



Australian Government

Department of the Environment

DRAFT

**THREAT ABATEMENT PLAN FOR PREDATION
BY FERAL CATS**

2015

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Department of the Environment

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1 INTRODUCTION

This threat abatement plan establishes a national framework to guide and coordinate Australia's response to the impacts of feral cats (*Felis catus*) 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 feral cats. It replaces the previous threat abatement plan for predation by feral cats published in 2008 (DEWHA, 2008a).

This plan should be read in conjunction with the publication background document for the threat abatement plan for predation by feral cats (DEWHA, 2008b). The background document provides information on feral cat characteristics, biology and distribution; impacts on environmental, economic, social and cultural values; and current management practices and measures.

1.1 THREAT ABATEMENT PLANS

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the identification and listing of key threatening processes. In 1999 with the commencement of the Act predation by feral cats was listed as a key threatening process and a threat abatement plan developed.

The Australian Government develops threat abatement plans and facilitates their implementation. To progress the main actions within the threat abatement plan, the Department of the Environment relies on partnerships and co-investments with other government agencies, industry and other stakeholders. An important part of implementation of the threat abatement plan 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 management. 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 to achieve the desired outcomes for biodiversity conservation and primary production. In addition, research and development programs for managing vertebrate pest species need to integrate interests relating to 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 manage invasive species. They allow primary production and environmental considerations to be jointly addressed, and management to be integrated across the local priority vertebrate pests within the scope of other natural resource management priorities.

The national coordination of pest animal management activities occurs under the Australian Pest Animal Strategy. The Invasive Plants and Animals Committee, comprising representatives from all Australian, state and territory governments, has responsibility for implementation of the strategy. This threat abatement plan provides guidance for the management of feral cats within that broader context.

1.1.1 THE REVIEW OF THE 2008 THREAT ABATEMENT PLAN

In accordance with the requirements of the EPBC Act, the threat abatement plan for predation by feral cats (DEWHA, 2008a) was reviewed in 2014 by the Department of the Environment (Department of the Environment, 2014).

This document replaces the 2008 threat abatement plan. It incorporates the knowledge gained in the intervening years and has been modified in line with recommendations from the review. The threat abatement plan aims to guide the responsible use of public resources and the best outcome for native species and ecological communities threatened by predation by feral cats. 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 feral cats. The activities and priorities under the threat abatement plan will need to adapt to changes as they occur.

1.1.2 INVOLVEMENT OF STAKEHOLDERS

The successful implementation of this threat abatement plan 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 cat impact and allocating adequate resources to achieve effective on-ground control of feral cats at critical sites, improve the effectiveness of management 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.

1.2 THREAT ABATEMENT PLAN FOR FERAL CATS

1.2.1 THE THREAT

Feral cats are a serious vertebrate pest in Australia, and have severe to catastrophic effects on native fauna (Woinarski et al. 2012).

The first recorded instance of cats being brought to Australia was by English settlers in the 18th century and had spread across the continent by the 1890s (Abbot 2008). Cats were deliberately released into the wild during the 19th century to control introduced rabbits and house mice (Rolls 1969). Today feral cats are distributed through all habitats in mainland Australia and Tasmania and on some offshore islands.

There is no way of accurately estimating the number of feral cats in Australia (Hone & Buckmaster 2015). Feral cat abundance varies significantly depending on rainfall, food availability and other factors. Although there is no way of estimating how many feral cats there are, even at low numbers, the damage that feral cats do to native species is significant (Doherty et al. 2015). Predation by feral cats is recognised as one of the primary factors in the decline and extinction of a number of native mammal species (Woinarski et al. 2014).

Adult feral cats weigh three to five kilograms on average (Read & Bowen 2001; Johnston et al. 2012; Johnston et al. 2012a; Johnston et al. 2013). Feral cats are carnivores and can survive with limited access to drinking water because they can consume adequate moisture from their prey: small and medium-sized mammals, birds, reptiles, amphibians, fish and invertebrates. Feral cats will also consume carrion when live prey is scarce, and some smaller amounts of vegetation.

Feral cats are solitary and predominantly nocturnal, spending most of the day in burrows, logs or rock piles. They occupy home ranges that vary from a less than one square kilometre up to 20-30 square kilometres in areas of scarce resources (Buckmaster 2011; Moseby et al. 2009; Molsher et al. 2005). Mature (one year or older) feral cats can breed in any season and may produce two litters per year, each of about four kittens, every year, however, few kittens survive.

Cats can be grouped into categories according to how and where they live. The definitions and categories used vary widely, so the following terms are used for the purposes of this plan:

- *feral cats* are those that live and reproduce in the wild (e.g. forests, woodlands, grasslands, wetlands) and survive by hunting or scavenging; none of their needs are satisfied intentionally by humans;
- *stray cats* are those found in and around cities, towns and rural properties; they may depend on some resources provided by humans but are not owned; and
- *domestic cats* are those owned by an individual, a household, a business or corporation; most or all of their needs are supplied by their owners.

These categories of cats are artificial and reflect a continuum, and individuals may move from one category to another (Moodie 1995; Newsome 1991). In any given situation, the category causing the most damage to wildlife needs to be identified because management actions will depend on the type of cat causing the damage. Where domestic cats are the primary cause, management is likely to concentrate on owners and consist of promoting responsible ownership through education and local or state/territory legislation. For feral cats, the focus is on reducing numbers or inhibiting predation through the use of mechanical, chemical or biological methods. Management of stray cats often requires a combination of technical and social approaches.

This plan focuses primarily on managing the negative impact of feral cats. Broadly, native species listed as threatened under the EPBC Act that are susceptible to cat predation are located in areas where domestic and stray cats are absent or in much lower numbers. It is generally accepted that improvements in the management of domestic and stray cats are necessary to reduce recruitment to the feral cat population. For eradication and control efforts to be sustained, the transition of cats from domestic or stray to feral must be prevented so that feral cat populations are not enhanced or new populations established.

Feral cats occur on Commonwealth land, such as Department of Defence properties and Commonwealth-managed national parks. On a national scale, however, management of feral cats on Commonwealth land is only a small part of the larger picture of conserving threatened species affected by cat predation. Many state and territory wildlife agencies have a history of practical on-ground management of feral cats. In addition, private sector and community initiatives also contribute to feral cat management activities.

1.2.2 THE IMPACTS

Feral cats are recognised as a potential threat to 74 mammal species and sub-species (Woinarski et al. 2014), 40 birds, 21 reptiles and four amphibians. The mammal species and subspecies are identified in the 2014 Mammal Action Plan (Woinarski et al. 2014) and the birds, reptiles and amphibians are listed as threatened under the EPBC Act and 19 species listed as migratory or marine that identify predation by feral cats as a threat (see Appendix A), although the impacts of predation by feral cats is not restricted to these species.

Cats have direct negative impacts on native fauna through predation. They prey on mammals, birds, reptiles, amphibians and invertebrates depending on resource availability. Mammals tend to be the dominant prey item when available. They also eat introduced mammals including rabbits, hares, rats and mice.

Typically terrestrial vertebrates consumed by feral cats will be less than 220 grams but individuals up to three kilograms are at risk. Birds are a major prey item with species up to 200 grams being taken, mostly ground-dwelling birds. Reptiles are also an important dietary component, especially in arid areas. Examples of other prey items include grasshoppers, centipedes, fish, frogs, freshwater crustaceans and marine turtle hatchlings (Doherty et al. 2015). Some cats become specialists in particular types of prey while others remain generalists (Dickman & Newsome 2014).

Feral cats have contributed to the extinction of many small to medium-sized mammals and ground-nesting birds in the arid zone, and have seriously affected or caused extinction of populations of bilby, mala, woylie and numbat. The ongoing decline of small mammals across northern Australia to very low numbers is also believed to be due, for a major part, to predation by the feral cat (Frank et al. 2014; Woinarski et al. 2014; Fisher et al. 2013).

Feral cats have direct and indirect impacts on native predators. Dasyurids, such as quolls, may be killed by feral cats and have a dietary overlap. As well as quolls, other native predators such as raptors and varanids may also have a dietary overlap with feral cats, resulting in competition for resources.

Feral cats in Australia are hosts to a number of disease causing agents including viruses (three species), bacteria (>40 species), fungi (>17 species), protozoa (21 species), helminths (26 species) and arthropods (19 species) (Moodie 1995). Some of these can be transmitted to native species, particularly mammals, and

also humans. *Toxoplasma gondii* is one significant protozoa species that uses the cat as the definitive host and is particularly concerning for native Australian mammals and immune-compromised people or pregnant women. Abortions can occur in livestock following infection with *Toxoplasma gondii* and one possible impact of the disease in some native animals is the loss of a sense of fear making these animals more vulnerable to predators (Fancourt & Jackson 2014). The tapeworm *Spirometra erincei* also parasitizes the cat as a definitive host and has been recorded in a wide range of native mammals (Adams 2003).

1.2.3 MANAGING THE THREAT

As cats are so thoroughly established in Australia, the focus of management is generally on impact abatement rather than eradication. Control of cats is difficult as they are found in very low densities over large home ranges, making them difficult to locate. They are also extremely cautious in nature, making them hard to cost-effectively control with traditional measures such as shooting and trapping. Fenced exclosures are a resource-intensive but effective way to control feral cat impacts as is the eradication of feral cats from offshore islands.

As a control technique, shooting is more effective if applied for an extended period or timed strategically. Shooting is most likely to be humane when the shooters are experienced, skilled and responsible (Sharp 2012a). However, because shooting is expensive, labour intensive and time consuming it is typically only done on a relatively small scale.

Feral cats are caught live using either leg-hold traps or cage traps. Leg-hold traps have padded jaws to reduce the likelihood of feral cats escaping the trap. Cage traps can also be used for trapping stray and domestic cats around rubbish dumps and in nature reserves close to urban development. To successfully trap feral cats, the lure or attractant chosen is important, with individual feral cats preferring different styles of lure. Like shooting, trapping as a control method requires skilled operators, is expensive, labour intensive and time consuming, and is only recommended on a small scale or where eradication within an area safe from further immigration (e.g. an island or fenced area) is the objective.

Baiting for feral cats is a broad-scale technique that has potential to reduce feral cat populations over larger areas. However, feral cats prefer live prey and will only take carrion (baits) when other resources are unavailable. The baits must also be laid on the surface as feral cats, unlike wild dogs/dingoes or foxes will not dig up a bait. The Eradicat[®] bait is directly injected with 1080 and may be used in Western Australia. This bait is effective when applied strategically to target the feral cats when they are hungry (Algar et al. 2013). A second type of bait, Curiosity[®], with the toxin PAPP (para-aminopropiophenone) has the toxin encapsulated in a hard plastic pellet. This bait is designed for use where there are non-target species that would be placed at risk by the Eradicat[®] bait and is anticipated to be available for use during the life of this threat abatement plan (Hetherington 2007; Johnston et al. 2012; Johnston et al 2014). Research and development is ongoing into other baits to ensure the availability of this control technique across all of Australia.

Predator-proof or exclusion fencing is used as an effective management technique for threatened species vulnerable to terrestrial predators, such as feral cats, foxes and wild dogs (Robley et al. 2007). To minimise the risk of breaches to the fence integrated baiting, trapping and shooting in the area surrounding the fence is needed to reduce the frequency of challenge to the fence by predators. Fencing also affects the movement of other wildlife, preventing their dispersal and interbreeding with other populations. Fencing is expensive and requires ongoing maintenance.

Interactions between pest species mean that control of feral cats can have flow-on effects on other invasive animals, such as rabbits, rats and mice, that feral cats may have preyed on. The interactions between the introduced (wild dog, fox, cat) and native predators may also influence the design of a control program. An understanding of these potential complex ecological interactions is important when designing and recommending pest animal control programs, and in many situations, concurrent multi-species programs will be required. Integrating control techniques may also maximise the success of management programs.

Although total mainland *eradication* may be the ideal goal of a feral cat threat abatement plan, it is not feasible with current or foreseeable resources and techniques. Feral cat populations must instead be suppressed and managed to mitigate impacts in targeted areas where they pose the greatest threat to biodiversity. Eradication may be achievable in isolated areas, such as small reserves and offshore islands. For example, cats were eradicated from Tasman Island in 2011 (Tasmanian Parks and Wildlife Service 2011). Progress in management programs must be monitored to ensure that objectives are met and to allow management options to be adapted to changing circumstances.

Best-practice management of feral cats must involve a reduction of the threat, not only to targeted threatened species, but also to other native species that may be affected by feral cat predation. For any given area this will require a determination of the level of feral cat control required, which should be measured through monitoring of population changes and of native species recovery. It may be possible in some situations to also measure a feral cat population reduction that can be linked to threatened species recovery.

2 GOAL, OBJECTIVES AND ACTIONS

The goal of this threat abatement plan is to minimise the impact of feral cats on biodiversity in Australia and its territories by:

- Protecting affected threatened species; and
- Preventing further species and ecological communities from becoming threatened.

To achieve this goal, the plan has four objectives, developed through the review (Department of the Environment 2014) of the previous threat abatement plan and consultation with experts. These objectives are to:

1. Effectively control feral cats in different landscapes;
2. Improve effectiveness of existing control options for feral cats;
3. Develop or maintain alternative strategies for threatened species recovery;
4. Increase public support for feral cat management and promote responsible cat ownership.

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.

The sections below provide background on each objective, followed by a table listing the actions required to meet the objective. Twenty-two actions have been developed to meet the four 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. taking five years or longer). The expected output and outcome from implementation of the action is described. Where there is a clear party identified as responsible for the implementation of the action (be this a government, organisation or group of individuals) this is noted. The identification of responsibility should not be taken as excluding the involvement of other parties where needed.

The actions have a strong focus on providing control options for feral cats and have been divided amongst the four objectives. However, there is overlap for some actions between the different objectives and readers may determine that an action would provide them a better outcome under an alternative objective. For example, the development of alternative strategies to conventional control will assist in effectively managing feral cats in different landscapes.

OBJECTIVE 1 EFFECTIVELY CONTROL FERAL CATS IN DIFFERENT LANDSCAPES

Predation by cats is a threat that needs to be interpreted and managed according to the landscape type and particular pressures in the area being managed. The landscape in which feral cats are being managed will determine which tools are most effective to use (for example, management in an alpine boulder field will be quite different to a tropical floodplain). Timing of management is also critical to achieve threatened species protection (for example, timing to protect ground nesting birds or at the end of mouse/rat plagues when the abundant feral cats are switching to other prey resources such as small threatened mammals). Site specific characteristics also need to be taken into account including the potential for immigration of new cats to the area, other management actions that are being undertaken (for example, prescribed burning) and other predators being controlled (for example, European red foxes) or conserved (for example, dingoes). Ensuring the management plan is interpreted and appropriately implemented for the area is important so that control programs for feral cats achieve the outcome of reduced predation of threatened and near-threatened species.

This objective builds on two ongoing research streams. First, research into new control options that will reduce land managers' expenditure on time-intensive, skilled labour. Secondly, research on the roles of feral cats within landscapes and how a range of land management practices may be used or manipulated to exert additional pressure on feral cats. This can include possible suppression by other predators, exploitation by feral cats of phenomena such as fire and prey irruptions, the sites to which cats and/or their prey retreat during tough times such as drought, and the role of cat-borne diseases. When research and development are being undertaken, evaluation of the success of control options for feral cats needs to consider how the biodiversity outcomes can be monitored as well as knowing how many feral cats have been killed.

Action 1.1 Ensure toxic baits targeting feral cats are registered and available for use across all of Australia

Land managers require effective tools for achieving feral cat control. These have been lacking on a broad-scale for feral cats with shooting, trapping and fencing being the main options available. In 2014, a toxic bait (Eradicat®) was made available for use on Western Australian lands managed by or in agreement with the Western Australian Department of Parks and Wildlife, which provided an additional tool for that state. During the life of this threat abatement plan it is expected that a new toxic bait (Curiosity®) will be registered for use in southern and central Australia. This plan now adds an additional focus through Action 1.1 of ensuring that toxic baits are registered and available for feral cat control across all of Australia. As with Eradicat® baits, governments will be required to restrict access to toxic baits and areas of application in order to maximise target specificity of baiting programs for feral cats, similar to other introduced predator control programs.

Action 1.2 Have a broad-scale toxic bait available for northern Australia to complement other toxic baits

Action 1.2 deals with the development of a toxic bait that can be used for broad-scale control in northern Australia. The baits developed to date, Eradicat® and Curiosity®, are not suitable for use in northern Australia due to risks to non-target species. However, a variation to the existing baits is likely to be suitable but requires additional research and development. It should be noted that this variant, as with the other toxic baits, would not necessarily be suitable for every landscape. For example, land managers may determine the risk to valued, non-target fauna at a particular site to be too high.

Action 1.3 Develop and register other cat control tools, including devices exploiting cat grooming habits

Action 1.3 recognises that scientists have been investigating a number of devices for cat control utilising particular traits of cats such as their fastidiousness for grooming. These tools may be particularly useful in some locations where cat activity in the landscape is restricted; for example along animal trails through thick vegetation or alongside watercourses. As with Action 1.1 and 1.2, this action focuses on getting these tools to land managers for use within cat control programs. Although not an explicit action, ongoing improvements to the designs and operating of existing management options for feral cats are also important. Enclosure fence designs are an example where refinements continue to be made.

Action 1.4 Continue research into understanding the role of other major landscape modifiers, such as fire or grazing by introduced herbivores, in cat activities and control

Cats have natural enemies or competitors in the other mammalian predators – the European red fox, wild dogs/dingoes (*Canis* species), Tasmanian devils and quolls. For the purposes of this threat abatement plan wild dogs and dingoes are considered together because they freely inter-breed and there is a continuum of animals across the continent that contain varying degrees of dog and dingo DNA (Invasive Animals CRC 2012). A great deal of recent research has focussed on interactions between feral cats and these other predators. Although much of this work is ongoing and there is divided opinion between scientists, an important theme is that relationships between the mammalian predators can vary in space and time. In some places dingoes seem likely to suppress feral cats (i.e. their numbers, behaviour or both) whilst in other parts of Australia one species appears to have little or no affect on the other. Further understanding these relationships, through research, is the focus of Action 1.4 so that land managers can make informed decisions about predator interactions when designing and implementing effective local management programs.

Action 1.5 Continue research into understanding the role of other major landscape modifiers, such as fire or grazing by introduced herbivores, in cat activities and control

Cats will respond to changes in landscapes through population changes or activity changes, including in response to: natural phenomena (for example prey irruptions such as *Rattus villosissimus* and *Mus musculus* following good rains); landscape management (for example prescribed burning); and management programs for other invasive species (for example an increase in rabbit numbers due to declining effectiveness of biocontrols) may provide additional food for feral cats (Doherty et al. 2015); management of foxes and wild dogs could mean fewer feral cats are preyed on by these animals in some areas, noting that evidence from studies to date is not conclusive to make any broad-scale recommendations (e.g. Fleming et al. 2012; Johnston and Ritchie 2012a; Allen et al. 2014; Allen et al. 2014a; Kennedy et al. 2012; Greenville et al. 2014; Wang and Fisher 2012). Research is providing insights into these responses, such as the preferential use by feral cats of areas recently burnt with high intensity fires to get easy access to prey species that have no vegetation cover to hide in (McGregor et al. 2014). This knowledge is valuable for land managers to adapt management programs for feral cats in order to exploit these responses. Action 1.5 seeks to continue this research and provide it to land managers.

Action 1.6 Continue research into the scale, efficiency, cost-effectiveness and risks of feral cat control options

When designing a program for feral cat management it is important to understand the scale of control required and the cost-effectiveness of the method/s being employed. Action 1.6 is aimed at further improving our knowledge of how much and when to undertake control; the short and long term efficiency of that control, especially with feral cats immigrating from outside the site; and what combinations of control methods may work in different locations. As mentioned in the previous section, this knowledge must focus on the recovery of threatened species as well as the feral cats.

Action 1.7 Continue development of new or enhanced attractants for cats to improve cat control and monitoring. Ensure availability of any attractants that are developed

Robust monitoring of feral cats can be difficult because of their dispersed spread and occurrence at low densities. In some circumstances it is necessary to use lures to attract cats into monitoring locations and control locations (e.g. traps). Although a range of visual, olfactory and auditory lures have been developed to attract feral cats; all lures are only partially successful. Action 1.7 identifies the development and assessment of other lures so that land managers get better results with their monitoring or control.

Action 1.8 Research into other control and monitoring technologies and enhancing available technology

Action 1.8 identifies the need for ongoing research into new control and monitoring tools. Included in the new control tools is support for euthanasia methods, particularly for small community groups where the current options (e.g. shooting, lethal injection administered by a vet) are not available or are too expensive/inhumane.

There are two elements to the monitoring tools. Firstly, there is a need for simple, low cost and low effort monitoring tools for small community groups with few resources. Secondly, there is a need to develop or enhance cost-effective monitoring technologies for feral cats more broadly and, where possible, collate the results. Further to this, a greater understanding of the links between feral cat numbers and impacts will allow land managers to know the appropriate level of control required. Unfortunately, there may be instances where the majority of the impact is caused by one or two individuals that have specialized in a particular prey item (e.g. the threatened species).

Action 1.9 Re-investigate diseases and other potential biocontrol agents and immunocontraceptive options for cats, and commence research on promising options. Undertake social research on promising options to gauge community support

Biological control agents such as cat-specific diseases have been reviewed in the past (e.g. Moodie 1995). However, with new techniques, a greater capacity to gather international information, and the possibility of

other emergent diseases, it is appropriate to undertake a new review to search for biological control and immunocontraceptive options. This is captured in action 1.9. This search, and any subsequent research on promising agents, will need to consider the risk to domestic cats and to other felid species internationally should the biological control agent escape from the country. If a promising agent is identified, social research would need to be undertaken to ensure there would be community understanding and support for a potential release. An effective method for gauging community support would be via a deliberative process of decision-making (e.g. an iterative approach based on a Technology Impact Assessment).

Action 1.10 Code of Practice and/or Standard Operating Procedures developed for new tools and agreed by governments

There is a nationally agreed *Code of practice for the humane control of feral cats* (Sharp & Saunders 2010) and Standard operating procedures for ground-shooting of feral cats, trapping of feral cats using cage traps and trapping of feral cats using padded-jaw traps (Sharp 2012a; Sharp 2012b; Sharp 2012c). As new tools become available the code of practice will require updating and new standard operating procedures may be required. Action 1.10 seeks these updates or new documents and endorsement by all governments.

PERFORMANCE INDICATORS

- Additional tools, including toxic baiting, are included as elements of effective management programs for cats.
- Broad-scale toxic bait available for use in all Australian environments.
- Interactions between predator species are understood and, if suitable, actively incorporated into management programs for feral cats.
- The role of other major landscape modifiers is understood and, where suitable, these are exploited in management programs for feral cats.
- New or enhanced attractants available for feral cat monitoring and control.
- New research into control and monitoring of feral cats undertaken and published.
- Monitoring of feral cats undertaken and results nationally reported (e.g. via Catscan).
- Contemporary understanding is gained of potential biocontrol agents for feral cats.
- Standard operating procedures (SOP) developed for new tools and the code of practice (COP) updated to include new tools. SOPs and COP to be agreed and adopted by governments.

Action	Priority and timeframe	Output	Outcome	Responsibility
1.1 Ensure toxic baits targeting feral cats are registered and available for use across all of Australia.	Very high priority, medium term	Toxic baits available to registered users	Effective broad scale control programs using toxic baits can be undertaken in conservation areas	Bait developers and governments
1.2 Have a broad-scale toxic bait available for northern Australia to complement other toxic baits	Very high priority, medium term	Toxic bait available to registered users in northern Australia	Effective broad-scale control programs using toxic baits can be undertaken in northern Australian	Bait developers and governments

Action	Priority and timeframe	Output	Outcome	Responsibility
			conservation areas	
1.3 Develop and register other cat control tools, including devices exploiting cat grooming habits.	Very high priority, medium term and ongoing	Tools available to registered users	Effective control programs using the tool can be undertaken	Tool developers and governments
1.4 Continue research into understanding interactions between feral cats and other predators: (i) in different landscapes; and (ii) any potential beneficial/perverse outcomes if other predator populations are modified.	High priority, medium term	A clear understanding of how other predators influence and are influenced by management programs for feral cats	If suitable, land managers are able implement management programs for cats that have regard to other predators	Researchers and land managers
1.5 Continue research into understanding the role of other major landscape modifiers, such as fire or grazing by introduced herbivores, in cat activities and control.	High priority, long term	An understanding of how other landscape modifiers may impact on cat predation	Land managers are able to understand the impacts of landscape modifiers to better implement cat management programs.	Researchers and land managers
1.6 Continue research into the scale, efficiency, cost-effectiveness, and risks of feral cat control options	High priority, medium term	Knowledge about effective feral cat control options suitable for different sites	Land managers are able to understand the complexities of different control method choices and implement effective options.	Researchers and land managers
1.7 Continue development of new or enhanced attractants for cats to improve cat control and monitoring. Ensure availability of any attractants that are developed.	Medium priority, medium term	New or enhanced attractants available	More effective control and monitoring for cats	Researchers for development and product manufacturers
1.8 Research into other control and monitoring technologies and enhancing available technology	Medium priority, long term - ongoing	New tools for control and monitoring of cats	Greater range of options for land managers to control cats	Researchers and product manufacturers

Action	Priority and timeframe	Output	Outcome	Responsibility
1.9 Re-investigate diseases and other potential biocontrol agents and immunocontraceptive options for cats, and commence research on promising options. Undertake social research on promising options to gauge community support.	High priority, long term - ongoing	Report outlining potential biocontrol options for cats. If appropriate, a long-term research project commenced.	Stakeholder understanding of the potential for biocontrol for cats. Start of research into promising biocontrol agent(s).	Government and researchers
1.10 Code of Practice and/or Standard Operating Procedures developed for new tools and agreed by governments	High priority, short term	Code of Practice or Standard Operating Procedures available for all control tools	Control of feral cats is undertaken in an effective manner as humanely as possible	Product developers and governments

OBJECTIVE 2 IMPROVE EFFECTIVENESS OF EXISTING CONTROL OPTIONS FOR FERAL CATS

Objective 2 focuses on delivering management options to land managers and ensuring they are able to conduct control programs effectively according to current best practice techniques and knowledge. Linking land managers with the outputs from research will improve programs for threatened species recovery where predation by feral cats is a contributing factor. In this threat abatement plan land managers are considered to encompass any person or group that has a responsibility for land management from individual land owners to community groups to Indigenous people caring for their country.

Action 2.1 Understand motivations and provide incentives for land managers to include cat management into standard land management for biodiversity outcomes

Land managers are typically very busy with competing priorities for management activities. Action 2.1 is a social science focused action to determine the motivations and best incentives (and possible penalties) to encourage land managers to include a cat management program into their many activities. Naturally, the outcome of this action will assist in the delivery of training material in Action 2.2 below.

Action 2.2 Provide information, in various media and through training, on best practice methods and standard operating procedures for controlling and monitoring feral cats

Action 2.2 focuses on providing training material to land managers so that they can access information on the best way to undertake both monitoring and control for feral cats in their landscape. Land managers are rarely experts on feral cats so being able to provide this information will take the guesswork out of when and how to control and monitor. It also provides an opportunity for researchers and land managers to collaborate to improve the on-ground outcomes.

Action 2.3 Ensure areas prioritized for cat management across Australia maximize benefits to biodiversity at a local, regional and national level

The 2008 threat abatement plan contained an action to identify priority areas based on criteria linked to threatened species and ecological communities. The outcomes from this action are still relevant. Action 2.3 takes this concept a step further to make sure that the scale of prioritisation is captured. For national

threatened species recovery it is important to consider populations of the species across the entire range and prioritise threat abatement actions for important native populations at threat from predation by feral cats. These particular sites may or may not be identified at a regional or local level due to other factors, or vice versa. An understanding of where it is critical to undertake feral cat management for threatened species will assist in more holistic cat management across Australia and provide decision-making guidance for national funding programs.

Action 2.4 Governments agree to consistent legislation that identifies feral cats as a pest, has requirements for control, and identifies control techniques that may be used

Feral cats are not declared as a pest in legislation in all states and territories, and requirements for control of feral cats are variable across the country. While recognising the means of achieving pest status and control requirements does not need to be uniform, it is desirable that land managers are able to legally undertake or have legislative support to undertake effective control programs as needed. Action 2.4 seeks to gain support from all state and territory governments to consider their legislation and, if necessary, amend to provide a mechanism for effective control of feral cats.

PERFORMANCE INDICATORS

- Training material and information widely available, including via the internet, for land managers on effective management and monitoring techniques for cats. Training programs delivered in all states and territories.
- Cat management programs for biodiversity are in place in all programs in prioritised areas.
- The abundance and impacts of feral cats are reduced in priority areas. To be measured through the recovery of species in the area and a reduction in the abundance of feral cats (specific targets will be dependent on the particular species and monitoring ability but should be identified in the relevant program plan).
- Consistent or complimentary legislation across all states and territories enabling effective control of feral cats.

Action	Priority and timeframe	Output	Outcome	Responsibility
2.1 Understand motivations and provide incentives for land managers to include cat management into standard land management for biodiversity outcomes	High priority, short term	Options for providing incentives to land managers for cat control	A greater proportion of land managers undertaking effective cat management	Social scientists and governments
2.2 Provide information, in various media and through training, on best practice methods and standard operating procedures for controlling and monitoring feral cats	High priority, medium term	Training material is available to land managers on how to effectively control and monitor feral cats and their impacts	Land managers running management programs for feral cats can effectively design and adapt the program	Researchers in association with communications or education specialists to develop the material. Land managers for uptake.
2.3 Ensure areas prioritised for cat management across Australia maximise benefits to biodiversity	Medium priority, long term -	An understanding of how	A holistic approach to cat management	Governments in association with land managers

at a local, regional and national level	ongoing	management programs provide effective threat abatement on all scales	for threat abatement	conducting management programs
2.4 Governments agree to consistent legislation that identifies feral cats as a pest, has requirements for control, and identifies control techniques that may be used	High priority – short term	Consistent legislation for feral cats	Land managers in all states and territories legally able to undertake effective control of feral cats	Governments

OBJECTIVE 3 DEVELOP OR MAINTAIN ALTERNATIVE STRATEGIES FOR THREATENED SPECIES RECOVERY

Objective 3 is focused on providing options where sustained control of cats is not possible or the degree of sustained control is insufficient to enable threatened species recovery. It is likely that any threatened species recovery program will need to incorporate a range of approaches to abate the threat. Also included in this objective is a consideration of the impact of disease transmission from feral cats to native animals and how this impact may be mitigated.

Action 3.1 Eradicate, or control, cats on offshore islands of high biodiversity, or potentially high biodiversity, value

Action 3.1 emphasises the importance that islands have in maintaining biodiversity. Cat eradication programs have been successful on a number of islands and similar programs on at least two more large islands (Dirk Hartog Island and Christmas Island) are underway. These islands are or will become important refuges for threatened species, or have endemic species that are threatened in the case of Christmas Island. This action has the option for sustained control on off-shore islands. This is generally not cost-effective in the long-term but is included to acknowledge that there may be islands where, at the present time, it is not possible (for financial, resourcing or technical reasons) to completely eradicate feral cats. In these situations it may be worthwhile investing in a sustained control program where it enhances the survival of threatened species.

Action 3.2 Establish, enhance or maintain biosecurity measures for cat-free offshore islands to prevent incursions

Establishing or maintaining biosecurity measures for islands that do not have feral cats is critical. Action 2.2 addresses issues of provision of appropriate training and information to support and undertake biosecurity.

Action 3.3 Establish and maintain further fenced reserves (“mainland islands”) for threatened species where it is identified cats cannot be controlled to the level required for recovery

Cats are present almost everywhere in the mainland Australian landscape so there are no natural mainland refuges that can be exploited for threatened species recovery. Instead, where a threatened species population is sufficiently threatened it may be possible to fence an area of habitat with a predator-proof fence. Action 3.3 recognizes this as an important option for some of the most threatened species that are unlikely to survive without such action. Predator-proof fence designs are now standard but are expensive and require significant ongoing monitoring and maintenance.

Action 3.4 Research methods to understand thresholds of cat abundance required to improve survival rates for threatened species heavily preyed upon by feral cats. Research ways in which adaptation by threatened species may improve survival rates

Action 3.4 focuses on further research into alternatives to direct killing or complete exclusion of feral cats that can help threatened species populations to recover. Examples of this may include research into how habitats can be manipulated (e.g. increase the structural complexity of vegetation), the use of guardian dogs (e.g. Marrema breed) or trained hunting dogs to protect threatened species populations, and the training or selection of traits within a species to make them more predator savvy. Directly linked to this action is Action 1.8 on understanding feral cat abundance and impact on threatened species in the landscape.

*Action 3.5 Continue research into cat diseases, including *Toxoplasma gondii*, their prevalence, ability to transmit to other species (including livestock and humans) their impacts, and ways to mitigate the impacts*

Cats in Australia carry a number of diseases that are transmissible to other species. The best known of these is toxoplasmosis, caused by a protozoan parasite called *Toxoplasma gondii*, of which felids are the only definitive host. Action 3.5 acknowledges that the transmission of diseases from feral cats can have a deleterious impact on social and economic values, as well as biodiversity. Consequently, through this action, the plan seeks to focus research into the impacts of these cat-borne diseases on other species including threatened species, other native animals, livestock and humans.

PERFORMANCE INDICATORS

- Further offshore islands cat-free or under sustained control programs, with a minimum of five further islands.
- Implementation of effective biosecurity programs for all islands that are currently cat-free and at risk of a cat incursion.
- Further fenced reserves (“mainland islands”) created for at least 20 threatened species most affected by predation.
- Research conducted into alternative ways to assist threatened species to avoid predation.
- Cat borne diseases and their impact on other species are better understood. A review is publicly available.

Action	Priority and timeframe	Output	Outcome	Responsibility
3.1 Eradicate, or control, cats on offshore islands of high biodiversity, or potentially high biodiversity, value.	Very-high priority, long term	Cats eradicated or under sustained control on offshore islands	Cat-free islands where threatened species can be recovered	Island owners or managers
3.2 Establish, enhance or maintain biosecurity measures for cat-free offshore islands to prevent incursions.	Very high priority, short term	Cat-free offshore islands have biosecurity measures	Cat-free islands remain cat free.	Island owners or managers and all visitors
3.3 Establish and maintain further fenced reserves (“mainland islands”) for threatened species where it is identified cats cannot be controlled to the level required for recovery	Very high priority, medium term	Fenced reserves created and maintained for key threatened species	Threatened species recovery for species under greatest pressure by predation by	Government and non-government conservation land managers

		populations	feral cats	
3.4 Research methods to understand thresholds of cat abundance required to improve survival rates for threatened species heavily preyed upon by feral cats. Research ways in which adaptation by threatened species may improve survival rates.	High priority, long term - ongoing	Use of alternative methods (to cat management actions or exclusion fencing) for threatened species protection	More resilient populations of threatened species to the effects of cat predation	Researchers
3.5 Continue research into cat diseases, including <i>Toxoplasma gondii</i> , their prevalence, ability to transmit to other species (including livestock and humans) their impacts, and ways to mitigate the impacts.	High priority, medium term	An understanding of cat diseases and their impacts	Impact of disease transmission from feral cats is mitigated	Researchers and land managers

OBJECTIVE 4 INCREASE PUBLIC SUPPORT FOR FERAL CAT MANAGEMENT AND PROMOTE RESPONSIBLE CAT OWNERSHIP

Objective 4 is particularly important for a species that is also highly valued as a domestic companion by many in the community. To have support from the community to manage feral cats it is important to have ongoing education campaigns to raise awareness about the impact of predation by feral cats on threatened species and ecological communities. One of the significant challenges to overcome with this type of education is engaging different audiences in the right way. It is also important that the messages are believable, the source trustworthy and an emphasis placed on the contribution from the individual being valuable.

Action 4.1 Quantify the proportion of the domestic and stray cat population that transitions to the feral cat population

It is poorly known what the contribution of domestic and stray cats are to the feral cat population and if this has any significant impact on the threat of predation on threatened species. This is particularly the case for more remote communities or places where domestic cats are actively encouraged to hunt (e.g. farms for rodent control). A clearer understanding of how many domestic and stray cats make the transition will inform public education about responsible ownership or the control of stray cats.

Action 4.2 Promote to the community: an understanding of the threat to biodiversity posed by cats and support for their management; an understanding of the transitions between domestic, stray and feral cats, and the need for responsible ownership; and support for the containment of domestic cats where their roaming may impact on identified conservation areas

Action 4.2 focuses on gaining community support on three elements. Firstly, as outlined above, an understanding of the biodiversity impacts posed by cats. Secondly, an understanding that all cats are the same species and cats may transition to and from domestic to feral. Incorporated into this is the concept of responsible ownership, including responsibility for stray cats. For people living, visiting or moving to offshore islands, an understanding of the biosecurity risks and requirements related to cats is also required. Thirdly, while many de-sexed domestic cats tend to be more passive, domestic cats do negatively impact on

native animals. The last element seeks support for expansion of 24-hour containment requirements for domestic cats, particularly close to identified conservation areas of significance.

It must be noted that the Australian Government does not have the jurisdiction to legislate to require the control of domestic cats (or feral cats) as this is the responsibility of state, territory and local governments. However, as domestic cats are a key source of cats entering into the feral population it is important to recognize actions that can contribute to reducing this problem.

Action 4.3 Promote the reduction of food and other resources to stray cats

Action 4.3 considers stray cat’s exploitation of human resources. These include refuse from rubbish tips, food outlets and some small-holdings. Minimising the availability of food may slow the rate of population increase and this may lead to fewer numbers of feral cats. The deliberate feeding of stray cats should be discouraged on animal welfare grounds. The concept of trapping, neutering and releasing stray cats as a method of population control should also be discouraged on animal welfare grounds and because it is not effective, except where populations are truly isolated and all females are neutered. As noted above for domestic cats, the Australian Government does not have the jurisdiction to legislate with respect to stray cats.

Action 4.4 Develop specific communication campaigns to accompany the release of new broad-scale cat control techniques, and other current/new cat control techniques

Action 4.4 builds on the requirement to gain community support for feral cat management. The release of new toxic baits for feral cats, even with restrictions on their availability and use, may be of concern to elements of the community. An effective communications campaign will be essential for the successful roll out of such products.

Across all of the actions in objective 4 is the need for consideration of Indigenous peoples and their particular cultural beliefs about feral cats. This is particularly the case in central and northern Australia where the land tenure by Indigenous people is high. These areas often have a rich diversity of threatened species requiring protection from cat predation. Culturally appropriate communication and education materials will be required.

PERFORMANCE INDICATORS

- Measurable increase in community support for feral cat management. The increase to be measured from a baseline study on commencement of the threat abatement plan.
- Increase in effective management for domestic cats with communities in all states and territories with confinement regulations.

Action	Priority and timeframe	Output	Outcome	Responsibility
4.1 Quantify the proportion of the domestic and stray cat population that transitions to the feral cat population	Medium priority, short term	An understanding of the transition between domestic, stray and feral populations	Information for communities to understand the links between domestic and feral animals	Researchers and governments

<p>4.2 Promote to the community:</p> <ul style="list-style-type: none"> - an understanding of the threat to biodiversity posed by cats and support for their management; - an understanding of the transitions between domestic, stray and feral cats, and the need for responsible ownership; - support for the containment of domestic cats where their roaming may impact on identified conservation areas 	<p>High priority, short term - ongoing</p>	<p>Further education material developed and utilised</p>	<p>Community support for the control of feral cats. Community ownership and responsibility for domestic and stray cats.</p>	<p>Governments and community</p>
<p>4.3 Promote the reduction of food and other resources to stray cats</p>	<p>High priority, medium term</p>	<p>Education material developed and utilised</p>	<p>Reduced availability of resources for stray cats</p>	<p>Governments and community</p>
<p>4.4 Develop specific communication campaigns to accompany the release of new broad-scale cat control techniques, and other current/new cat control techniques</p>	<p>High priority, short term</p>	<p>Communication campaign undertaken</p>	<p>Community understanding of the need for feral cat control and are supportive</p>	<p>Government</p>

3 DURATION, COST, IMPLEMENTATION AND EVALUATION OF THE PLAN

3.1 DURATION

This plan reflects the fact that the threat abatement process is likely to be ongoing, as there is no likelihood of nationally eradicating all feral cats in the foreseeable future. The plan lays out measures that should be taken in the next five years to reduce the impact from the key threatening process of predation by feral cats and from the additional threats that feral cats pose through indirect impacts such as disease transmission and ecological changes.

Threat abatement plans have a statutory review point within five years but have a formal life of ten years. Dependent on the degree of implementation and success of that implementation some or many of the objectives and actions in this plan may be valid for the full ten years.

3.2 COST OF THE PLAN

Investment in many of the threat abatement plan actions will be determined by the level of resources that stakeholders commit to management of the problem. The Commonwealth is committed, via the EPBC Act, to *implement the threat abatement plan to the extent to which it applies in Commonwealth areas*. However, it should be noted that the Australian Government is unable to provide funding to cover all actions in this threat abatement plan across all of Australia and requires the financial and implementation support from stakeholders.

Outlined below are some estimates of costs of implementation of the actions within the plan. These have been placed in this section instead of against each objective because it is difficult to fully cost the implementation of each action because of unknown variables. In particular, research or field project costs are going to be highly variable dependent on the subject and location. A more remote location, or one with difficult access, will cost more than an accessible site. Other actions are contingent on particular prior actions (e.g. identification of high priority sites) and cannot be accurately costed until the prior action is undertaken. What is presented here are estimates of different elements to actions within the plan to provide a guide to governments, researchers, land managers, island owners, community and others when considering what actions they may be able to implement. Anyone looking to implement an action is strongly recommended to undertake their own budget exercise for their particular circumstances and outcomes sought.

Action	Estimated cost	Total cost across TAP
Baiting for feral cats Bait development – new bait Field baiting (including permits, preparation, bait cost, aerial delivery, ground staff and monitoring)	\$3 million for a variation on existing baits suitable for new areas. \$6 million to develop a new bait. \$30,000-40,000 for 200km ² . Note costs will not scale exactly by area.	\$1 million – Curiosity available \$3 million – modified Curiosity for northern Australia \$30,000-40,000 to control 200 km ² .
Other current control methods Ground shooting Trapping	\$5,000-10,000 per week for ground shooting. \$3,000-4,000 per week for a single trap line.	\$4,000-10,000 per week
Exclusion fencing	\$50,000 per kilometre of fencing to install. \$150,000 per year for ongoing maintenance.	\$2.5 million to establish 5 areas of 10 km ² . \$3.75 million for ongoing maintenance of these areas for 5 years.

Action	Estimated cost	Total cost across TAP
Island eradications	\$2 million – 6 million per island	\$2 million – 6 million per island
Island Biosecurity Ranging from signage to a quarantine officer	\$500 – signs \$60,000 per year – part time quarantine officer	\$500 - \$300,000 over 5 years.
Social research Including community attitudes, incentives for control.	\$200,000 per six-month project involving community engagement.	\$600,000 across 3 actions.
Research projects Includes research into new tools, attractants, ecological modifiers, diseases, biocontrols, monitoring techniques Development and registration of cat control devices.	\$250,000 per year per researcher, including field costs \$3 million for devices.	\$4 million across 9 actions. \$9 million for 3 devices.
Prioritisation of cat control areas	\$100,000 for an initial broad prioritisation across all of Australia.	\$100,000 + additional for finer scale prioritisation. \$500,000
Community education general promotion of feral cat issues promotion of stray cat issues campaign for releases of new control techniques	\$200,000 \$100,000 \$200,000	1. \$1 million over 5 years 2. \$200,000 3. \$200,000
Training materials Including materials using different media and courses	1. \$10,000 to \$100,000 to develop different materials 2. \$2,000 to \$200,000 for delivery	1. \$500,000 over 5 years 2. \$300,000 over 5 years

This threat abatement plan 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 need to 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

The Department of the Environment will work with other Australian Government agencies, state and territory governments, 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 cats. For example, Indigenous communities' views need to be fully considered. It will be important to consult and involve the full range of stakeholders in implementing the actions in this plan.

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

The Department of the Environment will convene a threat abatement plan 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 agency researchers, and non-government organisations.

3.3 PLANNING LINKS

This threat abatement plan will tie in with other complementary planning processes and strategies for threat abatement and threatened species recovery. These will include other threat abatement plans where there is a clear overlap in issues (for example the *Threat abatement plan for predation by the European red*

fox (DEWHA 2008c) and recovery plans. The intersection between recovery plans and threat abatement plans is where there are threats to a native species which need to be addressed on a broader scale than on an individual species level or group of species level (where there are regional recovery plans). An example of this is the development of broad-scale baits for feral cats.

This threat abatement plan can also provide a base to develop targets or a source of justification for funding of scientific research or management actions.

3.4 EVALUATING IMPLEMENTATION OF THE PLAN

It may be difficult to assess directly the effectiveness of the plan in abating the impacts of feral cats on Australia's biodiversity. However, performance indicators have been provided against each of the objectives to provide an indication of the level of threat abatement that has been achieved.

Measurements in the improvement of threatened species populations or conditions can be monitored particularly where the primary threat is feral cat predation. However, in many situations, feral cat management is only an element of a complete recovery plan so being able to accurately assess impact of feral cat control may be difficult. Individual feral cat control programs with comprehensive monitoring may be able to see a recovery in the threatened species populations.

3.5 THREATENED SPECIES ADVERSELY IMPACTED BY FERAL CATS

Appendix A lists threatened species that are known to, or may, be adversely affected by predation by feral cats. The threatened species included are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or, in the case of mammals, identified as being threatened by feral cat predation in *The Action Plan for Australian Mammals 2012* (Woinarski et al. 2014). 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 FERAL CATS

Table A1 outlines the various statuses of mammals which may be affected by feral cats and the relative risk of feral cat predation on those species. These species were determined from *The Action Plan for Australian Mammals 2012* (Woinarski et al. 2014) and from profiles which identified predation by feral cats as a threatening process in the Australian Government's Species Profile and Threats Database (SPRAT). The Action Plan status is the conservation status assigned to a species by Woinarski et al. (2014) and has been based on the International Union for Conservation of Nature's (IUCN) Red List criteria. The overall threat rating considers both the severity and extent of feral cat predation and has been developed from *The Action Plan for Australian Mammals 2012* (Woinarski et al. 2014). For example, the threat is considered to be high risk where there may be a moderate consequence over the entire range, a severe consequence across a large extent of the range, or a catastrophic consequence across a moderate extent of the range (Woinarski *pers. comm.* March 2015). The number of other threats and those which are an equal or greater threat to feral cat predation are also from Woinarski et al. (2014).

TABLE A1: THREATENED MAMMAL SPECIES THAT MAY BE ADVERSELY AFFECTED BY FERAL CATS.

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Bettongia lesueur lesueur</i>	Burrowing Bettong (Shark Bay), Boodie	Vulnerable	Near Threatened (Conservation dependent)	Near threatened ¹	Moderate	6	Climate change/severe weather events (moderate); predation by red foxes (moderate) ² ; predation by black rats (moderate) ² ; novel disease (moderate) ² .
<i>Bettongia penicillata ogilbyi</i>	Woylie	Endangered	Critically endangered	Critically endangered ¹	High - very high	6	Predation by red foxes (high - very high); inappropriate fire regimes in presence of cats and foxes (high)
<i>Burramys parvus</i>	Mountain Pygmy-possum	Endangered	Critically endangered	Critically endangered	Very high	7	Inappropriate fire regimes (very high); predation by red foxes (very high); habitat loss and fragmentation (very high)
<i>Conilurus penicillatus</i>	Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma	Vulnerable	Vulnerable	Near threatened	High - very high	6	Inappropriate fire regimes (high); habitat loss and fragmentation (high)

¹ IUCN Red List Status provides the status at species level and is taken to include the subspecies (a separate assessment at the subspecies level has not been completed at this stage).

² This threat rating is based on the introduction and establishment of the pest species to islands within the range of the mammal species. At present, the pest species has either been eradicated, is not present, or has not established in large enough numbers to threaten the mammal within its current range.

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Crocidura trichura</i>	Christmas Island Shrew	Endangered	Critically endangered (Possibly Extinct)	Critically endangered	Very high	8	Novel disease (extreme)
<i>Dasyercus cristicauda</i>	Crest-tailed Mulgara	Vulnerable	Near Threatened	Least Concern	High	4	Predation by red foxes (high); habitat change due to livestock and feral herbivores (high)
<i>Dasyuroides byrnei</i>	Kowari	Vulnerable	Vulnerable	Vulnerable	High	9	Predation by dingoes/wild dogs (high); climate change (high)
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	Vulnerable	Near Threatened (Conservation dependent)	Near threatened	Moderate	6	Predation by red foxes (very high); consumption of toxic feral cat baits (very high);
<i>Dasyurus hallucatus</i>	Northern Quoll	Endangered	Endangered	Near threatened	High	9	Inappropriate fire regimes (high); poisoning by cane toads (very high)
<i>Dasyurus maculatus gracilis</i>	Spotted-tailed Quoll or Yarri (North Queensland subspecies)	Endangered	Endangered	Near threatened ¹	Moderate	7	Habitat loss and fragmentation (moderate); climate change/severe weather events over several decades (very high); poisoning associated with control of non-native predators (moderate); predation by wild dogs (moderate)
<i>Dasyurus maculatus maculatus (SE mainland population)</i>	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (south-eastern mainland population)	Endangered	Vulnerable	Near threatened ¹	Moderate	10	Inappropriate fire regimes (moderate); predation by red foxes (very high); predation by dingoes/wild dogs (high); habitat loss and fragmentation (moderate);
<i>Dasyurus maculatus maculatus (Tasmanian population)</i>	Spotted-tail Quoll, Spot-tailed Quoll, Tiger Quoll (Tasmanian population)	Vulnerable	Vulnerable	Near threatened ¹	Moderate	9	Habitat loss and fragmentation (high); timber production (high)
<i>Hipposideros semoni</i>	Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat	Endangered	Near Threatened	Data deficient	Minor	5	Disturbance at roost sites (minor); destruction or reduced accessibility of roost sites (minor); extensive, frequent and intense fires (minor); habitat change due to pastoralism (minor); habitat loss and fragmentation (minor)

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Isoodon auratus auratus</i>	Golden Bandicoot (mainland)	Vulnerable	Vulnerable	Vulnerable ¹	Moderate	4	Inappropriate fire regimes (moderate)
<i>Isoodon obesulus nauticus</i>	Southern Brown Bandicoot (Nuyts Archipelago)	Vulnerable	Near Threatened	Least Concern ¹	Moderate - high	10	Predation by red foxes (high); habitat loss and fragmentation (high)
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (Eastern)	Endangered	Near Threatened	Least Concern ¹	Moderate - high	10	Predation by red foxes (high); habitat loss and fragmentation (high)
<i>Lagorchestes hirsutus</i> unnamed subsp.	Mala, Rufous Hare-Wallaby (central mainland form)	Endangered	Endangered	Vulnerable ¹	Moderate (extreme if species introduced on islands ²)	5	Inappropriate fire regimes (very high); predation by foxes (extreme) ² ; predation by black rats (very high - extreme) ² ; novel disease (moderate - very high) ²
<i>Lagostrophus fasciatus fasciatus</i>	Banded Hare-wallaby, Merrinine, Marnine, Munning	Vulnerable	Vulnerable	Endangered ¹	Moderate (extreme if species introduced on islands)	3	Predation by red foxes (moderate); climate change/severe weather events (very high); novel disease (moderate)
<i>Leporillus conditor</i>	Wopilkara, Greater Stick-nest Rat	Vulnerable	Near Threatened (Conservation dependent)	Vulnerable	Moderate ²	3	Predation by red foxes (moderate)
<i>Macrotis lagotis</i>	Greater Bilby	Vulnerable	Vulnerable	Vulnerable	Very high - extreme	5	Predation by red foxes (extreme);
<i>Mesembriomys macrurus</i>	Golden-backed Tree-rat, Koorrawal	Vulnerable	Near Threatened	Least Concern	Moderate	2	Inappropriate fire regimes (high)
<i>Myrmecobius fasciatus</i>	Numbat	Vulnerable	Endangered	Endangered	Very high	4	Predation by red foxes (very high - extreme); Predation by raptors (high - very high)
<i>Notomys aquilo</i>	Northern Hopping-mouse, Woorrentinta	Vulnerable	Vulnerable	Endangered	Very high	2	Inappropriate fire regimes (very high)
<i>Notomys fuscus</i>	Dusky Hopping-mouse, Wilkiniti	Vulnerable	Vulnerable	Vulnerable	High - very high	4	Habitat change due to livestock and feral herbivores (high - very high)
<i>Notoryctes caurinus</i>	Kakarratul, Northern Marsupial Mole	Endangered	Least Concern	Data deficient	Moderate	5	Predation by red foxes (moderate); predation by dingoes/wild dogs (moderate)

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Notoryctes typhlops</i>	Itjaritjari, Southern Marsupial Mole, Yitjarritjarri	Endangered	Least Concern	Data deficient	Moderate	5	Predation by red foxes (moderate); predation by dingoes/wild dogs (moderate)
<i>Onychogalea fraenata</i>	Bridled Nail-tail Wallaby	Endangered	Vulnerable	Endangered	Very high	10	Predation by red foxes (very high); climate change/severe weather events (very high); predation by dingoes/wild dogs (very high); habitat loss and fragmentation (very high); Habitat degradation and resource depletion due to livestock and feral herbivores (very high)
<i>Parantechinus apicalis</i>	Dibbler	Endangered	Endangered	Endangered	High	4	Inappropriate fire regimes (high); predation by red foxes (high); habitat degradation due to <i>Phytophthora cinnamomi</i> (high)
<i>Perameles bougainville bougainville</i>	Western Barred Bandicoot (Shark Bay)	Endangered	Vulnerable	Endangered	Moderate (extreme if species introduced on islands ²)	3	Predation by red foxes (moderate); climate change/severe weather events (high); novel disease (moderate)
<i>Perameles gunnii gunnii</i>	Eastern Barred Bandicoot (Tasmania)	Vulnerable	Vulnerable	Near threatened ¹	Very high	10	Novel disease (very high)
<i>Perameles gunnii</i> unnamed subsp.	Eastern Barred Bandicoot (Mainland)	Endangered	Endangered	Near threatened ¹	Very high	10	Predation by red foxes (extreme); loss of genetic diversity (very high)
<i>Petaurus gracilis</i>	Mahogany Glider	Endangered	Endangered	Endangered	Minor	7	Inappropriate fire regimes (high - very high); habitat loss and fragmentation (very high); barbed wire fencing entanglement (minor); vehicle mortality (minor); predation by wild dogs (minor); habitat change due to livestock (minor); habitat change due to weeds (minor)
<i>Petrogale lateralis</i> MacDonnell Ranges race	Warru, Black-footed Rock-wallaby (MacDonnell Ranges race)	Vulnerable	Vulnerable	Near threatened ¹	High	6	Inappropriate fire regimes (high); predation by red foxes (extreme); habitat degradation due to weeds (high)

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Vulnerable	Vulnerable	Near threatened	Minor	7	Predation by red foxes (very high); habitat change due to livestock and feral herbivores (high); predation by wild dogs (minor); Small subpopulation size (minor); habitat degradation and resource depletion due to native herbivores (minor); habitat loss and fragmentation (minor); inappropriate fire regimes (minor)
<i>Petrogale persephone</i>	Proserpine Rock-wallaby	Endangered	Endangered	Endangered	Moderate	6	Predation by wild dogs (moderate); habitat loss and fragmentation (high)
<i>Petrogale xanthopus xanthopus</i>	Yellow-footed Rock-wallaby (SA and NSW)	Vulnerable	Near Threatened	Near threatened	High	5	Predation by red foxes (extreme); habitat change due to livestock and feral herbivores (high)
<i>Phascogale calura</i>	Red-tailed Phascogale	Endangered	Near Threatened	Near threatened	Very high	4	Habitat loss and fragmentation (very high); climate change/severe weather events (very high)
<i>Phascogale pirata</i>	Northern Brush-tailed Phascogale	Vulnerable	Vulnerable	Vulnerable	High	7	Inappropriate fire regimes (high); poisoning by cane toads (high); climate change (high)
<i>Potorous gilbertii</i>	Gilbert's Potoroo	Critically Endangered	Critically endangered	Critically endangered	High - very high	2	Inappropriate fire regimes (extreme); predation by red foxes (high - very high)
<i>Potorous longipes</i>	Long-footed Potoroo	Endangered	Vulnerable	Endangered	High	6	Inappropriate fire regimes (high); predation by red foxes (very high); predation by dingoes/wild dogs (high)
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (SE mainland)	Vulnerable	Near Threatened	Least Concern ¹	High	7	Inappropriate fire regimes (very high); predation by red foxes (very high); predation by dingoes/wild dogs (high); habitat loss and fragmentation (very high)
<i>Pseudantechinus mimulus</i>	Carpentarian Antechinus	Vulnerable	Near Threatened	Endangered	Moderate	4	Inappropriate fire regimes (high)

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum, Ngwayir	Vulnerable	Critically endangered	Vulnerable	Very high - extreme	6	Inappropriate fire regimes (very high); predation by red foxes (very high - extreme); climate change/severe weather events (very high - extreme)
<i>Pseudomys fieldi</i>	Shark Bay Mouse, Djoongari, Alice Springs Mouse	Vulnerable	Vulnerable	Vulnerable	Moderate (very high if cats establish on islands ²)	4	Predation by red foxes (moderate) ² ; predation by black rats (moderate) ²
<i>Pseudomys fumeus</i>	Konoom, Smoky Mouse	Endangered	Vulnerable	Endangered	Very high	7	Nil
<i>Pseudomys novaehollandiae</i>	New Holland Mouse, Pookila	Vulnerable	Vulnerable	Vulnerable	Very high	7	Inappropriate fire regimes (very high)
<i>Pseudomys oralis</i>	Hastings River Mouse, Koontoo	Endangered	Vulnerable	Vulnerable	High	6	Predation by red foxes (high); disjunct, genetically distinct populations (moderate)
<i>Pseudomys pilligaensis</i>	Pilliga Mouse, Poolkoo	Vulnerable	Least Concern	Data deficient	Unknown	Unknown	Unknown
<i>Pseudomys shortridgei</i>	Dayang, Heath Rat	Vulnerable	Near Threatened	Near threatened	High	6	Inappropriate fire regimes (high); habitat loss and fragmentation (moderate - high)
<i>Rhinolophus philippinensis</i> (large form)	Greater Large-eared Horseshoe Bat	Endangered	Near Threatened	Least Concern	Minor	6	Inappropriate fire regimes (minor); habitat loss and fragmentation (minor); destruction or reduced accessibility of roost sites (minor); disturbance at roost sites (minor); habitat change due to pastoralism (minor)
<i>Sminthopsis aitkeni</i>	Kangaroo Island Dunnart	Endangered	Endangered	Critically endangered	Very high	3	Inappropriate fire regimes (very high)
<i>Sminthopsis butleri</i>	Butler's Dunnart	Vulnerable	Vulnerable	Vulnerable	Moderate	4	Inappropriate fire regimes (moderate - high); habitat loss and fragmentation (moderate); poisoning by cane toads (moderate)
<i>Sminthopsis douglasi</i>	Julia Creek Dunnart	Endangered	Near Threatened	Near threatened	Very high	4	Nil
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	Endangered	Vulnerable	Endangered	Very high	3	Inappropriate fire regimes (very high); predation by red foxes (very high)

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Xeromys myoides</i>	Water Mouse, False Water Rat, Yirrkoo	Vulnerable	Vulnerable	Vulnerable	Moderate	12	Habitat loss and fragmentation (moderate); habitat degradation due altered hydrology (moderate)
<i>Zyomys maini</i>	Arnhem Rock-rat, Arnhem Land Rock-rat, Kodjper	Vulnerable	Vulnerable	Near threatened	High	3	Inappropriate fire regimes (very high)
<i>Zyomys palatalis</i>	Carpentarian Rock-rat, Aywalirroomoo	Endangered	Critically endangered	Critically endangered	Very high	4	Inappropriate fire regimes (very high); climate change (very high)
<i>Zyomys pedunculatus</i>	Central Rock-rat, Antina	Endangered	Critically endangered	Critically endangered	Very high	4	Inappropriate fire regimes (very high)
<i>Antechinus bellus</i>	Fawn Antechinus	<i>Not listed</i>	Vulnerable	Least Concern	High	4	Inappropriate fire regimes (Very high); poisoning by cane toads (high)
<i>Antechinus godmani</i>	Atherton Antechinus	<i>Not listed</i>	Near threatened	Near threatened	High	3	Climate change in the near future (high)
<i>Bettongia gaimardi</i>	Tasmanian Bettong, Eastern Bettong	<i>Not listed</i>	Vulnerable	Near threatened	High	4	Nil
<i>Bettongia tropica</i>	Northern Bettong	<i>Not listed</i>	Endangered	Endangered	High - very high	8	Climate change/severe weather event (high - very high); small, relictual subpopulations (high); habitat change due to changed fire regimes (high); predation by red foxes if establish in range in the future (extreme)
<i>Dasyurus viverrinus</i>	Eastern Quoll	<i>Not listed</i>	Endangered	Near threatened	High	6	Novel disease (high); predation by red foxes if establish on Bruny Island as well as Tasmania main island (very high)
<i>Hipposideros inornatus</i>	Arnhem Leaf-nosed Bat	<i>Not listed</i>	Endangered	Vulnerable	Minor	3	Inappropriate fire regimes (high); disturbance at roost sites (moderate); Destruction or reduced accessibility of roost sites (moderate)
<i>Lagorchestes conspicillatus</i>	Spectacled Hare-wallaby	<i>Not listed</i>	Near threatened	Least Concern	Moderate	5	Predation by red foxes (moderate); novel disease (moderate)
<i>Macropus parma</i>	Parma Wallaby	<i>Not listed</i>	Near threatened	Near threatened	Moderate	4	Inappropriate fire regimes (high); predation by red foxes (high)
<i>Mastacomys fuscus</i>	Broad-toothed Rat, Tooarrana	<i>Not listed</i>	Near threatened	Near threatened	High	8	Inappropriate fire regimes (high); predation by red foxes (high); climate change/severe weather events (high)
<i>Mesembriomys gouldii</i>	Black-footed Tree-rat, Djintamoonga	<i>Not listed</i>	Vulnerable	Near threatened	High	7	Inappropriate fire regimes (very high)

Scientific Name	Common Name(s)	EPBC Act Status	Action Plan Status	IUCN Red List Status	Overall Threat Rating of feral cat predation	Number of other threats	Other threats which are of equal or greater risk than feral cat predation
<i>Notomys cervinus</i>	Fawn Hopping-mouse, Ooarri	<i>Not listed</i>	Near threatened	Vulnerable	High	4	Nil
<i>Petaurus australis</i>	Yellow-bellied Glider	<i>Not listed</i>	Near threatened	Least Concern	Moderate	5	Inappropriate fire regimes (moderate); habitat loss and fragmentation (high); timber production (moderate)
<i>Petrogale burbidgei</i>	Warabi	<i>Not listed</i>	Near threatened	Near threatened	High	3	Inappropriate fire regimes (high)
<i>Petrogale coenensis</i>	Cape York Rock-wallaby	<i>Not listed</i>	Endangered	Near threatened	Moderate	2	Nil
<i>Petrogale concinna</i>	Nabarlek	<i>Not listed</i>	Near threatened	Data deficient	High	5	Inappropriate fire regimes (high)
<i>Petrogale godmani</i>	Godman's Rock-wallaby	<i>Not listed</i>	Near threatened	Least Concern	High	4	Habitat change due to livestock and feral herbivores (high)
<i>Petrogale purpureicollis</i>	Purple-necked Rock-wallaby	<i>Not listed</i>	Near threatened	Least Concern	High	4	Habitat change due to livestock and feral herbivores (high)
<i>Petrogale sharmani</i>	Mount Claro Rock Wallaby, Sharman's Rock Wallaby	<i>Not listed</i>	Vulnerable	Near threatened	Moderate	4	Habitat change due to livestock and feral herbivores (moderate)
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	<i>Not listed</i>	Near threatened	Near threatened	High	7	Nil
<i>Pseudomys australis</i>	Plains Rat, Palyoora	<i>Not listed</i>	Vulnerable	Vulnerable	Very high	3	Predation by red foxes (very high)
<i>Pseudomys calabyi</i>	Pinti	<i>Not listed</i>	Near threatened	Vulnerable	High	4	Inappropriate fire regimes (very high)
<i>Pseudomys occidentalis</i>	Western Mouse, Walyadji	<i>Not listed</i>	Near threatened	Least Concern	High	3	Habitat loss and fragmentation (high); climate change/severe weather events (high)
<i>Pteropus natalis</i>	Christmas Island Flying-fox	<i>Not listed</i>	Critically endangered	Vulnerable	High	6	Novel disease (high)
<i>Sminthopsis archeri</i>	Chestnut Dunnart	<i>Not listed</i>	Near threatened	Data deficient	High	3	Nil
<i>Sminthopsis bindi</i>	Kakadu Dunnart	<i>Not listed</i>	Near threatened	Least Concern	High - very high	4	Inappropriate fire regimes (high)
<i>Wyulda squamicaudata</i>	Scaly-tailed Possum	<i>Not listed</i>	Near threatened	Data deficient	High	2	Inappropriate fire regimes (very high)

Table A2 outlines the threatened bird, reptile, amphibian and migratory/marine species which may be affected by predation by feral cats. These species were determined from profiles in the Australian Government's Species Profile and Threats Database (SPRAT) which identified predation by feral cats as a threatening process. Note: species listed as marine or migratory are only threatened by feral cats when on shore. This includes predation of juveniles from on shore nests.

Table A2: Threatened species other than mammals that may be adversely affected by feral cats

Species type	Scientific Name	Common Name(s)	EPBC Act Status	IUCN Red List Status
Bird	<i>Accipiter hiogaster natalis</i>	Christmas Island Goshawk	Endangered	Least concern ¹
	<i>Amytornis barbatus barbatus</i>	Grey Grasswren (Bulloo)	Vulnerable	Least concern ¹
	<i>Amytornis modestus</i>	Thick-billed Grasswren	Vulnerable	Not listed
	<i>Botaurus poiciloptilus</i>	Australasian Bittern	Endangered	Endangered
	<i>Cacatua pastinator pastinator</i>	Muir's Corella (southern), Western Long-billed Corella (southern)	Vulnerable	Least concern ¹
	<i>Calonectris leucomelas</i>	Streaked Shearwater	Migratory	Least concern
	<i>Cinclosoma punctatum anachoreta</i>	Spotted Quail-thrush (Mt Lofty Ranges)	Critically Endangered	Least concern ¹
	<i>Cyanoramphus cookii</i>	Norfolk Island Parakeet, Tasman Parrot	Endangered	Near threatened
	<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-Parrot	Endangered	Least concern ¹
	<i>Dasyornis brachypterus</i>	Eastern Bristlebird	Endangered	Endangered
	<i>Epthianura crocea macgregori</i>	Yellow Chat (Dawson)	Critically Endangered	Least concern ¹
	<i>Epthianura crocea tunneyi</i>	Yellow Chat (Alligator Rivers)	Endangered	Least concern ¹
	<i>Fregata andrewsi</i>	Christmas Island Frigatebird, Andrew's Frigatebird	Vulnerable	Critically endangered
	<i>Gallirallus philippensis andrewsi</i>	Buff-banded Rail (Cocos (Keeling) Islands)	Endangered	Least concern ¹
	<i>Gallirallus sylvestris</i>	Lord Howe Woodhen	Vulnerable	Endangered
	<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	Vulnerable	Least concern ¹
	<i>Geophaps smithii blaauwi</i>	Partridge Pigeon (western)	Vulnerable	Vulnerable ¹
	<i>Hylacola pyrrhopygia parkeri</i>	Chestnut-rumped Heathwren (Mt Lofty Ranges)	Endangered	Least concern ¹
	<i>Lathamus discolor</i>	Swift Parrot	Endangered	Endangered
	<i>Leipoa ocellata</i>	Malleefowl	Vulnerable	Vulnerable

¹IUCN Red List Status provides the status at species level and is taken to include the subspecies (a separate assessment at the subspecies level has not been completed at this stage).

S ³ pecies type	Scientific Name	Common Name(s)	EPBC Act Status	IUCN Red List Status
	<i>Lichenostomus melanops cassidix</i>	Helmeted Honeyeater, Yellow-tufted Honeyeater (Helmeted)	Endangered	Least concern ¹
	<i>Malurus coronatus coronatus</i>	Purple-crowned Fairy-wren (western)	Vulnerable	Least concern ¹
	<i>Malurus leucopterus leucopterus</i>	White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren	Vulnerable	Least concern ¹
	<i>Neochmia ruficauda ruficauda</i>	Star Finch (eastern), Star Finch (southern)	Endangered	Least concern ¹
	<i>Neophema chrysogaster</i>	Orange-bellied Parrot	Critically Endangered	Critically endangered
	<i>Ninox natalis</i>	Christmas Island Hawk-Owl, Moluccan Hawkowl	Vulnerable	Vulnerable
	<i>Ninox novaeseelandiae undulata</i>	Southern Boobook (Norfolk Island), Norfolk Island Boobook Owl	Endangered	Least concern ¹
	<i>Pachycephala pectoralis xanthoprocta</i>	Golden Whistler (Norfolk Island)	Vulnerable	Least concern ¹
	<i>Pachycephala rufogularis</i>	Red-lored Whistler	Vulnerable	Vulnerable
	<i>Pachyptila turtur subantarctica</i>	Fairy Prion (southern)	Vulnerable	Least concern ¹
	<i>Pardalotus quadragintus</i>	Forty-spotted Pardalote	Endangered	Endangered
	<i>Petroica multicolor multicolor</i>	Pacific Robin (Norfolk Island)	Vulnerable	Least concern ¹
	<i>Pezoporus flaviventris</i>	Western Ground Parrot, Kyloring	Critically Endangered	Not listed
	<i>Pezoporus occidentalis</i>	Night Parrot	Endangered	Endangered
	<i>Phaethon lepturus fulvus</i>	White-tailed Tropicbird (Christmas Island)	Endangered	Least concern ¹
	<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel	Endangered	Vulnerable ¹
	<i>Sternula nereis nereis</i>	Australian Fairy Tern	Vulnerable	Vulnerable ¹
	<i>Stipiturus malachurus intermedius</i>	Southern Emu-wren (Fleurieu Peninsula), Mount Lofty Southern Emu-wren	Endangered	Least concern ¹
	<i>Stipiturus mallee</i>	Mallee Emu-wren	Endangered	Endangered
	<i>Turnix melanogaster</i>	Black-breasted Button-quail	Vulnerable	Near threatened
Reptile	<i>Anomalopus mackayi</i>	Five-clawed Worm-skink, Long-legged Worm-skink	Vulnerable	Vulnerable
	<i>Aprasia rostrata</i>	Ningaloo Worm Lizard, Monte Bello Worm-lizard	Vulnerable	Vulnerable
	<i>Bellatorias obiri</i>	Arnhem Land Egernia	Endangered	Not assessed
	<i>Christinus guentheri</i>	Lord Howe Island Gecko, Lord Howe Island Southern Gecko	Vulnerable	Vulnerable
	<i>Cryptoblepharus egeriae</i>	Christmas Island blue-tailed skink	Critically Endangered	Not assessed
	<i>Cyclodomorphus praealtus</i>	Alpine She-oak Skink	Endangered	Not assessed

S ³ pecies type	Scientific Name	Common Name(s)	EPBC Act Status	IUCN Red List Status
	<i>Delma impar</i>	Striped Legless Lizard	Vulnerable	Vulnerable
	<i>Emoia nativitatis</i>	Christmas Island forest skink, Christmas Island whiptail skink	Critically endangered	Critically endangered
	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Vulnerable	Critically endangered
	<i>Eulamprus leuraensis</i>	Blue Mountains Water Skink	Endangered	Endangered
	<i>Eulamprus tympanum marnieae</i>	Corangamite Water Skink	Endangered	Not assessed
	<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	Vulnerable	Vulnerable
	<i>Lepidodactylus listeri</i>	Christmas Island Gecko, Lister's Gecko	Critically Endangered	Vulnerable
	<i>Liasis olivaceus barroni</i>	Olive Python (Pilbara subspecies)	Vulnerable	Not assessed
	<i>Liopholis guthega</i>	Guthega Skink	Endangered	Not assessed
	<i>Liopholis kintorei</i>	Great Desert Skink, Tjakura, Warrarna, Mulyamiji	Vulnerable	Vulnerable
	<i>Oligosoma lichenigera</i>	Lord Howe Island Skink	Vulnerable	Vulnerable
	<i>Ramphotyphlops exocoeti</i>	Christmas Island Blind Snake	Vulnerable	Vulnerable
	<i>Rheodytes leukops</i>	Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver	Vulnerable	Vulnerable
	<i>Tympanocryptis pinguicollis</i>	Grassland Earless Dragon	Endangered	Vulnerable
	<i>Uvidicolus sphyrrurus</i>	Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko	Vulnerable	Lower risk/Near threatened
Amphibian	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Vulnerable	Vulnerable
	<i>Litoria aurea</i>	Green and Golden Bell Frog	Vulnerable	Vulnerable
	<i>Litoria castanea</i>	Yellow-spotted Tree Frog, Yellow-spotted Bell Frog	Endangered	Critically endangered
	<i>Philoria frosti</i>	Baw Baw Frog	Endangered	Critically endangered
Migratory/ Marine	<i>Amaurornis moluccana</i>	Pale-vented Bush-hen, Bush hen	Marine	Least Concern
	<i>Anous minutes</i>	Black Noddy	Marine	Not assessed
	<i>Anous stolidus</i>	Common Noddy	Migratory: CAMBA; JAMBA. Marine	Least Concern
	<i>Apus pacificus</i>	Fork-tailed Swift	Migratory: CAMBA; JAMBA; ROKAMBA. Marine	Least Concern
	<i>Ardenna grisea</i>	Sooty Shearwater	Migratory: CAMBA; JAMBA. Marine	Near threatened
	<i>Ardenna pacifica</i>	Wedge-tailed Shearwater	Migratory: JAMBA. Marine	Least Concern
	<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	Migratory: JAMBA; ROKAMBA. Marine	Least Concern

S ³ pecies type	Scientific Name	Common Name(s)	EPBC Act Status	IUCN Red List Status
	<i>Calonectris leucomelas</i>	Streaked Shearwater	Migratory: CAMBA; JAMBA; ROKAMBA. Marine	Least Concern
	<i>Cuculus saturates</i>	Oriental Cuckoo	Migratory: CAMBA; JAMBA; ROKAMBA. Marine	Not assessed
	<i>Esacus magnirostris</i>	Beach Stone-curlew	Marine	Near threatened
	<i>Gygis alba</i>	White Tern	Marine	Least Concern
	<i>Monarcha melanopsis</i>	Black-faced Monarch	Migratory: Bonn. Marine	Least Concern
	<i>Onychoprion fuscata</i>	Sooty tern	Marine	Least Concern
	<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	Marine	Least Concern
	<i>Procellaria aequinoctialis</i>	White-chinned Petrel	Migratory: Bonn. Marine	Vulnerable
	<i>Procelsterna cerulea</i>	Grey Ternlet	Marine	Least Concern
	<i>Pterodroma nigripennis</i>	Black-winged Petrel	Marine	Least Concern
	<i>Puffinus assimilis</i>	Little Shearwater	Marine	Least Concern
	<i>Sternula albifrons</i>	Little Tern	Migratory: CAMBA; JAMBA; ROKAMBA. Marine	Least Concern

Definitions:

Migratory species

Migratory bird species are those species which migrate to Australia and/or its external territories, or pass through or over Australian waters during annual migrations and require conservation. Under the EPBC Act, migratory bird species are taken to be those species which are: listed on the Appendices of the Bonn Convention, in the Annexes to Australia's bilateral migratory bird agreements; or any other relevant international agreement. The listing of the species as migratory under the EPBC Act makes it an offence to kill, injure, take, trade, keep or move that species without a permit.

Bonn Convention

The Bonn Convention, also referred to as the Convention on the Conservation of Migratory Species (CMS), lists threatened species that cyclically and predictably cross one or more national jurisdictional boundaries (migratory species) and where concerted conservation efforts and effective management of those species is required by range States. Australia is a Party to the Bonn Convention and implements requirements for species listed under its Appendices under the EPBC Act.

Bilateral migratory bird agreements

Australia's bilateral migratory bird agreements provide for the protection and conservation of migratory birds and their important habitats, protection from take or trade except under limited circumstances, the

exchange of information, and building cooperative relationships. The following agreements are currently in place:

- CAMBA agreement: China-Australia Migratory Bird Agreement
- JAMBA agreement: Japan-Australia Migratory Bird Agreement, and
- ROKAMBA agreement: Republic of Korea-Australia Migratory Bird Agreement.

The annexes to JAMBA, CAMBA and ROKAMBA identify species known to be regular and predictable migrants between the agreement countries. JAMBA also refers to endangered bird species of each country, but none of these species are regular migrants between Australia and Japan.

Marine species

Under the EPBC Act, a listed marine species is a species that occurs naturally in a Commonwealth marine area and requires long-term conservation. Its listing under the EPBC Act makes it an offence to kill, injure, take, trade, keep or move that species in a Commonwealth area without a permit and without notification of the action having occurred

GLOSSARY

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.
Endemic	A species that is present in a particular place.
Eradicate	To remove all animals from a population, with no prospect for any moving into the area.
Exclosure/exclusion (fencing)	An area that is fenced to protect the native species within and to prevent the entry of introduced predators.
Feral	An introduced animal, formerly in domestication, with an established, self-supporting population in the wild.
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.
Performance indicator	A criterion or measure that provides information on the extent to which a policy, program or initiative is achieving its outcomes.
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.

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