods and to develop and promote new control techniques. Areas for investigation should include the deployment of baits, canid-specific toxins (which may allow greater surface baiting), 1080/analgesic combination, M44 ejectors, self-loading bait delivery stations, hormone-based fertility control and bait station lures. Such an increased range of control techniques will reduce reliance on 1080 baiting and may facilitate high fox kill rates through integrated control.

The cost-effectiveness of exclusion fences and control methods such as shooting is covered by Action 4.3. The potential for use of control techniques that target foxes but not dingoes is covered by Action 4.4.

To improve the effectiveness of local and regional control programs, Action 4.5 is to develop training programs to help land managers identify control methods appropriate for local conditions and determine in what circumstances and times they should be used.

Fox control programs need to consider habitat rehabilitation and other activities that may be required to promote the recovery of native species and ecological communities; this is covered by Action 4.6.

Finally, to ensure that fox management follows best practice, Action 4.7 is to continue to promote the adoption and adaptation of the relevant model codes of practice and standard operating procedures for the humane management of foxes, including their recognition under the National Competency Standards for Vertebrate Pest Management (NTIS 2007).

Performance indicators

- Increased range of registered control techniques available for fox control.
- Widespread use of the most appropriate, cost-effective control methods, according to local conditions.
- Increased adoption and adaptation of the model codes of practice and standard operating procedures for the humane management of foxes, including their recognition as a reference under the National Competency Standards for Vertebrate Pest Management.

Action	Priority and timeframe
4.1 Conduct research and extension to improve the effectiveness, target specificity and humaneness of existing toxin–bait media and baiting methods.	High priority, long term
4.2 Conduct further work on the development of new, or improvements to existing, control techniques.	High priority, long term
4.3 Test and disseminate information on exclusion fence designs and other control methods regarding their cost-effectiveness for particular habitats or topography.	Low priority, medium term
4.4 Investigate the feasibility of control techniques to target foxes, but not dingoes, in some areas.	Low priority, long term
4.5 Develop training programs to help land managers identify locally appropriate control method(s) and when (i.e. circumstances and times) to apply them in controlling foxes.	High priority, short term
4.6 Ensure that habitat rehabilitation and management of potential prey, competitors and predators of foxes are considered in fox control programs.	Medium priority, long term
4.7 Continue to promote the adoption and adaptation of the model codes of practice and standard operating procedures for humane management of foxes.	High 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 foxes

Action 5.1 focuses on ensuring that the TAP actions are better communicated to interested parties by preparing and distributing extension materials. Extension materials will help to promote knowledge and understanding of the 19 actions listed in Objectives 1–4, the techniques used in fox control, and why fox predation is listed as a key threatening process. This action is of high priority and will require a long-term commitment.

It has been difficult to achieve and maintain effective regional fox control programs in many areas, despite the availability of suitable control techniques (see, for example, Riethmuller et al. 2005).

Performance indicators

- Increased proportion of fox control programs that use current best-practice techniques in fox control.
- Increased awareness of the threat posed by foxes.
- Increased awareness of the TAP actions and objectives.

Action	Priority and timeframe
5.1 Promote: • broad understanding of the threat to biodiversity posed by foxes and support for their control • support for the actions to be undertaken under this plan • the use of humane and cost-effective fox control methods • best-practice effective fox control in all tenures, and • understanding of predation by foxes 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

The plan reflects the fact that the threat abatement process is likely to be ongoing, as there is no likelihood of nationally eradicating foxes in the foreseeable future.

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 cannot be quantified at the time of writing. The ongoing costs of fox control will generally be high. For instance, to aerially bait approximately 35 000 square kilometres/year would cost approximately $1.3 million (Saunders and McLeod 2007). Exclusion fencing is also expensive, in some cases up to $10 000/km.

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 foxes. 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.

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 foxes 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 foxes. 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.

The species in the table below may be adversely affected by predation by foxes (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.

Appendix A: Species affected by the European red fox

Type/category	Scientific name	Common name	Current status
Listed threatened			
Birds	*Amytornis barbatus barbatus*	Grey grasswren (bulloo)	Vulnerable
	Cinclosoma punctatum anachoreta	Spotted quail-thrush (Mt Lofty Ranges)	Critically endangered
	Dasyornis brachypterus	Eastern bristlebird	Endangered
	Geophaps scripta scripta	Squatter pigeon (southern)	Vulnerable
	Leipoa ocellata	Malleefowl	Vulnerable
	Neophema chrysogaster	Orange-bellied parrot	Critically endangered
	Pedionomus torquatus	Plains-wanderer	Vulnerable
	Pezoporus occidentalis	Night parrot	Endangered
	Pezoporus wallicus flaviventris	Western ground parrot	Endangered
	Pterodroma heraldica	Herald petrel	Critically endangered
	Pterodroma leucoptera leucoptera	Gould's petrel	Endangered
	Stipiturus malachurus intermedius	Southern emu-wren (Fleurieu Peninsula), Mount Lofty southern emu-wren	Endangered
Birds (continued)	*Stipiturus malachurus parimeda*	Southern emu-wren (Eyre Peninsula)	Vulnerable
	Turnix melanogaster	Black-breasted button-quail	Vulnerable
Mammals	*Bettongia lesueur lesueur*	Boodie, burrowing bettong (Shark Bay)	Vulnerable

Type/category	Scientific name	Common name	Current status
Listed threatened			
	Bettongia lesueur unnamed subsp.	Boodie, burrowing bettong (Barrow and Boodie Islands)	Vulnerable
	Bettongia tropica	Northern bettong	Endangered
	Burramys parvus	Mountain pygmy-possum	Endangered
	Dasycercus byrnei	Kowari	Vulnerable
	Dasycercus cristicauda	Mulgara	Vulnerable
	Dasycercus hillieri	Ampurta	Endangered
	Dasyurus geoffroii	Chuditch, western quoll	Vulnerable
	Dasyurus maculatus gracilis	Spotted-tailed quoll, or yarri (north Queensland subspecies)	Endangered
	Dasyurus maculatus maculatus	Spot-tailed quoll, spotted-tail quoll, tiger quoll (southeastern mainland population)	Endangered
	Isoodon obesulus obesulus	Southern brown bandicoot	Endangered
	Lagorchestes hirsutus bernieri	Rufous hare-wallaby (Bernier Island)	Vulnerable
	Lagorchestes hirsutus dorreae	Rufous hare-wallaby (Dorre Island)	Vulnerable
	Lagorchestes hirsutus unnamed subsp.	Mala, rufous hare-wallaby (central mainland form)	Endangered
	Lagostrophus fasciatus fasciatus	Banded hare-wallaby, marnine, munning	Vulnerable
	Leporillus conditor	Wopilkara, greater stick-nest rat	Vulnerable
	Macrotis lagotis	Greater bilby	Vulnerable

Type/category	Scientific name	Common name	Current status
Listed threatened			
	Myrmecobius fasciatus	Numbat	Vulnerable
	Notomys fuscus	Dusky hopping-mouse, wilkiniti	Vulnerable
	Notoryctes caurinus	Karkarratul, northern marsupial mole	Endangered
	Notoryctes typhlops	Yitjarritjarri, southern marsupial mole	Endangered
Mammals (continued)	*Onychogalea fraenata*	Bridled nail-tail wallaby	Endangered
	Parantechinus apicalis	Dibbler	Endangered
	Perameles bougainville bougainville	Western barred bandicoot (Shark Bay)	Endangered
	Perameles gunnii gunnii	Eastern barred bandicoot (Tasmania)	Vulnerable
	Perameles gunnii unnamed subsp.	Eastern barred bandicoot (mainland)	Endangered
	Petrogale lateralis lateralis	Black-flanked rock-wallaby	Vulnerable
	Petrogale lateralis pearsoni	Pearson Island rock-wallaby	Vulnerable
	Petrogale lateralis MacDonnell Ranges race	Warru, black-footed rock-wallaby	Vulnerable
	Petrogale lateralis West Kimberley race	Black-footed rock-wallaby	Vulnerable
	Petrogale penicillata	Brush-tailed rock-wallaby	Vulnerable
	Petrogale xanthopus xanthopus	Yellow-footed rock-wallaby (SA and NSW)	Vulnerable
	Phascogale calura	Red-tailed phascogale	Endangered
	Potorous gilbertii	Gilbert's potoroo	Critically

Type/category	Scientific name	Common name	Current status
Listed threatened			
			endangered
	Potorous longipes	Long-footed potoroo	Endangered
	Potorous tridactylus tridactylus	Long-nosed potoroo (southeast mainland)	Vulnerable
	Pseudocheirus occidentalis	Western ringtail possum	Vulnerable
	Pseudomys australis	Plains rat	Vulnerable
	Pseudomys fieldi	Djoongari, Alice Springs mouse, Shark Bay mouse	Vulnerable
	Pseudomys fumeus	Konoom, smoky mouse	Endangered
	Pseudomys oralis	Hastings river mouse	Endangered
	Pseudomys pilligaensis	Pilliga mouse	Vulnerable
	Pseudomys shortridgei	Dayang, heath rat	Vulnerable
	Setonix brachyurus	Quokka	Vulnerable
Mammals (continued)	*Sminthopsis douglasi*	Julia Creek dunnart	Endangered
	Sminthopsis psammophila	Sandhill dunnart	Endangered
	Xeromys myoides	Water mouse, false water rat	Vulnerable
	Zyzomys pedunculatus	Central rock-rat	Endangered
Reptiles	*Caretta caretta*	Loggerhead turtle	Endangered
	Chelonia mydas	Green turtle	Vulnerable

Type/category	Scientific name	Common name	Current status
Listed threatened			
	Delma impar	Striped legless lizard	Vulnerable
	Dermochelys coriacea	Leathery turtle, leatherback turtle, luth	Vulnerable
	Egernia kintorei	Great desert skink, tjakura, warrarna, mulyamiji	Vulnerable
	Elusor macrurus	Mary River tortoise	Endangered
	Emydura signata	Bellinger River emydura (Bellinger River, NSW)	Vulnerable
	Eulamprus tympanum marnieae	Corangamite water skink	Endangered
	Hoplocephalus bungaroides	Broad-headed snake	Vulnerable
	Natator depressus	Flatback turtle	Vulnerable
	Pseudemydura umbrina	Western swamp tortoise	Critically endangered
	Rheodytes leukops	Fitzroy tortoise	Vulnerable
Amphibians	*Heleioporus australiacus*	Giant burrowing frog	Vulnerable
	Litoria aurea	Green and golden bell frog	Vulnerable
Unlisted species or taxa that could be adversely affected			
Birds	*Amaurornis olivaceus*	Bush-hen	
	Anas castanea	Chestnut teal	
	Anas gracilis	Grey teal	
	Anas superciliosa	Pacific black duck	

Type/category	Scientific name	Common name	Current status
Listed threatened			
	Anthus novaeseelandiae	Richard's pipit	
	Aythya australis	Hardhead	

Type/category	Scientific name	Common name	Current status
Birds (continued)	*Botaurus poiciloptilus*	Australasian bittern	
	Charadrius mongolus	Lesser sand plover, Mongolian plover	
	Charadrius ruficapillus	Red-capped plover	
	Coturnix pectoralis	Stubble quail	
	Eudyptes pachyrhynchus	Fiordland penguin	
	Eurostopodus argus	Spotted nightjar	
	Eurostopodus mystacalis	White-throated nightjar	
	Gallinago hardwickii	Latham's snipe, Japanese snipe	
	Haliaeetus leucogaster	White-bellied sea-eagle	
	Himantopus himantopus	Black-winged stilt	
	Menura alberti	Albert's lyrebird	
	Merops ornatus	Rainbow bee-eater	
	Morus serrator	Australasian gannet	

	Neophema petrophila	Rock parrot	
	Numenius minutus	Little curlew, little whimbrel	
	Oceanodroma leucorhoa	Leach's storm-petrel	
	Pezoporus wallicus wallicus	Ground parrot (eastern)	
	Phalacrocorax fuscescens	Black-faced cormorant	
	Puffinus carneipes	Flesh-footed shearwater, fleshy-footed shearwater	
	Puffinus pacificus	Wedge-tailed shearwater	
	Puffinus tenuirostris	Short-tailed shearwater	
	Recurvirostra novaehollandiae	Red-necked avocet	
	Spheniscus magellanicus	Magellanic penguin	
	Sterna albifrons	Little tern	
	Sterna anaethetus	Bridled tern	
	Sterna nereis	Fairy tern	
Type/category	**Scientific name**	**Common name**	**Current status**
Unlisted species or taxa that could be adversely affected			
Birds (continued)	*Sterna nilotica*	Gull-billed tern	
	Thinornis rubricollis	Hooded plover	
	Thinornis rubricollis rubricollis	Hooded plover (eastern)	
Mammals	*Dasyurus maculatus maculatus*	Spot-tailed quoll, spotted-tail quoll, tiger quoll (Tasmanian subspecies)	

	Macroderma gigas	Ghost bat	
	Macropus parma	Parma wallaby	

Glossary

Biocontrol	Control of pests by disrupting their ecological status through the use of organisms that are natural predators, parasites or pathogens.
Canid	A member of the Canidae family, which includes dogs, foxes and wolves.
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.
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.
Mesopredator	A middle-rank predator in a food web (Saunders and McLeod 2007).
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.
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*
TAP	threat abatement plan
1080	sodium fluoroacetate

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