**Biodiversity**

**Key Facts**
- Introduced species are recognised as a leading cause of biodiversity loss worldwide.

**Introduced Species**

**Trends**
- Rabbit numbers: a **DECLINE** since introduction of Rabbit Haemorrhagic Disease (RHD, also known as calicivirus) although the extent of the decline varies across the State.
- Fox numbers: **DOWN** in high priority conservation areas due to large-scale baiting programs; **STILL A PROBLEM** in other parts of the State.
- Feral camel and deer numbers: **UP**.
- Feral goat numbers: **DECLINING** across the State.
- Feral pig numbers: **UNKNOWN**.
- Mundulla Yellows and Phytophthora cinnamomi: **SPREADING**.
- Extent of terrestrial pest plants: **INCREASING**.

**Goal**
Minimal impact of pest animals and pest plants on primary industries, on natural ecosystems, and on public safety in South Australia.

**Animal and Plant Control Commission, Strategic Plan 2001–2003**

**What are the issues?**
Species have been deliberately introduced to Australia for a wide variety of reasons including for use as garden plants, domestic or companion animals, for sport (such as hunting), as pasture grasses or as aquarium species (in the case of some marine species). They have also been introduced accidentally, such as in shipments of imported grain or in ballast water.

Introduced plants, or weeds, can invade and compete with native plant species for space, light, water and nutrients and because of their rapid growth rates they can quickly smother native vegetation. Similarly to weeds, many introduced animals compete with and predate on native animals and impact on native vegetation. They have high reproductive rates and can tolerate a wide range of habitats. As a result they often establish populations very quickly.

Weeds can provide shelter for pest animals, although they can provide food for or become habitat for native animals. Blackberry, for example, is an ideal habitat for the threatened Southern Brown Bandicoot. This illustrates the complexity of issues associated with pest control and highlights the need for control measures to have considered specific conservation outcomes to be undertaken over time and to be accompanied by habitat restoration outcomes.

Weeds can also increase the risk of wildfire and can pose a serious threat to agriculture, forestry and pastoralism.

Introduced fish pose a significant environmental problem for inland rivers and streams. Many were introduced last century for recreational fishing and have subsequently spread into inland waterways, where they compete with native fish for food and habitat and can have an adverse impact on water quality.

Some native plant and animal species become pests if they are introduced to areas beyond their natural range. For example, the Cootamundra Wattle originating from the eastern states is invading bushland in South Australia.

The aim of pest control is to reduce and maintain pest density at levels where the benefits for specific conservation goals are maximised in comparison to the costs of control. Pest control is most effective...
where it is conservation outcome-focused – aimed at reducing the impact of pests rather than simply reducing pest density.

See also chapters on Native Vegetation; and Threatened Species.

Environmental indicators

- Number of new incursions of pest plants and animals and responses (new indicator)
  Newly emerging pest plants and animals provide an additional threat to biodiversity.

What is the current situation?

PRESSURE INDICATOR: Distribution of key terrestrial pest animals

The most significant pest animals in South Australia that cause damage to the terrestrial environment are rabbits, foxes, feral goats, deer, camels, cats and pigs.

Competition and land degradation by rabbits and feral goats, and predation by the European Red Fox and feral cats have been recognised as key threatening processes under the Commonwealth Environment
Biodiversity

KEY FACTS

- The European Rabbit is still our most widespread and destructive pest animal.
- Positive results have been achieved for Yellow-footed Rock-wallaby populations as a result of feral goat and fox control in the Flinders Ranges.
- Bridal Creeper is considered one of the most significant weed threats to biodiversity in South Australia.

European Rabbit Oryctolagus cuniculus

This species is still Australia’s most widespread and destructive pest despite the introduction of Myxomatosis and RHD. Rabbits are found throughout most of South Australia.

RHD is now common throughout the State following its introduction in 1995. It is estimated that RHD has reduced rabbit numbers in South Australia by more than 70% since its introduction, although the extent of the decline varies geographically across the State. In high rainfall areas rabbit numbers do not appear to have declined and may have increased (Animal and Plant Control Board, pers. comm.).

Traditional methods of control (poison baits, worm destruction and removal of shelters) are encouraged to enhance the effectiveness of RHD.

European Red Fox Vulpes vulpes

The European Red Fox occurs in most regions of the State. Priority is given to managing fox numbers in selected, high conservation areas. Large-scale baiting programs, such as those carried out as part of Operation Bounceback, Ark on Eyre (see chapter on Threatened Species) and West Coast Integrated Pest Management Strategy, have seen a decline in numbers over the last 10 years in the Flinders and Gammon Ranges and on parts of the Eyre Peninsula.

Fox populations in the semi-arid regions are reduced where rabbit populations have been controlled by RHD or worm destruction.

Elsewhere in the State, fows remain a problem, despite significant baiting programs in some areas.

Feral Goats Capra hircus

Feral goats occur in the southern and central areas of the State, particularly the Gawler and Flinders Ranges.

Methods for controlling goats include trapping, shooting and mustering. As with foxes, numbers are declining in the Flinders and Gammon Ranges and on parts of the Eyre Peninsula due to large-scale trapping, mustering and shooting programs that are being carried out in high priority conservation areas.

Elsewhere in the State, numbers are also declining.

Feral Deer Cervidae family

Feral deer occur as populations in remnant vegetation patches including conservation parks in the South East, Mid North, Murraylands, Mount Lofty Ranges and Kangaroo Island.

It is believed that numbers have increased over recent years as a result of escapes and deliberate releases from deer farm enterprises, reduced hunting efforts and new habitats in agro-forestry plantations.

Control is generally ad hoc although there have been some attempts by Animal and Plant Control Boards to introduce cooperative control programs involving landholders and recreational hunters.

Feral Camels Camelus dromedarius

Feral camels occur in the Far North of the State. Following a number of good seasons it is estimated that their numbers have doubled over the last eight years.

An aerial survey of camels and other large feral animals was conducted in 2002 in the Simpson Desert Region of South Australia (Ward et al., 2002). The camel population was estimated at over 10,000 animals.

The impact that these animals have on the environment is largely unknown. Current control is relatively ad hoc and largely limited to that done by landholders, indigenous landowners and the Department for Environment and Heritage (DEH) in its parks and reserves. Ongoing control activities for camels and other large feral animals include mustering and shooting.

The emergence of a camel industry, based on the harvest of camels, may become a significant component in the management of their population.

Feral Cats Felis catus

Feral cats are common in all regions of the State. Numbers have fallen to some extent following the introduction of RHD, as rabbits are a key source of prey.

It is difficult to achieve effective cat control, as they do not readily take meat baits used for fox control. In semi-urban areas, individuals from the domestic cat population are continually recruited to the feral population. Priority for action is currently given to areas of high conservation value around the State such as the Flinders and Gammon Ranges.

In other areas of the State, feral cats remain a problem.

Feral Pigs Sus scrofa

Feral pigs can be found in the far north-east of the State along the water courses and water holes of the Innamincka Regional Reserve, Warburton Creek and Diamantina River. These populations are temporary and recede during periods of drought. Feral pigs can also be found along the upper reaches of the River Murray from Renmark to the State border and on the western end of Kangaroo Island.

There is no information on the density of feral pig populations in South Australia and their impact on the environment is not well documented. Soil and vegetation disturbance is associated with feeding and trampling. They may also be implicated in the spread of Phytophthora and other weeds.

Feral pigs are the wild animals of principal concern in Australia in relation to the spread of exotic diseases, particularly Fost-and-mouth Disease, which is Australia’s main exotic disease of concern. They can also act as hosts or vectors of several diseases and parasites that can affect other animals, including...
domestic livestock and humans. The major diseases and parasites of concern are leptospirosis, melioidosis, tuberculosis, sparganosis and brucellosis. This last is exclusively spread by pigs.

**PRESSURE INDICATOR: Distribution of key terrestrial pest plants**

There are 20 weeds of national significance (WONS) that are regarded as a major threat to biodiversity. 11 of these have been identified in South Australia. These are Alligator Weed, Athel Pine, Bridal Creeper, Blackberry, Boneseed, Gorse, Parkinsonia, Serrated Tussock and Willows.

**Bridal Creeper Asparagus asparagoides**

Bridal Creeper is considered one of the most significant weed threats to biodiversity in South Australia. It is a climber that smothers native vegetation and competes for space, light, water and nutrients. It is common in all agricultural areas of the State.

**Bridal Veil A. declinatus**

Bridal Creeper is an extremely aggressive invading plant and hard to control. It remains a problem throughout its range. Bridal Creeper provides ideal habitat for the Southern Brown Bandicoot. It is therefore important that its eradication is staged and accompanied by habitat restoration.

**Boneseed Chrysanthemoides monilifera subsp. monilifera**

Boneseed is particularly prolific in the Mount Lofty Ranges, with isolated patches elsewhere in the State. It has considerable potential to expand its distribution as it proliferates through rapid growth and massive seed production.

The Cooperative Research Centre (CRC) for Australian Weed Management released the Tortrix leaf-roller moth as a means of biological control, however, this has established poorly due to high predation and severe drought conditions.

**Gorse Ulex europaeus**

Gorse is found throughout many agricultural areas of the State, but is most prevalent in higher rainfall areas, such as the Mount Lofty Ranges, Clare Valley and the Fleurieu Peninsula. It has the potential to become a serious pest throughout the southern areas of South Australia.

**Mesquite Prosopis spp.**

Mesquite occurs in scattered locations in South Australia's arid interior, however, limited data currently exist on weed distribution in these areas. It has the potential to further extend its range in South Australia's arid regions.

**Other environmental weeds in South Australia**

There are a number of other important environmental weeds in South Australia that are not listed as nationally significant. These include (but not exclusively) African Box-thorn, Briar Roses (Dog Rose and Sweet Briar), Capa Broom, Desert Ash, Hawthorn (May and Azarolus), Olives, Perennial Veldtgrass, Phalaris spp. and Willows. All of these species remain an environmental threat.

**PRESSURE INDICATOR: Distribution of key marine pests**

Approximately 250 introduced marine species have been discovered in Australian waters, with 38 recorded in South Australia. There is little information on the distribution and density of these marine pests.
Many of the pests found in Adelaide metropolitan coastal waters have been introduced via ballast water or on the hulls or anchor ropes of vessels. Aquaculture and mining are two other vectors for introducing marine pests and diseases. The State now has extensive commercial and recreational fisheries, and therefore any invasion would have huge economic and social consequences.

The Commonwealth Government currently has before it a nomination for ‘the introduction of marine pests into the Australian marine environment via shipping including the discharge of ballast water and/or hull fouling’ to be listed as a Key Threatening Process under the Environment Protection and Biodiversity Conservation Act 1999.

South Australian marine experts are extremely concerned about the risk of spread of both the Japanese Sea Star Asterias amurensis from Port Phillip Bay in Victoria (via recreational craft), and the Japanese seaweed Undaria pinnatifida.

The most significant marine introduced pest in South Australia is the invasive seaweed Caulerpa taxifolia. Two other significant pests in terms of damage to the marine environment are the European Fan Worm and toxic dinoflagellates, which are single-celled microscopic organisms.

**Invasive seaweed Caulerpa taxifolia**

Caulerpa taxifolia is a form of algae that was discovered in West Lakes and the upper Port River in early 2002. Likely vectors for its introduction and potential spread in these areas are through an escaped aquarium specimen or the transport of infected recreational equipment.

Caulerpa taxifolia has the potential to spread to large areas as it has done in New South Wales, the Mediterranean countries and California. It has also been associated with the collapse of fisheries overseas. An eradication program for the species started in June 2002, coordinated by Primary Industries and Resources SA. An eradication plan has been developed by State Government following trials to determine the most effective control measures.

**European Fan Worm/Sabellid Fan Worm Sabella spallanzanii**

The European Fan/Worm is native to the Mediterranean Sea. Its distribution in South Australia has not been fully mapped but there are significant populations in upper Gulf St Vincent and it has also been reported near Edinburgh. The species is believed to form dense populations, out-competing native species for habitat. It is a fouling organism and may interfere with marine infrastructure and aquaculture developments.

**Toxic dinoflagellates Gymnodinium and Alexandrium spp.**

These species produce toxins that may accumulate in filter feeders, causing Paralytic Shellfish Poisoning in predator species and human consumers. Blooms of these organisms may clog the gills of marine species or deplete oxygen from the water, leading to widespread fish kills. Toxic dinoflagellates impact on the fishing and aquaculture industries through the loss of stock and have the potential to affect the health of consumers, particularly in the case of infected shellfish.

**PRESSURE INDICATOR: Distribution of key freshwater pests**

There are a number of introduced freshwater fishes that are having a significant impact on freshwater ecosystems in South Australia. These species compete with native fish for food and habitat and can adversely affect water quality. There is limited comprehensive information on the distribution and extent of these species and so it is difficult to predict trends.

These of primary concern are the European Carp, Eastern Gambusia (or Mosquitofish), Redfin (or European) Perch, Rainbow Trout, Brown Trout and Tarch. Release of any of these species following capture is illegal under the Fisheries Act 1982.

The Rainbow and Brown Trouts have established populations in the Mount Lofty Ranges and Adelaide area, while the Eastern Gambusia can be found in rivers and streams throughout the State. This species was originally introduced in the 1930s to control mosquitoes. It proved relatively ineffective at controlling mosquitoes and has now become a significant pest in freshwater rivers and streams.

The Redfin Perch and European Carp are found in rivers and streams of the Murray-Darling Basin. The Redfin is a heavy predator of native fish. The European Carp is a particular environmental concern and has extended its range to almost the whole of the Murray-Darling Basin. Its feeding habits increase turbidity or muddiness of the water, dislocate aquatic plants and affect water quality.

For more information see the State of the Environment 2003 Supplementary Report.

**Other pest species of concern Phytotthora cinnamomi** poses a significant threat to biodiversity and is listed under the Environment Protection and Biodiversity Conservation Act 1999 as a key threatening process.

It is known to have spread throughout many areas in the Mount Lofty Ranges and parts of Kangaroo Island. Phytotthora is a microscopic fungus-like organism that rots the roots of susceptible plants causing death. It is a common pest of nurseries and domestic gardens. There is no known means of eradicating Phytophthora. Management strategies involve modifying/adapting human behaviour and minimising the spread to uninfested areas by controlling access and adopting hygiene procedures.

**Mundulla Yellows** is a progressive, slow yellowing and dieback disease of eucalypts and other native plants, first observed in the vicinity of Mundulla in the 1970s. It is characterised by yellowing of the leaves with growth and canopy dieback developing several years or decades later. It is always fatal. To date, there has been no success in re-establishing plants on sites with Mundulla Yellows dieback.

In South Australia, the symptoms of Mundulla Yellows have been recorded as far west as Streaky Bay and as far north as Wilpena Pound. There appears to be a strong association between the presence of Mundulla Yellows and roadside vegetation and/or areas that had been disturbed in some way by humans.
PRESSURE INDICATOR: Number of new incursions and responses

Significant new incursions, or invasions, of past plants, animals and pathogens in South Australia over the last few years that pose a threat to biodiversity include the invasive seaweed, Caulerpa taxifolia (see Distribution of key marine pests), Branched Broomrape and perennial glass weeds such as Chilean Needle Grass and Serrated Tussock1.

Branched Broomrape Orobanche ramosa
Branched Broomrape is a parasitic weed native to Southern and Central Europe. It has invaded the Mediterranean countries, Middle East, Central Asia and Central America. The weed has an adverse impact on yields of specific commercial crops in many of these regions.

Branched Broomrape only occurs in a 70-kilometre radius zone around the original discovery close to Murray Bridge. There are now 389 infested paddocks on 167 properties (PIRSA Annual Report, 2002) where the broad host range for Branched Broomrape was confirmed.

The full extent of Broomrape's effect on Australian native vegetation is unknown, however, it has been observed affecting a small number of native species. There is also a native species of Broomrape, Orobanche cernua var. australiana, which is listed as vulnerable under the National Parks and Wildlife Act 1972.

What impact do introduced species have?

Some of the environmental, social and economic effects of introduced species are listed below to illustrate the broader significance for sustainability.

Biodiversity loss. Introduced species are recognised as a leading cause of biodiversity loss worldwide.

Impact on native plants and plant communities. Weeds smother native vegetation and compete for space, light, habitat, water and nutrients. Rabbits, feral goats and deer prevent plant regeneration by eating seedlings. Feral camels and deer trample native vegetation.

Impact on native animals. Foxes and feral cats prey on native animals, some of which are already vulnerable due to low population numbers. Most introduced animals compete with native animals for food and habitat.

Degraded soil and water resources. Weeds degrade water courses and affect water quality. They also alter the composition of soil and increase fire hazard. Feral goats, rabbits, pigs and camels erode soil resources as the result of trampling and overgrazing.

Losses in agricultural production. Weeds cost South Australian agriculture an estimated $650 million per year (http://sustainableresources.pir.sa.gov.au). These costs are associated with reduced crop yield, poisoning of stock, tainting of meat and milk and reduced value of wool if contaminated with seeds and burrs. The presence of weeds or weed traces in export produce reduces quality and can cause buyer resistance.

Impact on rural communities. Introduced species can have indirect effects on the livelihoods of landholders and regional communities.

Cultural impact. Aboriginal and recreational use of native ecosystems can be compromised by introduced species displacing natives.

What are we doing about it?

The Animal and Plant Control Commission (APCC) is responsible for the administration and implementation of the Animal and Plant Control Act 1986. The APCC oversees and coordinates animal and plant pest control activities throughout the State.

In cooperation with the Commission, regionally based Animal and Plant Control Boards and/or Soil Conservation Boards develop coordinated programs for destroying or controlling key pest animals and plants throughout the State. The Catchment Water Management Boards are also playing a major role in controlling introduced species along watercourses.

There has been some success in controlling certain pest animals over the last 10 years. Rabbit numbers have remained relatively low since the introduction of Rabbit Haemorrhagic Disease in 1995. This has had an effect on fox and feral cat populations that rely on rabbits as a major food source, and their numbers have dropped correspondingly.

Fox and goat numbers also remain low in the northern Flinders, Gammon and Flary Ranges and on the Eyre Peninsula due to large-scale control programs carried out by the Department for Environment and Heritage as part of Operation Bounceback, the Ark on Eye Program (see the chapter on Threatened Species) and the West Coast Integrated Pest Management Program, which aims to see sustained and integrated pest management across the Eyre Peninsula. However, the numbers of wild camel and deer continue to increase.

The University of Adelaide is a partner in the National Weed Strategy, developed in 1998, provides a framework for coordinated weed management and links directly with the National Weed Strategy. However, despite control efforts, past plants remain a threat to biodiversity.

The University of Adelaide is a partner in the Cooperative Research Centre (CRC) for Australian Weed Management, established in July 2001. The CRC is working alongside other groups such as the APCC and the CSIRO to reduce the risk posed by current and new weed species. The move towards integrated management of natural resources should see the development of more holistic approaches to weed management.

Biological control programs are being implemented for some plant species with positive results seen so far for the control of Horeshound and Bridal Creeper.

Recently emerging introduced species to cause concern include Mundula Yellows, Phytophthora cinnamomi.

KEY FACTS

* Prevention and early containment of serious new weeds before they become widespread is the most cost-effective approach to weed management.

INTRODUCED SPECIES

**Rabbit** – an introduced species that preys on small native fish, frogs and invertebrates

Photo: Michael Hammer

**Dead Yaccas affected by Phytophthora cinnamomi**

Photo: Renate Velzeboer

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1 See the State of the Environment 2003 Supplementary Report for more information.
Biodiversity

Phytophthora cinnamomi and the invasive seaweed Caulerpa taxifolia. Caulerpa taxifolia represents a significant threat to commercial fisheries and the State Government has launched major control programs. The Department for Environment and Heritage (DEH) has a management framework and educational program in place to reduce the impact of Phytophthora cinnamomi across the State, although more resources are required to assess the effectiveness of these programs in terms of halting the spread of the disease.

Progress has been made in researching the impact of Mundulla Yellows on native plant species. A funding partnership has been formed between Environment Australia and DEH to progress research into the causes of Mundulla Yellows, its modes of spread and potential management strategies. This work commenced in March 2003.

In addition, the issue was taken to the National Land and Water Biodiversity Committee by DEH as one of potential significance to biodiversity conservation at the national scale. Subsequently, a Mundulla Yellows Task Group was set up in September 2002 to determine the current status of research and develop a flexible research strategy and appropriate risk management framework.

There are also a number of community and non-government based organisations across the State that are addressing the problems introduced species cause. These include the Urban Forest Biodiversity Program, Bushcare, Trees for Life and Native Fish Australia.

In terms of minimising the impact of introduced species on the marine environment, South Australia has provided input into the development of national ballast water management requirements, effective since July 2001. Ballast water from international vessels is a major source of exotic pests and diseases. The new requirements prevent high-risk ballast water from being discharged into Australian waters to help reduce the risk of exotic pests or diseases entering Australia’s unique marine environment.

For more information on programs and initiatives see the State of the Environment 2003 Supplementary Report.

References
Animal and Plant Control Commission
http://sustainableresources.pir.sa.gov.au

Further information
Bush for Life Program
Bushcare
CSIRO Centre for Research on Introduced Marine Pests
http://crimp.marine.csiro.au
Environment Australia – Invasive Species
Introduced Marine Pests Program
www.ea.gov.au/coasts/imps
National Weeds Strategy
www.weeds.org.au
Native Fish Australia
www.nativefishsa.asn.au
Operation Bounceback
South Australian Animal and Plant Control Commission
http://sustainableresources.pir.sa.gov.au
Urban Forest Biodiversity Program
www.urbanforest.on.net/main.htm
West Coast Integrated Pest Management strategy
Native Vegetation

Trends

- Broadacre clearance: HALTED except under regulated conditions.
- Area of land held under Heritage Agreements: INCREASED 12% (50,749 hectares) since 1998.
- Area of land held in National Parks and Wildlife Reserves: INCREASED 1.6% (334,937 hectares) since 1998.
- Revegetation activity: STABLE, no change since 1998.

Goal

To reverse the long-term decline in the quality and extent of Australia’s native vegetation and ecological communities and the ecosystem services they provide.


What are the issues?

Native vegetation is one of our most precious natural assets. It provides essential habitat for native animals and underpins the continued persistence and evolution of our natural ecosystems. Native vegetation plays an important role in stabilising the soil, making it less vulnerable to wind and water erosion. It also reduces the impact associated with climate change by absorbing greenhouse gases, such as carbon dioxide, from the atmosphere. Native vegetation is also important in preventing dryland salinity through its influence on groundwater levels. It also provides valuable shelter and windbreaks for stock and crops.

Since European settlement, native vegetation has been subjected to a range of pressures that have resulted in its extensive degradation. In urban areas, settlement has led to its destruction and replacement with introduced plants, buildings and infrastructure. In the agricultural areas, clearance and fragmentation of original native vegetation intact. Although extensive areas of native vegetation remain in the arid zone, these are in various states of degradation and modification. Other pressures that have affected the condition of native vegetation include grazing by sheep, cattle, rabbits, goats and camels; trampling; invasion by weeds such as Bridal Creeper and Blackberry; changed fire regimes; plant pathogens such as Phytophthora cinnamomi and Mundulla Yellows; firewood collection; increasing soil salinity and rising groundwater; altered water flows in rivers and streams; and pollution (NUWAR, 2002).

The current system of parks and reserves plays an important role in protecting remnant native vegetation. In the agricultural zone, 35% of remaining vegetation is preserved either in formal reserves or privately managed Heritage Agreements. The latter is an agreement between a private landholder and the State Government to protect areas of native vegetation in perpetuity. Heritage Agreements now cover over half a million hectares of native vegetation in South Australia.

In the agricultural lands, a range of revegetation activities are underway. However, a large proportion of this is for commercial or landscape purposes and the contribution to biodiversity outcomes is limited or unknown.

Native vegetation associated with the River Murray and its floodplains and wetlands has been highly modified due to the effects associated with river regulation and the extraction of water for irrigation development. Deteriorating water quality and increasing water extraction and drainage for agricultural purposes is affecting the health of aquatic vegetation in rivers, streams and wetlands throughout the State. Marine vegetation such as seagrass and mangroves are suffering the effects of poor water quality and increasing coastal development. The chapters on Rivers, Streams and Wetlands; River Murray; and the Health of the Marine and Coastal Environment provide more information on these issues.

See also chapters on Introduced Species; Land Use; and Threatened Species.

Environmental indicators

CONDITION INDICATOR: Extent and condition of remnant native vegetation (reported on in the State of the Environment Report 1998)

The extent and condition of native vegetation is considered to be the best available measure we currently have of the condition of ecosystem diversity.

RESPONSE INDICATORS

- Area of land held under protected status (reported on in the State of the Environment Report 1998)
  An adequate reserve system is necessary to protect and maintain ecosystem, species and genetic biodiversity.
- Area of revegetation (reported on in the State of the Environment Report 1998)
  While revegetated areas do not have the same environmental benefits as uncleared land, they contribute towards the restoration of many ecological values. It is critical that land is revegetated with locally occurring native species to achieve maximum biodiversity outcomes.

What is the current situation?

CONDITION INDICATOR: Extent and condition of remnant terrestrial vegetation

Around 85% of the State is covered in native vegetation, however, the majority occurs in the...
Biodiversity

Findings

Making progress

Vegetation clearance is now subject to much stricter controls as a result of recent (2002) amendments to the Native Vegetation Act 1991. The amendments prohibit broadacre clearance of intact native vegetation and impose much stricter penalties for illegal clearance.

The last five years have seen the initiation of a number of State Government programs aimed at a more integrated and regional approach to the protection and conservation of native vegetation. These include the Regional Biodiversity Planning Program, NatureLinks and the State Revegetation Strategy. These will be complemented by, and integrated with, the National Action Plan (NAP) for Salinity and Water Quality and Natural Resource Management Planning.

The Pastoral Lease Assessment Program has completed the first round of property based condition assessment. In the last 14 years the program has established vegetation and soil monitoring points in every paddock of every pastoral property, representing about 40% of the State.

The Biological Survey Program of South Australia has conducted biological inventories and established monitoring baselines across approximately 75% of the State.

Fire Management Plans or Statements are being prepared for each fire-prone National Park and Wildlife Reserve, and assessed against performance indicators. Priority for rehabilitation works will be given to those areas most disturbed by fire, or where the disturbance has the greatest potential to impact on reserve values.

Attention required

Scientific and replicable techniques for measuring the condition of all key vegetation communities are yet to be developed. In light of the many threats to native vegetation, this is a critical shortcoming of the State’s Reserve system.

While Heritage Agreements require the protection of native plants and animals, they do not always address on-ground and on-going management requirements. Many of our national parks and reserves do not have formal management plans.

To date, most revegetation efforts using native species have been small scale and not specifically designed to meet the needs of biodiversity conservation, particularly in terms of restoring ecological processes or wildlife habitat on a broad scale. A few large-scale ecological restoration trials are presently underway across the State to determine the best methods for restoring habitat on a broad scale.

The impact on habitat quality and biodiversity associated with the removal of firewood is currently not being adequately addressed.

Native vegetation may still be cleared legally in accordance with exemptions in the Regulations to the Native Vegetation Act 1991. New regulations introduced in August 2003 resulted in a tightening of many existing exemptions.

What more should we be doing?

The Environment Protection Authority recommends that:

5.7 A long term monitoring program is developed to scientifically assess the condition of native vegetation across the State.

5.8 The principles of the NatureLinks Program, which aims to restore habitat at the landscape scale, are incorporated into the natural resource management planning process and associated investment strategies. To assist in achieving the objectives of the NatureLinks Program, existing broadscale habitat restoration trials should be maintained and new trials initiated to cover the varied ecosystems of the State.

5.9 Continued effort is directed to the development and improvement of Regional Biodiversity Plans to inform development planning and natural resource management planning.

5.10 The development and implementation of management plans for Heritage Agreement areas receives a higher priority, particularly in terms of providing greater support to the managers of Heritage Agreements. There also needs to be greater emphasis on establishing Heritage Agreements in the arid lands of South Australia.

5.11 Effective resourcing for the development and implementation of management plans for National Parks and Wildlife Reserves is given greater priority.

5.12 A firewood strategy is progressed further in order to improve our information base, educate the public and develop a sustainable firewood industry.

5.13 Additional effort is directed towards the development of strategies for managing fire and fuel loads in native vegetation for both safety and ecological purposes.
pastoral regions and Aboriginal lands. Less than one-third of the original native vegetation occurs in the agricultural areas of the State – most has been cleared for agricultural and urban development (Map 5.1). A quarter of the State’s remaining native vegetation is protected in National Parks and Wildlife (NPW) Reserves and another 10% via Heritage Agreements. The remaining 85% occurs on private land and is not necessarily subject to any form of protection, conservation or management for conservation outcomes.

Some regions have been subjected to more extensive clearance than others. The Mount Lofty Ranges and the South East have been most significantly affected due to their suitability for agricultural development in terms of climate, soil type and topography. Only around 15% of native vegetation in the Mount Lofty Ranges and 13% of native vegetation in the South East remains.

South Australia has strictly controlled broadscale clearance for the past two decades with the Native Vegetation Act 1991 the most recent of a succession of strategies aimed at minimising clearance rates.

**Condition of native vegetation**

There is now considerable information available on the current condition of native vegetation in the pastoral areas of the State. In some areas, inappropriate grazing practices over the last 150 years have led to land degradation, a loss of productive potential and an impact on biodiversity.

As part of the State Government’s Pastoral Lease Assessment Program (1990–2000) over 5500 permanent photopoint monitoring sites have been established on pastoral properties. These were set up to provide a baseline to monitor the condition of soil and vegetation over time. These monitoring points form the basis for the calculation of a land condition index (LCI) for each lease in the sheep country south of the Dog Fence. The LCI ranks pastoral leases as having high, moderate or low ‘disturbance’ or departure from original (pristine) condition. The completion of the rangeland assessment process allows for ongoing monitoring of change in soil and vegetation condition, improved grazing management and the rehabilitation of degraded areas (see the State of the Environment 2003 Supplementary Report for more information).

In the agricultural regions of the State, measures to assess the condition of native vegetation in Heritage Agreements, other protected areas and unprotected areas are under development. A program to monitor the condition and ecological integrity of Heritage Agreement areas began in June 2000. A small number of areas have been monitored since then, and the program will continue subject to the availability of funding.

Despite this activity, scientific and replicable techniques for measuring the condition of all key vegetation communities in agricultural regions are yet to be developed.

The condition on the condition of native vegetation is to be collected as part of the NAP for Salinity and Water Quality. In order to fulfil our reporting requirements under the NAP a significant injection of funding will be required from the State Government to enable vegetation condition assessments and monitoring to be conducted in the agricultural regions of the State.

**Pressures on native vegetation**

**Vegetation clearance**

The clearance of healthy, intact native vegetation is not allowed in South Australia under requirements of the Native Vegetation Act 1991.

Over the five-year period from 1996/97 to 2001/02, a total of 9161 hectares of degraded native vegetation was approved for clearing. Some of this area comprised plots where only scattered trees were cleared. This is equivalent to an area 10 times the size of Belair National Park. However, an area of 5299 hectares was refused permission for clearance in the same period.

In turn, a total area of 6233 hectares of natural regeneration or revegetation was required during this period to offset the losses associated with the clearance. It should be noted that ad hoc revegetation is not an ideal substitute; instead a landscape approach towards nature conservation should be adopted that includes the strategic re-establishment of native vegetation communities on a broad scale, to maximise habitat value and connectivity. The Native Vegetation Council appreciates the importance of this approach and will increasingly apply the principle in conditions attached to any clearance approvals.

Figure 5.1 shows the number of clearance applications received since 1996/97. The declining trend indicates the changing attitude towards the clearance of native vegetation and the recognition that applications are less likely to receive approval. Applications are now being modified to more realistic levels.

Despite generally strict controls on clearance, native vegetation may still be legally cleared subject to exemptions included in the Regulations to the Native Vegetation Act 1991. These exemptions were originally designed to permit clearance that would reasonably be approved – for example for safety reasons, the establishment of fuelbreaks, tracks and fenceline clearance.

One such example is the current exemption of clearance associated with the erection of a building or other structure (e.g. housing developments). This can result in the loss of intact and healthy areas of native vegetation and is of particular concern in the Mount Lofty Ranges (see chapter on Land Use). Changes to the Regulations have been prepared to reduce this impact on substantially intact native vegetation and larger eucalypt trees.

Despite a strong legislative base to prevent vegetation clearance, illegal clearance still continues, particularly where there is the perception that policing is inadequate.

**Firewood removal**

The impacts of firewood removal on habitat and biodiversity within South Australia need to be addressed. Unsustainable activities include the collection of fallen timber, removal of dead branches and hollow logs on live trees, and the cutting of...
standing dead trees. Remnant woodlands in close proximity to large urban centres are under the greatest pressure.

The Native Vegetation Act 1991 prohibits the harvesting of live timber for firewood unless under exceptional conditions. Currently there are no controls on the collection of dead timber on privately owned land and this is likely to have an impact on wildlife habitat in South Australia. However, new Regulations will control the clearance of large dead trees that provide habitat for listed threatened species under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. The taking or cutting of live timber and the collection and use of fallen dead timber in parks and reserves for any purpose is not permitted under the National Parks and Wildlife Act 1972.

The Department for Environment and Heritage has developed a draft South Australian Action Plan for Firewood Collection and Use (DEH, unpub.).

Fire management

Fire is perhaps the single most significant natural and human-induced risk factor affecting native vegetation and its ecological health. Bushfires can have devastating effects on the community and on native vegetation communities. Poorly managed native vegetation, from a fire perspective, represents an unacceptable risk to human life and property, as well as to the health of ecosystems. Habitat fragmentation, grazing pressure, diseases, weed invasion and a landscape shaped by fire over long periods of time make ecologically sensitive fire management a difficult technical task.

Fire Management Plans or Statements are being prepared for each fire-prone National Park and Wildlife Reserve, and being assessed against performance indicators. Priority for rehabilitation works, such as revegetation, will be given to those areas most disturbed by fire, or where the disturbance has the greatest potential to impact on reserve values.

What impact does clearing native vegetation have?

Some of the environmental, social and economic effects associated with the clearance of native vegetation are outlined below to illustrate the broader significance for sustainability.

Loss of habitat for native plants and animals. This will lead to reductions in population sizes and possible species extinctions.

Potential loss of genetic resources. The loss of plant species will also threaten genetic resources which are of potential value for the development of pharmaceuticals and agricultural products.

Increasing dryland salinity. Deep-rooted perennial vegetation helps to maintain or minimise the rise of saline groundwater. Its removal causes groundwater levels to rise rapidly bringing naturally occurring salts to the surface. This is one of the principal causes of dryland salinity.

Increasing greenhouse impact. Plants absorb carbon dioxide, a major greenhouse gas, from the atmosphere. Their removal will mean greater concentrations of carbon dioxide in the atmosphere than there would otherwise have been. Continuing degradation and loss of vegetation also means the loss of future benefits should carbon trading schemes be initiated (see chapter on Climate Change).

Degradation of soil and water resources. Native vegetation stabilises the soil, preventing wind and water erosion, and underpins catchment health and good quality water.

Losses in agricultural production. Native vegetation provides shelter for stock, wind breaks that prevent damage to crops, and habitat for valuable crop pest predators.

Lost opportunities for leisure and recreation. Native vegetation is a fundamental component of the Australian landscape, and must be protected and managed in parks, reserves, open spaces and private land.

What are we doing about it?

RESPONSE INDICATOR: Area of land held under protected status

In August 2003, 25.5% of the State was held under some form of protected status, a rise from 21.4% in 1996 (as reported in the State of the Environment Report 1998). This increase was due largely to the creation of four Indigenous Protected Areas under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. These are Nantawarina in the northern Finders Ranges, Yalata on the edge of the Nullarbor Plain and Walalkara and Watamu in the Anangu Pijantjatjara lands to the north-west of Coober Pedy. Indigenous Protected Areas now comprise 3.2% of all land in South Australia.

The vast majority of the State’s protected areas (21.7%) are preserved under the National Parks and Wildlife (NPW) Reserve system (Table 5.1), which is managed by DEH. The number of NPW Reserves rose to 332 in 2003, 16 more than in 1998. The increase in area protected rose 1.6% – from 20,998,936 hectares in 1998 to 21,352,879 hectares in 2003 (Figure 5.2). Despite the increase in area of land protected, the contribution of this land to conserving important communities, species and their habitats has not been fully determined.

Map 5.2 shows areas protected under the NPW reserve systems in South Australia.

Of the 332 protected areas under the NPW Reserve system there is a legal requirement to prepare formal management plans for 282 areas protected under the Crown Lands Act 1929 (some are not legally required to have management plans). Of those, 94 do not yet have a formal management plan. The absence of a formal management plan for around one-third of NPW Reserves is of concern.

The Heritage Agreement scheme, launched in 1980, was a visionary and progressive move to protect significant parts of the State’s biodiversity that lay outside of the formal National Parks and Reserves system. Since then, over 1300 landholders have
Inland reserves under the National Parks and Wildlife Act 1972; the Wildflowers Protection Act 1982 and the Cream Land Act 1929.

In November 2002 the Native Vegetation (Miscellaneous) Amendment Act 2002 was passed. The Act allows for a number of changes that reflect the Government’s commitment to further improve protection for the State’s native vegetation. These include an end to broadacre clearance and increased penalties for unauthorised clearing (including fines of up to $100,000). The Native Vegetation (Miscellaneous) Amendment Act 2002 also provides for revegetation works that mimic a naturally occurring plant community, and for incentives to be provided which encourage landholders to revegetate in this way. Under the Act, revegetated areas must conform with pre-European vegetation mapping.

Most recorded revegetation activity in the State has been for commercial or land management purposes, with a relatively small proportion involving the re-establishment of native vegetation. The State Revegetation Strategy (2001), the second for the State, indicates that efforts will continue to place an emphasis on the economic and ecological implications of revegetation activity.

While there is now a high degree of protection for native vegetation, many areas are isolated and in danger of further fragmentation and degradation via pressures such as pests and wildfire. In the past there has not been enough emphasis on managing the State’s remaining native vegetation as a whole. There is now increasing recognition that effective biodiversity conservation requires strategic planning and action on a large scale over long periods.

Table 5.1 Terrestrial protected areas of South Australia – Summary (August 2003)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of reserve types</th>
<th>Number of protected areas</th>
<th>Area (hectares)</th>
<th>Percentage with mining access</th>
<th>Percentage State protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Parks and Wildlife Reserves²</td>
<td>7</td>
<td>332</td>
<td>21,352,679</td>
<td>78</td>
<td>21.7</td>
</tr>
<tr>
<td>Forestry Reserves</td>
<td>2</td>
<td>199</td>
<td>26,109</td>
<td>0</td>
<td>0.03</td>
</tr>
<tr>
<td>Indigenous land owners</td>
<td>1</td>
<td>4</td>
<td>3,143,527</td>
<td>100</td>
<td>3.2</td>
</tr>
<tr>
<td>Private land owners (Heritage Agreements)</td>
<td>1</td>
<td>1277</td>
<td>564,000</td>
<td>100</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>1,1812</td>
<td>25,086,315</td>
<td>95</td>
<td>25.5</td>
</tr>
</tbody>
</table>

Source: DEH

RESPONSE INDICATOR: Area of revegetation

Information on revegetation activity in South Australia is collected by Rural Solutions SA (part of Primary Industries and Resources SA). The definition of ‘revegetation’ used by Rural Solutions SA is wide and includes a variety of activities ranging from the re-establishment of native plants to commercial forestry, the establishment of fodder shrubs and farm forestry.

Figure 5.3 summarises major revegetation activity in South Australia from 1999 to 2001 as assessed by Rural Solutions SA (2002). Most of this activity was for commercial or land management purposes. The planting of Tasmanian Blue Gum plantations in the lower South East for the wood chip industry comprised a large proportion of total revegetation activity, especially in 2000. The increased growth of Blue Gum plantations has raised concerns about the sustainable use of groundwater resources in the region (see chapter on Land Use).

Only around one-third of revegetation during this period involved the use of native species.

Programs and policy

There is now a high degree of protection given to remaining native vegetation in South Australia and, in recognition of the vital role that native vegetation plays in maintaining healthy ecosystems, efforts are increasing.

To ensure the integration of native vegetation issues with property planning and water resource management, the State Government has established the Department of Water, Land and Biodiversity Conservation (DWLBC), which brings together key functions relating to these issues. The integration of natural resource management activities in South Australia will further enhance these efforts.

In November 2002 the Native Vegetation (Miscellaneous) Amendment Act 2002 was passed. The Act allows for a number of changes that reflect the Government’s commitment to further improve protection for the State’s native vegetation. These include an end to broadacre clearance and increased penalties for unauthorised clearing (including fines of up to $100,000). The Native Vegetation (Miscellaneous) Amendment Act 2002 also provides for revegetation works that mimic a naturally occurring plant community, and for incentives to be provided which encourage landholders to revegetate in this way. Under the Act, revegetated areas must conform with pre-European vegetation mapping.

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While there is now a high degree of protection for native vegetation, many areas are isolated and in danger of further fragmentation and degradation via pressures such as pests and wildfire. In the past there has not been enough emphasis on managing the State’s remaining native vegetation as a whole. There is now increasing recognition that effective biodiversity conservation requires strategic planning and action on a large scale over long periods.
Biodiversity

The State Government has established NatureLinks, a major initiative that takes a long term and landscape-based approach to biodiversity conservation across the land and sea. NatureLinks involves managing the State’s reserve system as a series of ‘ecological cores’. Partnerships with landholders and others will be established to ensure that surrounding areas are managed and developed, via restoration and revegetation, as ‘links’ thus creating connected habitat across the landscape. Projects being implemented according to NatureLinks principles will build on existing major initiatives including the State’s network of parks and reserves, large scale ecological restoration projects such as Operation Bounceback (see chapter on Threatened Species), revegetation initiatives and programs for marine planning and Marine Protected Areas.

To support the NatureLinks objectives ecological restoration trials are being conducted in regional areas to determine the most appropriate methods for restoring habitat. These will lead, ultimately, to the development of ecological restoration guidelines tied to scientifically supportable measures of the contribution of restoration efforts to biodiversity conservation.

The Large Scale Habitat Re-establishment Working Group was formed in 2002. Its objective is to consider and scope the issues in relation to large-scale habitat re-establishment. The group comprises representatives from the University of Adelaide, DEH and DWLBC. Its focus is on the provision of strategic direction for ecological restoration through large-scale habitat reinstatement, encompassing issues such as planning and legislation, resourcing, socio-political considerations and technical principles.

The Biological Survey Program of South Australia commenced in 1971 with the intention of providing a systematic survey of South Australia’s flora and fauna. The program’s goal is to achieve a complete survey and map coverage of the state by 2015. The quality and coverage of the information collected as part of the Biological Survey will give South Australia one of the most complete inventories of native flora and fauna in Australia.

Regional Biodiversity Plans are being developed as part of our commitment to the National Strategy for the Conservation of Australia’s Biological Diversity 1996. These plans provide a regional approach for the conservation and management of biodiversity, as well as considering land management and agricultural goals. Local communities have been involved in their preparation, particularly in identifying issues and priorities and developing strategies for achieving on-ground action. The Plans are important for providing regional biodiversity information upon which to base natural resource management and planning decisions.

Community participation plays a major role in biodiversity conservation. Bushcare is a key program of the Natural Heritage Trust (NHT) that places a strong emphasis on community participation and ownership. South Australian Bushcare projects involve habitat restoration for the Brush-tailed Bettong and the conservation and sustainable management of native grasslands in the Mid North. For more information on policy and programs see the State of the Environment 2003 Supplementary Report.

References


Further Information


National Parks and Wildlife SA www.parks.sa.gov.au


Landcare www.landcaresa.org.au

Pultenaea
Photo: Kym Nicolson
Map 5.1: Remnant native vegetation cover across the agricultural zone of South Australia

SOURCE: DEH

Map 5.2: Areas protected under the NPWS reserve system in South Australia

SOURCE: DEH
The stomach contents of this average sized female cat revealed an unusually large number of native and introduced animals including 33 reptiles, one house mouse and one Zebra Finch.

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**Threatened Species**

**Trends**

- The number of plants and animals and ecological communities at risk: INCREASING particularly at the regional level.
- Recovery efforts: have INCREASED significantly across the State but remain less than is required to minimise the potential for species loss.

**Goal**

The South Australian Government has a policy commitment to ‘no species loss’. In line with this, the goal from the Draft Strategy for the Recovery of Threatened Species in South Australia (unpublished) is: To enable South Australia’s species and ecological communities threatened with extinction to survive and thrive in their natural habitats and to retain their genetic diversity and potential for evolutionary development, and prevent additional species and ecological communities from becoming threatened.

**What are the issues?**

Threatened species are those considered to be at risk of extinction in the wild. Around one-quarter of all species recorded in South Australia are considered to be threatened.

The historical loss of habitat and fragmentation prior to clearance controls being enacted in South Australia is one of the most significant threats to our native plants and animals. Most of the agricultural zone has been cleared of native vegetation, and much of the remaining vegetation is in small, isolated patches, prone to disturbance and degradation.

Other threatening processes include competition and land degradation by rabbits, feral goats and camels, inappropriate livestock grazing regimes, predation by feral cats and foxes, dieback caused by plant diseases such as the root rot fungus Phytophthora cinnamomi, invasion by weeds, degradation of water bodies, loss of drought refuges, altered fire regimes and climate change caused by human-generated emissions of greenhouse gases. Many of these threats are State-wide while others affect particular regions such as the pastoral or agricultural zones.

In South Australia the term ‘threatened species’ refers to species classified as either rare, endangered or vulnerable on Schedules 7, 8 and 9 respectively of the National Parks and Wildlife (NPW) Act 1972. Endangered species are under the most threat and likely to become extinct in the near future unless the circumstances and factors threatening their survival cease to occur. Vulnerable species are those likely to move into the endangered category in the near future unless the circumstances and factors threatening their survival cease to occur. Rare species are those that are the least threatened, but at some risk due to their low numbers, restricted distribution or observed decline. Species are also listed as threatened at the national level under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999. These plants and animals tend to receive priority for conservation activities because they are threatened at both the national and State level.

See also chapters on Introduced Species; and Native Vegetation.

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**Environmental indicators**

**CONDITION INDICATOR**

- Number of extinct, endangered and vulnerable species and ecological communities reported on in the State of the Environment Report 1998

The number of species considered extinct, endangered or vulnerable is the best available surrogate for the loss of species. However, it is not an ideal measure and care must be taken with its interpretation. There is an emerging trend to monitor threatened communities, however, at this stage more work is required to develop methodology for monitoring threatened communities.

**RESPONSE INDICATOR**

- Number of recovery plans prepared and implemented (reported on in the State of the Environment Report 1998)

The number of recovery plans prepared and, more importantly, implemented provides an indication of the extent and effectiveness of our response to the decline in species diversity.

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**What is the current situation?**

**CONDITION INDICATOR: Number of extinct, endangered and vulnerable species and ecological communities**

In South Australia 1041 of the approximately 4350 species recorded in the State (or 24%) are listed as threatened at the State level: 785 plant, 88 mammal, 127 bird, 39 reptile and 2 amphibian species (Table 5.2). It is known that 23 mammal, 2 bird and 26 plant species are presumed to have become extinct in South Australia since European settlement.

For information on the status of species on a regional basis see the State of the Environment 2003 Supplementary Report.

A review of the official listing of threatened species in South Australia (the Threatened Species Schedules of the NPW Act 1972) was completed in 2000, the first review since 1991. This review has resulted in an increase in the total number of threatened plant and animal species occurring in South Australia from 778 in 1991 to 1041 in 2000.1 The 2000

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1 The 1998 State of the Environment Report reported on numbers contained in the 1991 Schedule and this makes it difficult to report on trends.
Findings

Making progress
We have seen a number of success stories in terms of the recovery of threatened plants and animals ranging from captive breeding programs to the re-establishment of populations in the wild. Recovery success stories include the Yellow-footed Rock-wallaby, Kangaroo Island Glossy Black Cockatoo, Brush-tailed Bettong, Greater Bilby and Greater Stick-nest Rat. Although these are still listed as threatened, each species has experienced an increase in numbers as a result of recovery actions.

A list of marine species of conservation concern in South Australia is being developed. This is the first time for the State and addresses a key target identified in the Marine and Estuarine Strategy for South Australia 1998.

Attention required
Around one-quarter of all South Australian species are considered to be threatened. In particular, 63% of South Australia’s mammals are at risk. Many species are declining at a regional level, but they often receive inadequate funding or attention because they do not rate highly on national or State listings. There is a risk that while we focus our investment on the recovery of nationally threatened species, many more will become extinct regionally and across the State. To address this, the Government is in the process of developing a No Species Loss strategy.

The threats to our native species persist. Until these are addressed on a wide scale and over the long term, species will continue to decline.

What more should we be doing?

The Environment Protection Authority recommends that:

5.14 Policy, program development and regulatory frameworks that focus on biodiversity provide for major, large-scale habitat restoration in key regions and be integrated into broader natural resource management programs.

5.15 A higher priority is given to the recovery and management of species declining at the regional level.

Table 5.2: Species listed as threatened in South Australia – 2000

<table>
<thead>
<tr>
<th></th>
<th>Plants</th>
<th>Mammals</th>
<th>Birds</th>
<th>Reptiles</th>
<th>Amphibians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(as a % of total number recorded in South Australia – 1998)</td>
<td>(as a % of total number recorded in South Australia – 1998)</td>
<td>(as a % of total number recorded in South Australia – 1998)</td>
<td>(as a % of total number recorded in South Australia – 1998)</td>
<td>(as a % of total number recorded in South Australia – 1998)</td>
</tr>
<tr>
<td></td>
<td>144 (3%)</td>
<td>41 (29%)</td>
<td>20 (4%)</td>
<td>6 (3%)</td>
<td>0</td>
</tr>
<tr>
<td>Endangered*</td>
<td>212 (6%)</td>
<td>14 (10%)</td>
<td>44 (10%)</td>
<td>8 (4%)</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Vulnerable</td>
<td>429 (12%)</td>
<td>33 (24%)</td>
<td>63 (14%)</td>
<td>25 (11%)</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Rare</td>
<td>785 (22%)</td>
<td>88 (63%)</td>
<td>127 (28%)</td>
<td>39 (17%)</td>
<td>2 (8%)</td>
</tr>
</tbody>
</table>

* Includes species considered extinct in South Australia.

Source: Department for Environment and Heritage – as listed on the 2000 revision of Schedules 7, 8 and 9 of the NPW Act 1972.

Schedule has undergone review and updated Schedules will be in place by September 2004.

Freshwater fish have been included in the schedules for the first time.

In numbers does not necessarily mean that we now have 263 more threatened plants and animals, although some new ones have been added to the list. Other factors that have influenced the number include taxonomic revisions (which can result in one species being split into many) and records of new plants and animals previously unrecorded in South Australia.

With improved information and knowledge, a number of new species have now been identified as of conservation concern. In particular, a better understanding of the distribution and abundance of the State’s birds has led to a substantial increase in the number of bird species considered to be threatened. Similarly, more is now known of the status of reptiles to enable the assessment of the conservation status of all species for the 2000 Schedule review.

No species were removed from the 2000 list of threatened species due to population recovery. However, a small number have had their conservation status reviewed.
KEY FACTS

- Over 63% of South Australia’s mammals are listed as threatened at the State level; 31% are threatened at the national level.
- Approximately 59% of the birds in the Mount Lofty Ranges are likely to become regionally extinct unless action is taken to restore habitat on a broad scale.
- More effort must be made to prevent the loss of species at the regional level.

Regionally threatened species

There are many species and communities that, while still relatively secure across the State, are threatened with extinction in one or more regions of the State. Other species and communities are declining at rapid rates but do not yet meet State or Commonwealth criteria for listing as threatened.

Many bird species in the Mount Lofty Ranges face such a situation. Loss of native vegetation and fragmentation of the remaining vegetation has placed many of the region’s bird species at risk. It is predicted that unless drastic action is taken to restore habitat on a large scale and reduce other threats, approximately half of the birds in the Mount Lofty Ranges will become regionally extinct (Paton et al., 2003).

Nationally threatened species occurring in South Australia

A total of 185 species that occur in South Australia are threatened at the national level, this is around 31% of all nationally threatened species (EPBC Act 1999). (Table 5.3)

Nationally threatened ecological communities

An ecological community is a group of interacting species that have adapted to particular conditions of soil, topography, water availability and climate. A number of ecological communities are considered threatened with extinction. The Commonwealth Government has recognised the need to protect and recover these communities through enabling their listing as threatened under the EPBC Act 1999.

There are currently three ecological communities occurring in South Australia that are listed as endangered under the Act:
- Buloke Woodlands of the Riverina and Murray-Darling Depression Boreegons;
- the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin;
- swamps of the Flinders Peninsula.

There are also three ecological communities that occur in South Australia under consideration for listing in the Act:
- natural temperate grasslands;
- Peppermint Box (Eucalyptus odora) grassy woodland;
- Iron Grass (Lomandra effusa – L. multiflora ssp. durus) tussock grassland.

What impact does losing species have?

Some environmental, social and economic effects associated with the loss of species are outlined below.

Loss of biodiversity

Any loss of native plants and animals contributes towards a loss of biodiversity. Biodiversity underpins the processes that make life possible.

Loss of untapped genetic potential

The genetic material in plants and animals can deliver social, economic and environmental benefits via the biotechnology industry. This includes the development of disease-resistant crops and drugs to fight diseases.

Impact on tourism

Our native plants and animals provide a focal point for tourism, which produces a significant economic return for the State.

Impact on cultural identity

Many Australians place a high value on native plants and animals, which contribute to recreation activities and a sense of cultural identity and spiritual enrichment.

Impact on Indigenous culture

Many native plants and animals are central to Aboriginal and Torres Strait Islander cultures.

Ethical issues

It can be argued that we do not have the right to exploit or cause the extinction of any species we share this planet with.

What are we doing about it?

RESPONSE INDICATOR: Number of recovery plans prepared and implemented

A recovery plan is a document that outlines the management actions required for the ‘recovery’ of a particular threatened species. The plan provides details on how to minimise or eradicate the threats and risks to these species. It also identifies knowledge gaps and research needs. At present, most recovery plans are written for nationally threatened species, which tend to receive the highest priority for recovery plan development.

Table 5.3: Number of nationally threatened species occurring in South Australia

<table>
<thead>
<tr>
<th>Status</th>
<th>Plants</th>
<th>Mammals</th>
<th>Birds</th>
<th>Reptiles</th>
<th>Amphibians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extinct</td>
<td>2</td>
<td>15</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Endangered</td>
<td>35</td>
<td>9</td>
<td>10</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Vulnerable</td>
<td>60</td>
<td>19</td>
<td>23</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td>43</td>
<td>34</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: DEH
Table 5.4 summarises the current status of recovery plans and other recovery actions. This indicates that 21 species have formal recovery plans approved under State and Commonwealth legislation, most of which are being implemented to some degree. The plants and animals subject to these recovery plans are listed in Table 5.5.

A further 112 species have recovery plans in preparation and 64 species have no formal recovery plans but are subject to a range of recovery actions including research and monitoring, or on-ground actions such as habitat protection.

The number of threatened species subject to recovery action has increased substantially since the 40 reported in the State of the Environment Report 1998. However, due to the large number of recovery actions identified, funding shortfalls often mean that action cannot be implemented to the extent required for species recovery.

Policy and programs
The State Government is in the process of developing a No Species Loss strategy. There are a number of programs currently underway that are contributing to preventing the decline of species at the regional level. The Department for Environment and Heritage is implementing NatureLinks, a program to protect threatened species at regional and State levels.

Ecological restoration is the long term aim of NatureLinks (see the chapter on Native Vegetation).

The Birds for Biodiversity Program is a collaborative program underway in the Mount Lofty Ranges. This program is addressing the recovery of over 80 declining bird species and sub-species and their habitats, and is jointly funded and supported by DEH, Environment Australia and managed by the Conservation Council of South Australia. Birds for Biodiversity is working in partnership to achieve bird recovery in the region through the integration of targeted research, planning, extension and on-ground works, within an adaptive management framework. The program is also seeking to address many existing knowledge constraints to recovery and restoration goals through a learning approach to implementation.

Operation Bounceback, coordinated by the Department for Environment and Heritage, is a very successful ecological restoration program that has been operating in the Flinders and Olary Ranges since 1992. A dramatic reduction in grazing pressure has been achieved through the control of rabbits, feral goats and kangaroos. Combined with the virtual elimination of feral cats and the suppression of feral cat populations, this has enabled the recovery of native species and ecological communities (see Case Study). This success has led to Operation Bounceback being extended to the

### Table 5.4: Status of species recovery in South Australia – 2002

<table>
<thead>
<tr>
<th></th>
<th>Completed recovery plan</th>
<th>Recovery plan being implemented</th>
<th>Recovery plan in preparation</th>
<th>Other recovery actions underway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Birds</td>
<td>7</td>
<td>7</td>
<td>52*</td>
<td>7</td>
</tr>
<tr>
<td>Reptiles</td>
<td>3</td>
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<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Fish</td>
<td>0</td>
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<td>Amphibians</td>
<td>0</td>
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<td>8</td>
</tr>
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<td>Plants</td>
<td>9</td>
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<td>42</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>19</td>
<td>112</td>
<td>64</td>
</tr>
</tbody>
</table>

* Being prepared as part of the Birds for Biodiversity Program (see ‘What are we doing about it?’ in this chapter).

Source: DEH

### Table 5.5: Threatened species in South Australia that have recovery plans – 2002

<table>
<thead>
<tr>
<th>Mammals</th>
<th>Birds</th>
<th>Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kangaroo Island Dunnart</td>
<td>Orange-bellied Parrot</td>
<td>Spiny Everlasting Daisy (Acanthocladium</td>
</tr>
<tr>
<td>Sanhill Dunnart</td>
<td>Glossy Black Cockatoo (Kangaroo Island</td>
<td>dockieri)</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Swift Parrot</td>
<td>Spalding Blown Grass (Argoszis limitanea)</td>
</tr>
<tr>
<td>Pigmny Bluetrogue</td>
<td>Black-eared Miner</td>
<td>Pink-ip Spider Orchid (Caladenia zebrina)</td>
</tr>
<tr>
<td>Striped Snake Loard</td>
<td>Southern Emu-Wren</td>
<td>Large-club Spider Orchid (Caladenia</td>
</tr>
<tr>
<td>Great Desert Skink</td>
<td>Mount Lofty Ranges subspecies</td>
<td>macroclavia)</td>
</tr>
<tr>
<td></td>
<td>Malkeetowl</td>
<td>Woolcock’s Spider Orchid (Caladenia</td>
</tr>
<tr>
<td></td>
<td>Red-tailed Black Cockatoo</td>
<td>woolcockorum)</td>
</tr>
<tr>
<td></td>
<td>(South-eastern subspecies)</td>
<td>Peronostylis despectans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Halbury Greenhood (Peronostylis Halbury)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hindmarsh Valley Greenhood (Peronostylis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bryophila)</td>
</tr>
</tbody>
</table>

Source: DEH
Winning the conservation battle

CASE STUDY – Yellow-footed Rock-wallaby
The Yellow-footed Rock-wallaby is listed as vulnerable at the national and State levels. A recovery program was established in the early 1990s as part of Operation Bounceback in the Flinders and Olary Ranges. Extensive fox, rabbit and feral goat control programs combined with reduction in rabbit numbers via Rabbit Haemorrhagic Disease has achieved a substantial and sustained increase in Rock-wallaby numbers (Figure 5.4). The slight drop in numbers during 2002 is believed to be due to drought conditions.

CASE STUDY – South Australian Glossy Black Cockatoo (Kangaroo Island subspecies)
The South Australian Glossy Black Cockatoo is currently listed as endangered at the national and State levels. It now breeds only on Kangaroo Island. A recovery program commenced in 1995 with involvement from the local community, business organisations and Government. Recovery action has involved the protection of nest sites, the erection of artificial nest hollows and the provision of incentives for the protection and revegetation of potential nesting and feeding tree species. As a result numbers of Glossy Black Cockatoos have increased from an estimated 162 birds in 1993 to an estimated 260–280 birds in 2002 (Figure 5.5).
Gammon Ranges National Park and other landholdings in the Northern Flinders Ranges region.

The Ark on Eyre Program, launched in 1999, focuses on biodiversity projects across Eyre Peninsula. The program serves as a promotional banner to the local community and has built a high profile for regional conservation programs through increased community awareness and involvement. It contributes to and links a number of projects including threatened flora and fauna recovery and the new initiative ‘East meets West’, which aims to manage the east-west biogeographic link across the north of Eyre Peninsula to Western Australia.

A series of Regional Biodiversity Plans have been developed to identify priorities to protect and restore regionally threatened species. The Biodiversity Plans identify conservation priorities for major regions of the State and provide guidance on conservation actions that can be undertaken. The Plans are prepared in consultation with the local community, including landholders and community groups, as well as with input from experts.

A range of species recovery programs are being implemented across the State facilitated by cooperative efforts from all levels of Government and the community. The efforts that are made in this regard deserve recognition. Many of these programs are in the early stages of development but have had successful results in terms of increasing population numbers. One of these is the recovery program for the South Australian Glossy Black Cockatoo (see Case Study).

Despite the various programs and initiatives underway, the risks to our native species remain. Unless there is a major commitment to reinstate habitat and address other threats on a large scale, species and ecological communities will continue to decline.

For more information on programs and initiatives see the State of the Environment 2003 Supplementary Report.

References


Further information
Ark on Eyre and Operation Bounceback

Regional Biodiversity Plans
www.environment.sa.gov.au/biodiversity/bioplans.html#regional

Threatened Species in South Australia

Threatened Species Network
www.wwf.org.au

KEY FACTS
• Unless there is a major commitment to reinstate habitat and address other threats on a large scale, species and ecological communities will continue to decline.

• Cooperative efforts from community groups and all levels of Government are having positive on-ground results for some species.