

Invasive species in Australia

Australia is home to many plants and animals that have been introduced since European settlement. Some of these have become invasive — they have spread and multiplied to the point where they damage the environment, threaten the continued existence of native plants and animals, or create significant problems for agriculture. Invasive animals, often called feral animals, and invasive plants or 'weeds' are one of the biggest environmental problems facing Australia today. The Australian Government, working with the states and territories, is supporting research and developing management plans to reduce the impact of invasive species on Australia's native plants and animals and on agriculture.



Although it is known that feral cats prey on native mammals, birds and reptiles, the details of their impact on native wildlife are still being researched. Photo: C Potter

Why are invasive species harmful?

In Australia, invasive species cause immense damage to our soils, native plants and animals, and annual production losses worth millions of dollars. Feral animals such as rabbits, goats, cattle, buffalos, pigs, donkeys, horses and camels degrade natural habitats by intensive or selective grazing. Animals with hard hoofs compact the soil, making it difficult for native vegetation to grow and contributing to erosion. They also compete with native animals for food and habitat. Feral rabbits can take over the burrows of native animals such as bilbies and bandicoots. Feral cats and foxes hunt and kill many native animals and are a major factor in the disappearance of the numbat and mallee fowl from many areas.



The plague minnow *Gambusia holbrooki* is one of over 20 species of exotic fish introduced into Australian waters. It competes for food with native fish and may contribute to the reduction of some types of aquatic vegetation. Photo: Sydney Water Streamwatch, Daniel Cunningham and David Cleary

What are invasive species?

Invasive species are animals, plants, parasites or disease-causing organisms that establish outside their natural range and become pests. Native species can also become invasive if transferred outside their natural range.

Many of the most damaging invasive animal species were originally introduced either for sport, as pets, or as livestock and pack animals. Some, such as the cane toad and plague minnow *Gambusia holbrooki*, were introduced to control other pests and became pests themselves. Others, such as black and brown rats and the house mouse, arrived accidentally.

Invasive plants were introduced in a variety of ways, for example as crops, pasture and garden plants and to prevent erosion. Some established so well that they have spread to the bush, where they have thrived.

A number of invasive plants spread rapidly — *Mimosa pigra*, a native of tropical America, now occupies over 800 square kilometres in the Top End of the Northern Territory and was recently found in Queensland.

Invasive species also include disease-causing organisms such as fungi and viruses. The soil fungus *Phytophthora cinnamomi*, responsible for a type of dieback in many native plants, was probably introduced to Australia through European settlement, while the virus that causes 'beak and feather disease' in native parrots is believed to occur naturally in Australia.



*An aquatic beetle *Agasicles hygrophila* has been used to remove an alligator weed infestation from the Georges River in Sydney. Booms floating on water have been used to control the weed in other locations. Photos: Mic Julien, CSIRO Entomology*

The impacts of invasive fish can include predation on native animals, competing with native fish for food or habitat, uprooting aquatic vegetation, disturbing sediments and introducing diseases or parasites.

Invasive fish such as the plague minnow and European carp are now common in many Australian waterways. Plague minnows prey on the eggs and attack the tadpoles of native frogs. They also attack, injure and prey on native fish and compete with them for food and habitat. European carp now make up more than 90% of the total fish population in some Murray-Darling Basin rivers. Many introduced insects are also of concern. Species of tramp ants, including the red imported fire ant *Solenopsis invicta* discovered in Brisbane and the yellow crazy ant on Christmas Island, pose a serious threat to a number of native species. Feral honeybees occur throughout Australia, competing with native animals for nectar and pollen and also for habitat, as they use tree hollows for breeding.

Environmental weeds rapidly invade disturbed sites and compete with native plants for space, nutrients and sunlight. They do not always provide the food or shelter that native animals need and may provide shelter for invasive species such as feral rabbits. Lantana is a major threat to many species, including plants such as the endangered hairy quandong. Mimosa clogs northern Australian waterways, choking out native vegetation and destroying fish, turtle, crocodile and waterbird habitats.

Disease-causing organisms can be a threat to a wide variety of native plants and animals. Phytophthora root rot affects hundreds of thousands of hectares of native vegetation in several states. Viral 'beak and feather disease' has the potential to cause catastrophic losses in small populations of endangered parrots and other birds.

What can we do about invasive species?

It would be desirable to rid Australia of the worst invasive species, but this is not achievable in most cases. An exception is on offshore islands, where limited access means that invasive species cannot easily re-invade once they are removed.

Thus, management of invasive species focuses on reducing their impacts as cost effectively as possible. Management may involve eradication of the pest in a particular area, repeated reductions of pest numbers for periods of time, lasting reductions of pest numbers, removal of the most destructive individuals or exclusion of the pest species from an area. This approach means that control can be targeted — for example, to protect a threatened native species.

Interactions between native species and invasive species are often hard to measure and can complicate decisions about controlling the invaders. For example, in many areas, feral rabbits are a major food source for foxes and feral cats, and reducing the number of rabbits in the area may cause foxes and feral cats to switch to native fauna as an alternative food source.

Conventional control methods

Conventional techniques for control of invasive animals include fencing, trapping, poisoning and shooting. There has been some community concern for the welfare of invasive animals and it is now generally accepted that any pest control program must be humane and must have minimal impact on non-target species.

Fences have been used to exclude species such as foxes and feral cats, for example in protecting specific populations of endangered species such as the bilby. Electric fences are also used to protect small areas of high conservation value from some invasive animals. However, the high cost of building and maintaining fences means that it is only feasible where the area to be enclosed is small.

Traps baited with grain, or placed around watering holes to catch animals as they come in to drink, can be used to control invasive animals such as feral pigs and feral goats. In general, trapping is not suitable for pest control over a wide area, as traps must be checked at least once a day for animals. Some traps used in the past, such as steel-jawed traps for rabbits and foxes, are no longer used because they are considered inhumane.

Poisoning is also used as a control method for feral pigs, rabbits and foxes, but there are risks of poisoning non-target animals. Shooting is a useful control method for feral horses, feral pigs and feral goats. In rugged terrain and in vast, remote areas, trained shooters operate from helicopters. This method is considered to be a quick, effective and humane way to control many invasive species.

Control methods for invasive plant species include poisoning with herbicides, manual removal and ploughing in. Problems that may arise from the use of poisons include the pollution of streams and the killing of native insects and small invertebrates.

Biological control methods

Biological methods to control pests include the use of natural predators, parasites and disease-carrying bacteria or viruses. Myxomatosis and rabbit calicivirus disease are examples of biological controls that have been used in Australia to control feral rabbits. The use of *Cactoblastis* to control prickly pear is an example of a biological control being used to control invasive plants in Australia. Biological controls are most effective if used in combination with conventional methods, such as digging up warrens in the case of rabbits. There are strict tests and controls to ensure that future biological control agents do not become pests in Australia.

Who is responsible for managing invasive species?

Many land-holders, land managers, local communities, Aboriginal and Torres Strait Islander groups, industry groups and individuals are active in helping to manage invasive species and often do so on a volunteer basis.

Local governments have responsibility for nature conservation through land-use planning, development approvals and fire management, roadside vegetation and local bushland. These responsibilities include the control of invasive species.

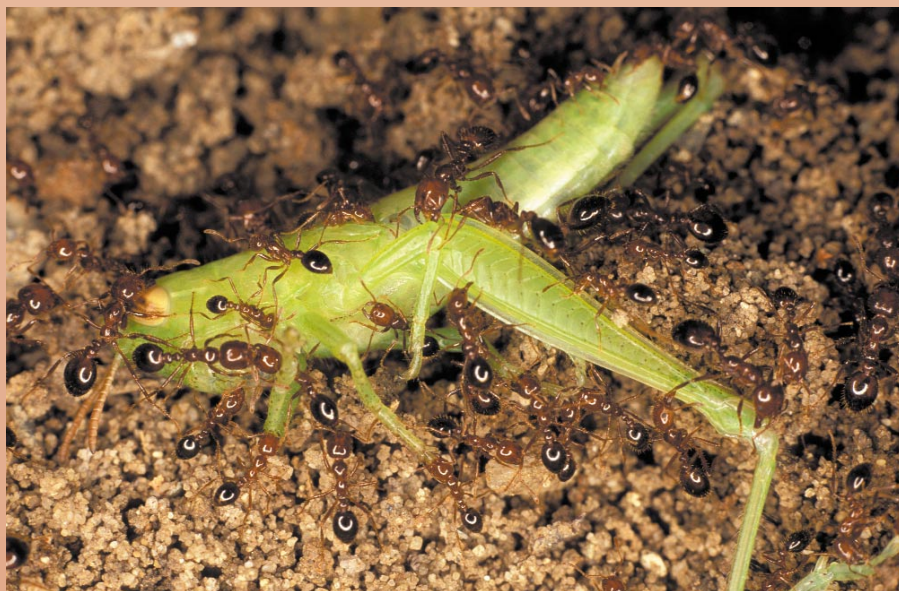
State and territory governments have specific legislation relating to conservation of biodiversity and have responsibility for managing invasive species at local, regional and state levels. State and territory



Cane toads were introduced into Australia in an effort to control insect pests of sugar cane. The control attempt failed and now cane toads are regarded as pests themselves. Photo: Queensland Environmental Protection Agency

governments also work with the Australian Government when a combined effort is required to manage invasive species at a national level.

The Australian Government provides national leadership, coordination and resources for research, assessment, education and public awareness on invasive species issues and assists in developing and implementing control strategies. It controls imports of organisms that might be environmentally or agriculturally damaging. It is also responsible for the control of invasive species on all Commonwealth lands and waters, including Australia's island territories, and has joint responsibility with local indigenous communities for the management of Uluru – Kata Tjuta, Kakadu and Booderee national parks.



*The red imported fire ant *Solenopsis invicta* is a serious new pest that has been detected in Queensland. Shown attacking a grasshopper, these ants inflict a painful sting and have the potential to cause great environmental damage if not eradicated. Photo: Steve Wilson/ANTphoto.com.au*

How the Australian Government is dealing with a national problem

The assessment of species as threatened fauna or flora is the first step to promoting their recovery under Commonwealth law. Once a species is listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), its recovery is promoted using *recovery plans* and *threat abatement plans*.

Recovery plans set out the research and management actions necessary to stop the decline, and support the recovery, of listed threatened species or threatened ecological communities. The aim of a recovery plan is to maximise their long-term survival in the wild.

Similarly, threat abatement plans provide for research, management, and any other actions necessary to reduce the impact of listed *key threatening processes* on a threatened species or ecological community. Implementing the plan should aid long-term survival in the wild.

Once a recovery plan or threat abatement plan has been recognised under the EPBC Act, the Australian Government is responsible for its implementation where it applies in Commonwealth areas. If a plan applies outside Commonwealth areas, the national government must work with the relevant states or territories to jointly implement the plan.

Threat abatement plans for invasive species

The Australian Government provides funding to implement the threat abatement plans for each key threatening process. These plans provide a national framework for the research, management and other actions necessary. Threat abatement plans are in place for:

- predation by feral cats
- predation by the European red fox
- competition and land degradation by feral goats
- competition and land degradation by feral rabbits
- dieback caused by the root rot fungus *Phytophthora cinnamomi*

and are being drafted for:

- psittacine circoviral (beak and feather) disease
- predation, habitat degradation, competition and disease transmission by feral pigs
- infection of amphibians with chytrid fungus resulting in chytridiomycosis
- the reduction in the biodiversity of Australian native fauna and flora due to the red imported fire ant.

Alert List for Environmental Weeds

The National Environmental Alert List contains a number of non-native plant species that have established naturalised populations in the wild. This list focuses on environmental weeds that are in the early stages of establishment and could become a significant threat to biodiversity if they are not managed. The list includes 28 non-native weeds, such as the Chinese rain tree and leaf cactus.

Weeds of National Significance

Twenty weeds that are causing significant national environmental damage (eg alligator weed, bitou bush) are included in the list of Weeds of National Significance.

Funding of strategic national weed projects, including coordination, research and public awareness that address the impacts caused by the Weeds of National Significance and the weeds on the National Environmental Alert List, will be considered through the national delivery component of the Natural Heritage Trust.

Assistance for on-ground strategic control and management may be sought through the trust's regional investment planning system. Regional investments will become the principal delivery mechanism for the trust and will follow, where appropriate, the model developed for the National Action Plan for Salinity and Water Quality. Under this model, investment is made on the basis of a regional natural resource management plan, incorporating the major natural resource management issues in the area.

Fact sheets on individual invasive species can be found at:

<http://www.deh.gov.au/biodiversity/invasive/index.html>

Key threatening processes are listed at:

<http://www.deh.gov.au/biodiversity/threatened/kt/index.html>

Threat abatement plans are listed at:

<http://www.deh.gov.au/biodiversity/threatened/tap/index.html>

Information on Weeds of National Significance and the Alert List for Environmental Weeds can be found at:

<http://www.deh.gov.au/biodiversity/invasive/weeds.html>

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