National Koala Conservation and Management Strategy 2009–2014

Endorsed by the Natural Resource Management Ministerial Council

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National Koala Conservation and Management Strategy 2009–2014
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Photo on front cover by Dan Lunney

The Natural Resource Management Ministerial Council (NRMMC) consists of the Australian state, territory and New Zealand government ministers responsible for primary industries, natural resources, environment and water policy.

Addresses of relevant government authorities may be found on the final page.

The strategy is based on the knowledge and technology available at the time of publication and may be varied over time in the light of new knowledge. Suggestions on how the strategy can be improved are welcome and should be forwarded to:

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This edition of the strategy will be reviewed in 2014.

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Foreword

The koala attracts considerable public attention as an Australian icon and, through its appeal to international visitors, contributes significantly to Australia's tourism industry. The koala is also an important component of Australia's biodiversity, and its unique habitat supports a variety of other native species.

The koala has suffered declines due to the extensive habitat clearing and fragmentation which started with European settlement. Other threats to koalas have included hunting, disease, fire, drought and, more recently road deaths and predation by dogs. Despite considerable effort to conserve koalas, only hunting has been effectively eliminated as a threat. A growing additional threat is climate change. Not only will climate change have direct impacts on koala habitat, it may interact with other threats with unpredictable and potentially severe consequences for koalas. While the koala is not yet considered to be threatened with extinction nationally, there is no doubt that it is declining and the time to act, to ensure that this does not happen, is now.

Protecting and managing koalas today is a complex task. Much of their habitat occurs on private land where there are many competing land uses and the range of management issues is as varied and wide as the distribution of the koala. The need for a strategic approach to the management of koalas has become urgent to maximise the effectiveness of conservation efforts.

The 1998 National Koala Conservation Strategy identified the key threats to koalas, and the courses of action to be taken to tackle them. However, a review of the strategy, in October 2008, identified as its major limitation the lack of a clear process for implementing the actions. The 2009–2014 National Koala Conservation and Management Strategy includes an implementation plan, and a national implementation team has been established to coordinate the identified actions.

The new strategy takes into account the considerable amount of koala research, planning and management activity since 1998. For instance, the 1998 strategy makes no reference to climate change. Recent research has also shown that the relative importance of each threat differs from location to location. This requires local solutions, based on local studies and local plans, to manage individual koala populations across their extensive range. The task of this strategy is to give cohesion to all levels of activity, and acknowledge that there is no one universal solution for managing koalas.

Since 1998, national and state conservation efforts have increasingly focused on multi-species and landscape-scale protection and recovery. Protecting, restoring and managing koalas and their habitat will have significant benefits for a wide range of other species and ecological communities which also share the koala's habitat. This new strategy aims to integrate with, and complement, conservation efforts in all areas where the koala exists. Importantly, the koala can be a flagship with which to generate public support for these broader efforts.

Community ownership of this strategy will be vital for its successful implementation. Accordingly, public comment was sought on the draft revised strategy, and submissions were considered by the National Koala Conservation Strategy review steering committee in preparation of the final revised strategy.

This strategy was developed jointly by the Australian, state and territory governments through the Natural Resource Management Ministerial Council (NRMMC). It aims to provide a national framework for the conservation of koalas. The success of the strategy will hinge on the participation

of the community, conservation groups, industry and developers, local government authorities and researchers, working cooperatively with state and Australian Government authorities, using the attached implementation plan as a tool for coordinating action and monitoring progress. To help promote ongoing action and engagement of all stakeholders, the implementation team will meet regularly and report annually on progress. The Australian Government will take an important central role in coordinating and supporting the implementation team.

The new strategy will be formally reviewed after five years, to facilitate an adaptive approach to koala conservation management. The intention is to be proactive in koala conservation, as well as to be of sustained assistance to those who have the expertise, the commitment and the responsibility to manage our koala populations throughout their range.

The issue of culling was considered in the development of the strategy. Culling as a management tool was rejected by ministers in May 1996 and is not considered further here. Similarly, the deliberate introduction of *Chlamydia* to populations free of *Chlamydia* is not supported as a management tool for population control.

This strategy is an important step in mobilising coordinated action by the Australian Government, state and territory governments, local governments, local conservation groups, the rural community, wildlife carers and researchers everywhere.

1. Objectives

The National Koala Conservation and Management Strategy aims to conserve koalas by retaining viable populations in the wild throughout their natural range.

As part of this overall goal, the strategy identifies four broad long-term goals (1–4 below). The ability of the strategy to meet these outcomes will be demonstrated in the short term by measurable progress towards several short-term outcomes (5–9 below) that are key to producing the long-term outcomes.

Desired outcomes—long term (0–50 years)

1. *Koala populations in identified priority areas are stabilised or increasing.*[1]
2. *Overabundant koala populations are stabilised or reducing wherever they occur or arise.*[2]
3. *Threatened status of the koala at state and regional levels is reduced.*
4. *Koala remains nationally abundant and widespread, and is not nationally threatened.*

Desired outcomes—short term (0–10 years)

5. *Increased consideration of koala habitat demonstrated in development planning.*
6. *Greater area of high-quality koala habitat conserved and effectively managed through legislation, covenants or agreements.*
7. *Greater activity by land and resource managers to effectively protect and manage koala populations.*
8. *Increased community capacity to drive koala conservation and care.*
9. *Productive and integrated partnerships that foster the conservation and welfare of koalas.*

To achieve these short and long-term outcomes, the strategy will facilitate and coordinate delivery of the following major products and tools between 2009–2014:

Outputs (major products and tools to be delivered, 0–5 years)

A. Provide policy advice to ensure koala habitat is prioritised in land conservation and management initiatives (contributes to outcomes 1–4, 6–8).

B. Provide policy advice to guide the consideration of koala habitat in statutory planning strategies and applications (contributes to outcomes 1–4, 5, 7–8).

C. Develop a better understanding of koala population requirements and management responses, and maintain an information network to guide and assist planning, natural resource management processes, and other community and stakeholder activities (contributes to outcomes 1–9).

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1 Priority areas will be defined by the implementation team during implementation of several actions under the strategy.

2 In 2009 overabundant populations are identified in the following habitat areas: Victoria—Raymond Island, Snake Island, French Island, parts of the Otway Ranges, Framlingham, Mount Eccles National Park, Tower Hill Game Reserve; South Australia—Kangaroo Island and possibly the Adelaide Hills and Mount Lofty Ranges.

D. Facilitate high welfare standards for koalas kept in captivity or while under care and management (contributes to outcomes 8 and 9).

E. Recognise, motivate and commemorate koala conservation efforts (contributes to outcomes 7–9).

F. Develop and maintain productive, integrated partnerships to influence and achieve greater funding for outcomes (contributes to outcomes 7–9).

Appendix 1 outlines the actions that would need to be undertaken to deliver these outputs. Several actions may support more than one output. Appendix 1 also sets out the stakeholders, priority, and timelines for each action.

Appendix 2 contains a summary of actions.

These outcomes and outputs are not in order of priority. Each jurisdiction should assess the efficacy of the actions listed under each output according to their particular needs and situation. When developing management plans for the koala, each range state should liaise closely with the others to maximise cooperation and avoid duplication. In some cases additional funding and resources will be required to complete actions. Decisions about resourcing need to be made by jurisdictions bearing in mind the priorities identified in the strategy.

The strategy operates at several different geographic scales:

- At the national and state scale, the strategy provides a framework for coordinated cooperation and strategic action amongst the wide range of stakeholders in koala conservation. It sets priorities and focuses attention on the most important issues.
- The strategy also provides for the development of cost-effective tools to guide action at different scales.
- At the local scale, the strategy aims to improve the awareness of communities and authorities who live with koalas, and to provide relevant support and assistance for devising and implementing effective conservation actions.

1.1 Policy context

Koala conservation and management are influenced by a wide variety of cross-jurisdictional, Australian Government, and state and local government policies, regulations and programs. The strategy interacts with these policies and frameworks in a variety of ways.

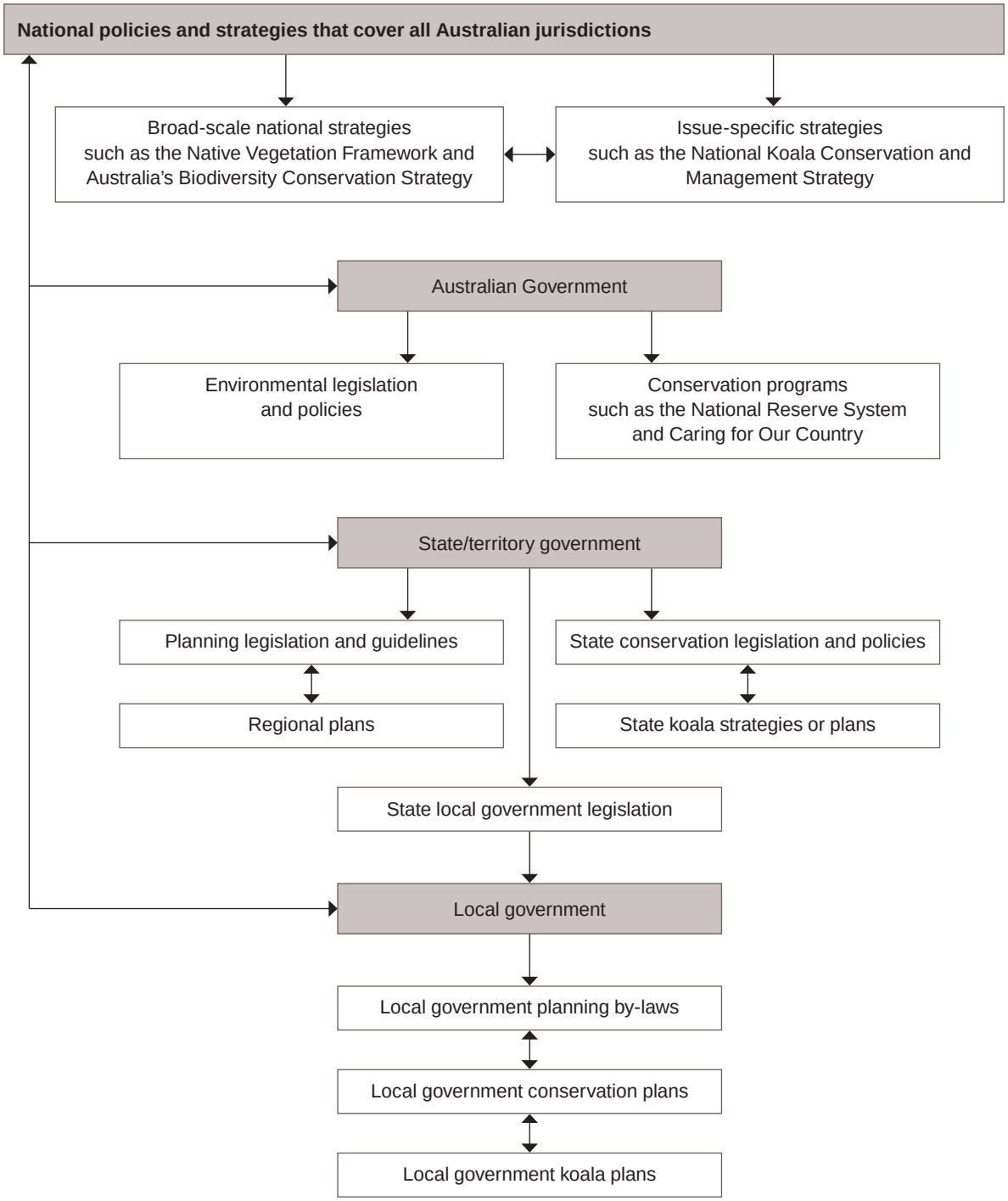
At the national scale, broad frameworks such as the National Biodiversity Conservation Strategy 2010–2020 and the Native Vegetation Framework, which are currently being revised, provide broad policy context for koala conservation. The strategy reflects a number of trends in national conservation that are outlined in these policies, such as encouraging conservation on a landscape scale, and ensuring the effects of climate change are taken into account in conservation planning. As many specific actions are also aligned, such as with the Native Vegetation Framework's goals of increasing the extent and improving the condition of native vegetation, there is scope for the strategies to support each other by explicit recognition of complementary activities.

The strategy also provides a national coordinating framework for many of the plans and actions that are already being undertaken by state and local governments to conserve and manage koalas. The National Koala Conservation and Management Strategy does not replace them, though in many cases it goes beyond what is already being done or provides a framework for incorporating current activities into broader national action. In addition to implementing the actions identified by this strategy

relevant to the jurisdiction, all states will implement their state plans in a way that is consistent with the national strategy.

Importantly, it should be noted that this strategy does not provide any legislative powers. It is a policy document that provides priorities and directions for action. Most regulatory control that affects koalas is at the state government level in the form of planning laws and regulations, and regional plans that set frameworks for development and conservation. These rules both enable and place limits on local government planning decisions. The integration of national and state koala policies with state and local regulatory decisions is a critical goal for conserving koalas and their habitat.

The diagram below illustrates these varied relationships:



2. Implementation, monitoring and review

The successful implementation of the strategy depends on sustained commitment by a variety of stakeholders, ongoing and timely exchange of information between managers, researchers, and community groups, and regular monitoring and reporting on progress to enable managers to alter their plans where required.

Stakeholders who will be involved in or responsible for actions under the plan include:

- Australian, state and local governments
- research scientists
- non-government organisations
- zoos and wildlife parks
- community groups, and
- individual members of the public.

Implementation of this strategy will have financial costs and benefits for governments, industry, business and the community, resulting in:

- increased costs resulting from improved measures to meet the objectives of this strategy
- lower costs over time because the future costs of koala conservation will be substantially reduced by timely investment in conservation measures, and
- benefits from the conservation of our natural and cultural heritage, including conservation of co-occurring species and ecosystems, sustainable land use practices and increased opportunities for ecotourism.

While there are already resources directed to koala conservation and management, resources will be required to implement this strategy. Resources from governments at all levels will be supplemented by ongoing and potentially increased commitments from community organisations, the private sector and philanthropists to assist the achievement of the strategy's objectives. Outcomes benefiting koalas may also be delivered through conservation activities that are undertaken for other species.

In implementing the strategy, there will be a need to ensure that attention is given to the most effective use of resources.

It is important that this strategy is reviewed in light of experience with its implementation and developing knowledge. A review including public consultation will be appropriate after the strategy has been implemented for a period of five years.

2.1 Implementation team and advisory group

Implementation team

Given the complexity of the conservation and management requirements of the koala, a cross-jurisdictional implementation team will be established to promote and coordinate the actions identified in the plan to achieve the goals of the strategy.

The implementation team will consist of Australian, state and territory governments (Queensland, New South Wales, Victoria, South Australia and the Australian Capital Territory) and will:

- promote action to achieve the outcomes of the strategy
- coordinate specific deliverables under the implementation plan
- disseminate information, new developments and research findings
- promote ongoing action and engagement of stakeholders
- report annually to the Natural Resource Management Ministerial Council on progress against performance targets
- provide these annual reports to the advisory group as well as other interested stakeholders and the public
- meet within six months of the commencement of the strategy, and
- discuss progress at least every 12 months by teleconference or in person.

Advisory group

The implementation team will consult with an advisory group which will consist of Australian, state and territory government members with direct involvement in koala conservation, in addition to a range of stakeholder groups that may include:

- local government
- non-government organisations including conservation groups
- researchers
- land and resource managers
- landholders/industry/developers
- Indigenous communities
- koala care groups
- veterinary organisations / animal hospitals, and
- any other appropriate group

The advisory group will:

- assist in delivering outcomes of the strategy by contributing on issues such as mapping standards, codes of practice and advising on research priorities
- consider annual reports on progress of the strategy
- promote ongoing action and engagement of stakeholders
- disseminate information, new developments and research findings to interested parties, and
- meet approximately every 12 months.

Operational arrangements

The implementation team will be established as an advisory body under the Natural Resource Management Ministerial Council (NRMMC).

Operational arrangements and composition of the implementation team will be determined by the Natural Resource Policies and Programs Committee before the implementation team's first meeting.

Operational arrangements and composition of the advisory group will be determined by the implementation team before the advisory group's first meeting, and will be reviewed after two years.

The implementation team and the advisory group will be supported by a secretariat, provided by the Australian Government.

The secretariat will arrange meetings of the implementation team and advisory group and coordinate reports to and from the implementation team, including annual performance reporting to NRMMC. On behalf of the team, and in conjunction with members tasked with particular duties, the secretariat will also coordinate many of the actions identified in this strategy, such as arranging workshops, and developing draft national guidelines. The implementation team will finalise papers and reports for approval or endorsement by NRMMC as required.

2.2 Evaluation

Progress will be monitored and evaluated annually by the implementation team. An independent external reviewer will be contracted to review and evaluate the strategy and its implementation within five years.

In delivering the actions set out in this strategy (such as developing guidelines for carers or research funding), it is anticipated that the implementation team will consider developing simple standard formats to facilitate collection of basic data to assist evaluation of actions and the strategy more generally (for example, number and health of animals cared for, location of capture, etc.)

Key performance indicators for the strategy include:

Desired outcomes—long term (0–50 years)

1. *Koala populations in identified priority areas are stabilised or increasing*

   Measure: Number and/or distribution of koalas in identified priority areas assessed, using accepted monitoring standards, at least every five years.[3]

2. *Overabundant koala populations are stabilised or reducing wherever they occur or arise*

   Measure: Number and/or distribution of koalas in identified overabundant populations assessed, using accepted monitoring standards, at least every five years.

3. *Threatened status of the koala at state and regional levels is reduced*

   Measure: Threatened status lower than in 2009.

4. *Koala remains nationally abundant and widespread, and is not nationally threatened*

   Measure: Koala does not meet national eligibility criteria for listing as threatened.

Desired outcomes—short term (0–10 years)

5. *Increased consideration of koala habitat demonstrated in development planning*

   Measures:

   - Increased percentage of local governments with koala habitat that have adopted koala planning guidelines in areas where koalas are threatened.
   - Increased percentage of planning decisions on koala habitat that take account of local koala planning guidelines.
   - Reduced percentage of planning decisions in which local koala planning guidelines are overruled.
   - Case studies of use of local koala planning guidelines.

3 Accurate population estimates are not possible in all habitat types.

6. *Greater area of high quality koala habitat conserved through legislation, covenants or agreements*

   Measures:

   - Number of hectares of high quality koala habitat conserved.
   - Number of hectares of high quality koala habitat cleared.

7. *Greater activity by land and resource managers to effectively protect and manage koala populations*

   Measure: Qualitative evidence of landholders and managers improving amount and quality of conservation and management efforts.

8. *Increased community capacity to drive koala conservation and care*

   Measures:

   - Funding received by community groups and non-government organisations for koala projects.
   - Extent and quality of information and guidance available to community groups.
   - Fewer incidents reported of carers not operating in accordance with the carers' code of practice.

9. *Productive and integrated partnerships that foster the conservation and welfare of koalas*

   Measure: Qualitative evidence of new or improved engagement between stakeholder groups.

Some of these measures may be addressed by alternative proxies or qualitative evidence where data is absent.

2.3 Reporting

The implementation team will report progress of implementation of the strategy to the NRMMC annually, including progress against the implementation plan and the key performance indicators.

Reports will be distributed to the advisory group and other key stakeholders, and will be made public.

3. Guiding principles

The objectives and actions that form this strategy were developed in the context of the following guiding principles consistent with the Intergovernmental Agreement on the Environment:

- The conservation of koalas should seek to complement existing strategies and to provide multi-species benefits, via integration with other measures to conserve Australia's biological diversity and to maintain ecological systems and processes.
- The principles of ecologically sustainable development should be followed, including □the precautionary principle', which in application means that decisions should be □guided by careful evaluation to avoid serious or irreversible damage to the environment, and by an assessment of the risk-weighted consequences of options'.
- Community input and involvement should be recognised as being crucial to the conservation of koalas.
- The strategy should build on the many existing local approaches that exist.
- Processes and decision-making at all levels of government should be efficient and transparent and provide for public participation.

4. Conservation Status

4.1 National context

Koalas formerly occurred throughout the broad band of eucalypt forest and woodland communities extending from north-eastern Queensland to the south-eastern corner of South Australia. After European settlement, clearing of habitat for agriculture in combination with hunting, disease, fire and drought resulted in a severe population decline. By the late 1930s they were considered extinct in South Australia and severe declines had occurred in New South Wales, Victoria and Queensland. However, in the late 1930s the fur trade ceased and state governments were introducing protective measures. Reintroduction programs, which moved koalas from colonies established on French Island and Phillip Island in Victoria, were used to re-establish koalas in their former range in Victoria and to a lesser extent in South Australia and the Australian Capital Territory. In South Australia, koala populations were reintroduced at various stages of the 20th century into regions outside of their original distribution: Kangaroo Island (1920s), Adelaide Hills (including escapees, 1930s to 1970s), Riverland (1960s) and Eyre Peninsula (1969).

Today, the regional conservation status of the koala varies from secure in some areas to vulnerable or extinct in others. In Queensland, they occur throughout most of their natural range, although the overall koala population continues to decline due to clearing and fragmentation of woodland and forest, ongoing drought and climate change. There is significant pressure from urban development on the koala in south-east Queensland, where it is listed as vulnerable by the state government. In some areas of south-east Queensland, such as the Koala Coast, koala populations are in sharp decline. In New South Wales, trends across the state are mixed—some populations on the New South Wales coast are declining (the population at Iluka became extinct in the 1990s), while some populations west of the Great Dividing Range have expanded. There are generally only transient animals occurring in the Australian Capital Territory, with very little of the area within the territory containing forest vegetation that is considered to be koala habitat. Koalas in Victoria occur over much of the southern and eastern lowlands and population densities are high in some areas (Raymond Island, Snake Island, French Island, parts of the Otway Ranges, Framlingham, Mount Eccles National Park, Tower Hill Game Reserve). Densities are lower in the dry forests and woodlands in northern parts of Victoria where the habitat is of lower quality. However, much of the habitat remaining in the state is fragmented and many populations are isolated. In South Australia, the koala is now found over a greater range and abundance than at the time of European settlement, because of introductions both within its natural range and areas where it did not occur naturally.

4.2 Australia

The legal status of the koala varies across Australia from secure to vulnerable, with different states affording the species different levels of significance and protection (Table 1).

The koala is not listed under the Australian Government's national environment law—the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The most recent assessment in 2006 by the Australian Government Threatened Species Scientific Committee found that, while the species was subject to a variety of threats and that some regional populations had declined significantly, the koala did not meet the criteria for listing at the national level under the EPBC Act. However, the conservation status of the koala under the EPBC Act is due to be reassessed by 30 September 2010.

The population of koalas in the Koala Coast area of south-east Queensland has been nominated for listing under the EPBC Act.

4.3 Queensland

In Queensland, the koala is listed as vulnerable wildlife throughout the south-east Queensland bioregion, and least concern wildlife elsewhere in the state under the *Nature Conservation Act 1992*. The population of koalas in the Koala Coast area of south-east Queensland has been nominated for listing as endangered wildlife under the *Nature Conservation Act 1992*. The koala is a protected species in Queensland and cannot be taken, used or kept without a permit. In addition, the legislation acknowledges the cultural significance of the koala and requires that government agencies consider the management measures necessary to conserve existing koala populations.

In 1994, the Queensland Government approved the five-year Koala Coast protection plan, which included a comprehensive research and monitoring component. The first koala state planning policy was put in place and subsequently revised in 1997.

In 2006, the Queensland Government implemented the Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006–2016 (koala plan). The operation of the koala plan was reviewed by the Queensland Government in late 2008 in response to the crisis in koalas in south-east Queensland.

A report by the Queensland Department of Environment and Resource Management released in May 2009 described a continuing substantial decline in the numbers of koalas in the Koala Coast area of Brisbane. Significant declines have also been recorded in other parts of south-east Queensland, such as the former Pine Rivers Shire (now part of Moreton Bay Regional Council).

These ongoing declines have led the Queensland Government to take urgent action via the Koala Crisis Response Strategy released in December 2008, including the possible reconsideration of the legislative status of the koala in the south-east Queensland bioregion. The legislative and regulatory approaches to koala conservation in south-east Queensland have been evolving rapidly, and will likely change soon with the release for public comment of a new draft koala planning instrument.

At the time of writing, the Queensland Government has:

- completed comprehensive mapping of koala habitat values across the south-east Queensland region to inform strategies targeted at stabilising and recovering the koala population. The koala habitat value map was recognised with an Industry Award in September 2009 at the Queensland Spatial Excellence Awards
- begun the development of a state planning policy (public consultation started 1 July 2009) for koala conservation, intended for implementation in late 2009
- implemented interim south-east Queensland koala state planning regulatory provisions concerning assessment of proposed developments, including the clearing of habitat, within interim koala habitat protection areas in south-east Queensland (these provisions expire on 28 February 2010). It is expected that the new koala planning instrument will be in place before expiry of the state planning regulatory provisions
- revised the South East Queensland Regional Plan (2009–2031) to incorporate additional measures for koala conservation, including the removal of 900 hectares at Thornlands and southern Redland Bay from the South East Queensland Regional Plan Urban Footprint in July 2009

- implemented a freeze on the disposal and clearing of state-owned land in south-east Queensland not needed for urgent social infrastructure until an assessment is made of the koala habitat values on each site, and
- significantly expanded, since December 2008, the number of national parks and other protected areas. In this time, more than 87,000 hectares has been added to the protected area estate, in turn providing protection for more than 52,000 hectares of koala habitat in south-east Queensland.

It is anticipated that the koala state planning policy will include:

- new koala habitat statutory maps, based on the Queensland Department of Environment and Resource Management's latest koala habitat map
- new development codes to better protect, maintain and improve the integrity of koala habitat and promote a more consistent approach to development assessment
- a focus on securing and rehabilitating koala habitat areas outside south-east Queensland's urban footprint, and
- guidelines to assist state agencies and local governments in their strategic planning, particularly the planning of new urban communities.

4.4 New South Wales

In New South Wales the koala is listed as vulnerable under the *Threatened Species Conservation Act 1995*. Two populations are listed as endangered: one in the Hawks Nest and Tea Gardens area of Great Lakes local government area, and one in the Pittwater area of Warringah local government area.

As with all native animals, the koala is a protected species in New South Wales under the *National Parks and Wildlife Act 1974* and cannot be harmed or possessed without authority. Controls are also in place under the *Native Vegetation Act 2003* and the *Environment Planning and Assessment Act 1979*, including the subordinate planning instrument State Environmental Planning Policy No. 44—Koala Habitat Protection.

In November 2008, the then Minister for the Environment and Climate Change, the Hon. Carmel Tebbutt, released a state-wide recovery pan for the koala. The plan was prepared by the New South Wales Department of Environment and Climate Change (now the New South Wales Department of Environment, Climate Change and Water). The recovery plan outlines actions necessary to aid the recovery of koala populations and provides a framework for local koala recovery efforts throughout the state. This plan is consistent with the National Koala Conservation and Management Strategy.

The New South Wales Department of Environment, Climate Change and Water has undertaken a statewide survey of koalas, published in 2009. This work is a precursor for further studies on:

- population dynamics that will look at koala populations, their rates of breeding, causes of mortality, home range sizes and movements across the landscape, habitat selection, tree selection, and assessment of threats in each location, and
- auditing previously implemented recovery actions in order to tailor future state programs to be more effective.

The New South Wales Government has added significant koala breeding habitat to the reserve system, including areas at Wedderburn (Dharawal Nature Reserve), Pilliga (Pilliga Nature Reserve), several reserves in the Brigalow Belt South area, Port Stephens (Tilligerry State Conservation Area), and Dorrigo (New England National Park). It has implemented cooperative, cross-tenure dog control for koala populations susceptible to dog attack including targeted control at a major population on the Tilligerry Sandbeds.

4.5 Victoria

In Victoria, the koala is listed as other protected wildlife under the *Wildlife Act 1975* which controls the possession of, trade in and research into native fauna through licensing and permits. The koala is not listed under the *Victorian Flora and Fauna Guarantee Act 1988*, which provides schedules of threatened species, communities and potentially threatening processes and has the conservation of Victoria's native flora and fauna as its main objective. The Victorian Department of Sustainability and Environment released Victoria's koala management strategy in September 2004. The strategy was intended to sit under the 1998 National Koala Conservation Strategy and to provide guidance towards achieving the aim of the national strategy and meeting its objectives in Victoria.

4.6 South Australia

In South Australia, the koala is protected under the *National Parks and Wildlife Act 1972*, which allows for the protection of habitat and wildlife and provides for the use of wildlife through a system of permits allowing certain actions (that is, keeping, selling, trading, harvesting, farming, hunting and the destruction of native species). The koala was listed as rare, but was de-listed in 2008.

4.7 International

The koala is listed as 'of least concern' on the *2008 IUCN Red List of Threatened Species* (IUCN 2008).

The United States Fish and Wildlife Service listed the koala as threatened on the United States *Endangered Species Act* in May 2000. In their ruling, they stated that 'the eucalyptus forest and woodland ecosystems on which this arboreal mammal depends have been greatly reduced [and] the limited koala habitat continues to deteriorate'. The listing requires that United States federal agencies consider the impact of their actions on the koala and prohibits commercial activity or trade in koalas by the United States, except under a threatened species permit. The listing of the koala on the United States *Endangered Species Act* does not influence the legislative responsibilities of the Australian, state or territory governments with respect to koala management and conservation. However, it does demonstrate the international interest in, and concern for, the koala.

Table 1: Legal status of the koala throughout its range in Australia

State/territory	Legislation	Status of koala
Australian	*Environment Protection and Biodiversity Conservation Act 1999*	Not listed
Queensland	*Nature Conservation Act 1992*	Vulnerable in South-East Queensland Bioregion Least concern (common) elsewhere
New South Wales	*Threatened Species Conservation Act 1995*	Vulnerable Two populations listed as endangered
	National Parks and Wildlife Act 1974	Protected
Australian Capital Territory	*Nature Conservation Act 1980*	Not listed
Victoria	*Wildlife Act 1975*	Protected wildlife
	Flora and Fauna Guarantee Act 1988	Not listed
South Australia	*National Parks and Wildlife Act 1972*	Protected Not listed as threatened

5. Species information

5.1 Description

The koala (*Phascolarctos cinereus*) is the sole member of the family Phascolarctidae. It is an arboreal marsupial with large furry ears and a vestigial tail. Its fur colour varies from pale grey in the northern parts of its range to grey-brown in the south. The koala also varies in size across its latitudinal range, from an average 6.5 kilograms in Queensland to 12 kilograms in Victoria. Male koalas can weigh up to 50 per cent more than females. Detailed accounts of the koala can be found in Cronin (1987), Lee and Martin (1988), Phillips (1990), Martin and Handasyde (1999), Jackson (2007) and Moyal (2007).

5.2 Taxonomy

Three 'races' or subspecies of *Phascolarctos cinereus* were proposed by early taxonomists, based on differences in the species' morphology across its geographic range: *Phascolarctos cinereus adjustus* (Thomas 1923) in Queensland, *P. c. cinereus* (Goldfuss 1817) in New South Wales and *P. c. victor* (Troughton 1935) in Victoria. However, analyses by Houlden et al. (1999) found relatively low levels of genetic differentiation among the proposed subspecies, which suggests that physical variations across the species' range may reflect adaptations to different climates, rather than separate subspecies.

5.3 Distribution

The koala occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range (Figure 1). Historically, koalas had a largely continuous distribution throughout much of coastal and inland Queensland and New South Wales, throughout the majority of Victoria and in the south-eastern portion of South Australia. However, as a result of habitat loss, drought, hunting and disease, koala populations rapidly declined and by the 1930s koalas were present in less than 50 per cent of their previous distribution. There was a decline in Queensland and observers at the time considered that small remnant populations remained in New South Wales, few animals remained in Victoria, and in South Australia koalas were considered extinct.

Koalas have since returned to many parts of their former distribution—in Queensland from a natural recovery, and in Victoria and South Australia as part of active re-introduction programs from island populations. In the latter states the species now occurs in areas where it was not recorded historically, such as Kangaroo Island, Adelaide and Mount Lofty Ranges, Eyre Peninsula and the Riverland. The apparent success of these re-established populations is tempered by unforeseen problems of over-browsing and of low genetic diversity leading to inbreeding depression.

The koala now has a fragmented distribution throughout eastern Australia, from north-eastern Queensland to the Eyre Peninsula in South Australia, and inland into the eastern margins of the arid zone of New South Wales and Queensland. In South Australian there remains a small breeding population on the Eyre Peninsula, from koalas introduced in the 1960s. There are also introduced and breeding populations in the Adelaide Hills/Mount Lofty Ranges, the Riverlands, and in the lower south-east. Some of these were established from koalas relocated from Kangaroo Island and have been demonstrated to have high levels of inbreeding associated with morphological abnormalities.

About 300 local government areas and more than 30 catchment management authorities/regional natural resource management bodies are responsible for planning decisions affecting koalas within their geographic range. The map below provides a general indication of the range of the koala and demonstrates that many jurisdictions need to be involved in koala conservation and management. This map is not intended to reflect the exact distribution of the koala.

Figure 1: Indicative range of koalas in 2005

(Source: Planning guidelines for koala conservation and recovery, McAlpine et al. 2007)

5.4 Population

Deriving reliable broad-scale koala population estimates remains very difficult, so the national population of the koala remains unclear at this stage.

Reliable population estimates are possible for specific areas at smaller scales, but usually come at significant cost. As such, the level of survey effort and precision should be evaluated on a case-by-case basis relative to the management need for precision and the priority of decisions or actions based on those data. A range of suitable sites from different regions could be selected for ongoing monitoring purposes in conjunction with the strategy. At a national level, it may be more realistic to estimate the extent of habitat loss, fragmentation and modification and declines in distribution as indicators of koala population declines rather than population size *per se*.

6. Threats and management issues

6.1 Habitat loss, fragmentation and degradation

Loss of habitat is the major threat to the koala in Queensland and New South Wales, and is the primary factor responsible for declining populations in those states. This continuing problem, which results mainly from clearing or fragmentation of forest and woodland, must be addressed.

Clearing is mainly associated with urban development in coastal regions and agricultural development (cropping and pastures) in inland regions, resulting in incremental loss and fragmentation of remaining koala habitat. Habitat loss is the most significant cause of koala population declines and reductions in long-term population viability. Fragmentation effects due to the linear infrastructure (roads, railways, powerlines) bisecting habitat may also be significant, even with relatively minor loss of habitat area.

Under the strategy it is a high priority to identify important habitat areas and protect them from clearing, through planning and legislative tools and other measures such as covenanting. Important habitats may have different features in different areas. High-quality habitat may include both bushland and urban areas. In addition, important habitat may include corridors of relatively lower-quality habitat which enable movement between other higher quality areas. Where clearing is unavoidable, it is vital to put in place meaningful conservation offsetting measures to effectively protect and restore other suitable habitat areas. However, it is imperative that all other options are explored to avoid and mitigate impacts on koala habitat before any resort is made to offsets. It is important to consider that there is a significant lag-time before successfully replanted habitat can support koalas.

Degradation of habitat can result from: some logging regimes; thinning of timber during property development; destruction of undergrowth and mid-storey shelter trees; and other disturbances, such as regular burning, excessive nutrient input or the introduction of weeds. Degraded habitats are capable of supporting fewer koalas than undisturbed habitats.

Healthy ecosystems provide a broad range of biodiversity benefits, so protecting and restoring natural habitat is essential not just for koalas but also for a wide range of other species that depend on these habitats. Habitat conservation efforts often take place at a multi-species or landscape scale, and efforts to address koala habitat should be integrated into these approaches wherever possible to achieve maximum benefit for koalas and other species and ecological communities.

6.2 Over-browsing

Where koalas have been introduced to islands, fragmented habitat, or outside their natural range—such as has occurred in areas of Victoria and South Australia—koalas may reach high densities and over-browse their food trees. Severe reductions in available food resources can in turn lead to starvation, suffering and death. Unsustainable over-browsing can also lead to ecosystem damage and jeopardise vegetation conservation. The impacts of over-browsing have been an important issue at some Victorian sites for more than 85 years and continue to be an ongoing problem in parts of Victoria and South Australia (see sections 4.1 and 5.3). Koalas were also introduced to islands in Queensland (for example Saint Bees) but have not reached the densities seen on southern islands. The reasons for the differences are not well understood.

6.3 Natural disasters

Natural disasters such as fire and drought affect koala populations both directly and indirectly. Hot crown fires can cause high numbers of koala mortalities, as well as destroy habitat or reduce it to remnant patches. However, if there are unburnt refuge areas, nearby populations may survive fires and recolonise habitat as vegetation recovers. Droughts can also cause high rates of mortality, and may have a greater impact on young koalas, especially in semi-arid and arid regions. If a natural disaster such as a drought occurs over an extended time the impact on the population will be even greater. The impact of natural disasters such as fire and drought is exacerbated by fragmentation of habitat and may also be influenced by climate change.

6.4 Disease

The most significant diseases in wild koalas are associated with chlamydial infections. Many koalas appear to carry *Chlamydia* without showing clinical symptoms. Eye or urinary tract infections due to *Chlamydia* may become apparent as overt diseases when an animal is subject to additional stress. Infection of the reproductive tract by *Chlamydia* may lead to female infertility, which may reach sufficiently high levels to cause a marked depression of the reproductive rate in the population. This may be an issue of particular concern in small, isolated populations. However, some isolated populations with *Chlamydia* also reach over-abundant levels. For example, koala populations at Raymond Island, Snake Island and Mount Eccles National Park are *Chlamydia* positive but have grown to such an extent that they have outstripped their food supplies. Other diseases also affect wild koala populations, such as the koala retrovirus. The extent, impact and possible treatment of these diseases are poorly understood at present and require further study.

The frequency of severe cases of disease in healthy koala populations is usually low, and thus does not normally threaten the survival of koala populations; however, further research is required on the potential impacts of some diseases. Vulnerability to disease may itself be an indicator of problems such as nutritional or environmental stress.

The low genetic variation found in koalas in some locations may exacerbate the risk of disease. If a new disease risk arises in such populations, low genetic variation means that a high proportion of individuals may be vulnerable to the disease.

6.5 Vehicle collisions

Injury and death of koalas due to road vehicle collisions is a problem throughout their range, particularly in urbanised areas where roads intersect koala habitat. The extent of the problem depends on the abundance of the population in the area, the frequency with which koalas cross roads, provisions for koalas to cross and on the traffic volume, road width and other attributes of the road. The problem is accentuated when koala populations occur close to roads that carry high volumes of traffic travelling at high speeds. The problem of vehicle collisions is usually a result of poor planning and road design (for example, placing new roads too close to koala habitat) but may also result when koalas are resident in urban areas, or disperse into them from adjacent forest.

6.6 Predation by dogs

Dog attacks primarily occur mainly where koalas use habitat in urban areas, on small rural holdings close to urban centres and in semi-urban and rapidly urbanising areas. They also occur in the wider landscape in areas such as national parks, reserves and on a range of rural holdings. The problem is exacerbated when dogs have the opportunity to form pairs or packs, when dogs can roam widely outside their home properties and where large and aggressive breeds are common. Dog attacks commonly result in stress, injury or death to koalas.

6.7 Climate change

The impacts of climate change on koalas are already apparent, particularly in western Queensland and New South Wales. They include:

- changes in the structure and chemical composition of koala food trees
- changes in the composition of plant communities and the range of important habitat species, including food and shelter trees
- increased frequency and intensity of drought
- increased frequency and intensity of wildfire
- sea level changes which may affect the habitats of coastal and island populations
- changes in average temperature, rainfall and humidity levels with consequent impacts on the extent of areas capable of sustaining koalas, and
- contractions in the distribution of koala populations.

Climate change is likely to compound existing stresses of habitat loss and fragmentation, leading to higher risks from disease, and may also increase the risk of injury by dog attacks and vehicles as koalas move across the landscape in search of food.

Appendix 1: Implementation plan

The following implementation plan sets out the key actions that will need to be carried out to deliver the major products and tools (outputs) under the strategy. Some actions contribute to more than one output.

The koala has received significant attention from managers, conservation groups, the general public and the research community. Consequently, most of the problems facing koalas are well known, and critical actions at a coarse scale are readily identified, if not always easily implemented. For example, the loss of habitat is widely accepted as the major threat to koalas and the broad solution, prevention of further clearing, is clear. However, this has been difficult to achieve in the past given the diverse and substantial pressures from human activity. Further action is required and innovative solutions need to be developed, requiring action by stakeholders from all sectors.

Given the diversity of the potential actions, it is important to develop national priority areas and decision-making tools early in the life of the strategy to guide its further development and implementation. Enacting these will require building or further strengthening partnerships between government and other stakeholders in landscape conservation, and with the community. There is also a need to continue to acquire new knowledge about koalas and their problems via research and monitoring to monitor trends, extend knowledge of lower priority areas and improve feedback between management and monitoring and research to further develop capacity for adaptive management.

Category 1 Habitat identification and protection

Habitat loss and fragmentation is the primary threat to koalas in key parts of their range (for example south-east Queensland). In such key areas, there is enough information to enact quickly measures to conserve koalas, and these should be taken as a matter of urgency. The pressure is immediate and the context well enough known that the opportunity cost of waiting for more research is too high, and appropriate direct action can be taken. However, monitoring may still prove to be valuable, as a means to evaluate the success of steps taken with a view to adapting management to changing circumstances. Similarly, as these populations may constitute a significant proportion of the national population, such monitoring will prove valuable to future assessments of the koala's status at all levels (regional to national).

In other parts of their range, such as where human population and development pressure is lower, there has not been the impetus to collect the data on distribution of koalas and their habitats. In these cases it is appropriate to undertake further survey effort in anticipation of the development of habitat protection actions.

These actions also need to incorporate the multi-species approach to habitat protection. Koalas occur in a variety of habitats and usually require large areas of contiguous habitat to sustain viable populations. Consequently, incorporation of koala habitats into planning for conservation of other species, and vice versa, can be beneficial for both. We identify this as a specific action as it is a recognised priority approach to reserve planning and conservation action at all levels of government.

Action 1.01 Incorporate koala habitat conservation into existing multi-species or landscape scale conservation programs.

- Department of the Environment, Water, Heritage and the Arts and states to conduct GIS (Geographic Information Systems) analysis of overlap of koala distribution with known distributions of other threatened species and communities to identify areas where maximum conservation value can be achieved via land protection.
- Discuss above analysis with managers of relevant national, state and local organisations and programs to develop priorities for land acquisition/assignment to benefit koalas and other species, consistent with the principles of those organisations and programs.
- Revision after five years to incorporate new knowledge of species and community distributions.
- Should refer to outcomes of Action 1.04.

Relates to: Outputs A, B, C.

Stakeholders: Australian, state and territory governments, local government, catchment management authorities and regional bodies.

Priority: 1

Time scale: 1–2 years; review after 5 years.

Action 1.02 Assess, develop and implement options for protecting priority koala habitat on public lands using legislation, covenants or agreements, or by new acquisition of koala habitat.

- Includes working with local government to incorporate koala conservation into planning processes.
- Includes acquisition of koala habitat by governments for conservation

Relates to: Outputs A, B, C.

Stakeholders: State and territory governments, local government.

Priority: 1

Time scale: 1–2 years for guidelines/process to be rolled out, 5 years for implementation, then review.

Action 1.03 Assess, develop and implement options for protecting koala habitat on private lands.

- Develop incentive-based mechanisms for koala conservation on private lands.
- Implement incentive-based mechanisms for koala conservation on private lands.
- Establish covenants over koala habitat via cooperation with local government, community and business.

Relates to: Outputs A, C, E, F.

Stakeholders: Australian, state and territory governments, local government, individuals.

Priority: 1–2

Time scale: 1–5 years, then review.

Action 1.04 Prioritise conservation of populations under immediate pressure.

- Workshop of experts to identify where existing koala populations are already experiencing significant loss of habitat and to identify immediate and short-term actions to secure their status.

Relates to: Outputs A, B, C.

Stakeholders: Australian, state and territory governments.

Priority: 1

Time scale: 6–12 months.

Action 1.05 Revegetate habitat to facilitate natural dispersal and reduce fragmentation effects.

Fragmentation, or the loss of connection between habitats, exacerbates the overall problem of habitat loss. A single large patch is likely to support more animals than two smaller patches with the same total area. This is particularly the case when the smaller patches are slightly below the threshold size required to maintain a viable population. Thus re-connection of existing habitat fragments via revegetation may enable recolonisation and persistence of koalas where this is currently not possible.

Such actions may not be appropriate where koalas are beyond their natural range (for example, parts of South Australia) such that dispersal may extend their range further into habitats never previously occupied by koalas.

It is important to consider that there is a significant lag-time before successfully replanted habitat can support koalas.

In future, when the impacts of climate change are better understood, it may be appropriate to identify key areas for revegetation that would enable koalas to extend their range as habitats change.

- Assess and develop options to revegetate priority habitat areas.
- Assess and develop options to ensure that vegetation planted under proposed carbon storage schemes contributes to the re-establishment of koala habitat.
- Implement revegetation programs.

Relates to: Outputs A, B, C, E, F.

Stakeholders: Australian, state and territory governments, local government, community groups, individual landholders.

Priority: 1–2

Time scale: 1 year to develop, 5 years to implement, then review.

Action 1.06 Develop standard monitoring/habitat assessment protocols.

There is some inconsistency and disagreement over how koala populations should be surveyed and mapped.

- Develop consistent protocols that enable population numbers or density to be compared between the same place at different times and between different habitats.

Relates to: Outputs A, B, C.

Stakeholders: Australian, state and territory governments, local government, researchers

Priority: 1

Time scale: 6–18 months.

Action 1.07 Establish a national database of koala population distribution and density and habitat mapping data.

To facilitate appropriate planning at all scales, it is most appropriate that all data reside in, or be accessible from, a central repository that can be accessed by relevant authorities for their needs, bearing in mind confidentiality of some unpublished data.

- Coordinate and analyse results and report to improve management strategies.

Relates to: Outputs A, B, C

Stakeholders: Australian, state and territory governments, researchers, koala carer groups.

Priority: 2

Time scale: 1–5 years.

Action 1.08 Establish or continue surveying and monitoring programs.

Monitoring fulfils two important functions: evaluating population status so that the relative need for management can be assessed; and evaluating population trends so that the efficacy of management actions can be assessed. The scale at which these are undertaken must be appropriate to the scale of management.

- Continue monitoring of populations for which there are existing long term data. In many cases these are large or important populations, so provide information on their own individual status, but in combination are also useful for evaluating status at a larger scale.
- Extensive less-detailed monitoring. At the scale of the koala's range, intensive monitoring is too expensive and laborious to be feasible. Thus, for matters at larger scales survey intensity may be reduced.
- Explore feasibility of developing guidelines for local scale monitoring, and develop guidelines if appropriate.

Relates to: Outputs A, B, C.

Stakeholders: Australian, state and territory governments, local government, researchers.

Priority: 1

Time scale: Identify programs for continued support or additional work: 2 years.

Action 1.09 Incorporate causes of habitat loss or degradation, other than land clearing, into planning for koala habitat conservation.

While land clearing clearly leads to the unambiguous loss of koala habitat, a range of other processes may lead to the loss, or severe degradation, of habitat. Developing an understanding of how these will develop in the future, and incorporating this in reserve planning will be critical to long term success. These include, but are not limited to:

- climate change
- fire, and
- drought.

While the impacts of these threats are by their nature unpredictable, some immediate actions can be taken, as the impacts will manifest by reducing habitat quality, the effects of which will be strongest at the margins of their range. This places additional emphasis on the need to identify and protect high

quality habitat (Actions 1.01–1.05) in all parts of the range (for example, riparian zones in arid areas). Future research can help to refine this precautionary approach (addressed at Category 6).

Relates to: Outputs A, B, C, E, F.

Stakeholders: State and territory governments, local government, community groups.

Priority: 1–3

Time scale: 1 year to integrate, review after 5 years.

Category 2 Over-browsed habitats

In parts of their range, notably in locations in Victoria and South Australia, koala populations have reached very high densities, and have exceeded the carrying capacity of their habitats. At the extreme, this can lead to loss of browse trees and consequent habitat degradation and to suffering or death of individual koalas. To date, efforts to tackle this problem have included translocation of individuals to new areas and sterilisation to reduce reproductive capacity of the population. Translocation is expensive, and much of the available koala habitat in Victoria and South Australia now contains koalas. There can be no guarantees that individual koalas will adjust well to a new habitat. Additionally, some translocated populations have also become overabundant and many are derived from only a few individuals, and thus have very low genetic variation.

Action 2.01 Continue and refine management programs to regulate koala density to a level below that which causes severe tree defoliation.

Relates to: Outputs A, B, C.

Stakeholders: Australian, state and territory governments, local government, community groups.

Priority: 1

Time scale: 1–5 years.

Action 2.02 Identify potential problems at an early stage through regular assessment of koala abundance and the extent of crown defoliation of preferred food tree species.

Relates to: Outputs A, B, C, E, F.

Stakeholders: State and territory governments, community groups, individual landholders.

Priority: 1

Time scale: 1–3 years.

Action 2.03 Develop and adopt national translocation guidelines for translocation of koalas for introduction, reintroduction and supplementation, and for management of overabundant populations.

These guidelines will include consideration of the welfare of koalas which are handled during management actions covered by the guidelines.

The development of new national guidelines would need to take account of any existing guidelines such as those adopted by state governments, and those prepared by the International Union for the Conservation of Nature.

Relates to: Outputs A, B, C, E.

Stakeholders: Australian, state and territory governments, local government, koala carer groups.

Priority: 5

Time scale: 1 year.

Category 3 Direct mortality of individual koalas

Even in areas where high quality habitat is available, koalas may be threatened by factors that cause the death of individuals, and which may threaten the viability of a population if this mortality exceeds the reproductive capacity of the population. These factors include death by vehicle collisions, predation by dogs and disease. Unfortunately, habitat loss and degradation often coincide with the above factors, and each may exacerbate the other. As these threats are more specific, they can also be addressed more specifically.

Action 3.01 Develop appropriate national guidelines for road design in koala habitat.

The development of new roads through koala habitat should be avoided where possible.

The development of new national guidelines for road design in koala habitat would need to take account of existing research and national, state and local government guidelines. These would need to assess the viability and effectiveness of measures including, but not limited to, speed limits, overpasses, culverts and exclusion fences. Guidelines should also address retrofitting of existing roads in koala habitat.

Relates to: Outputs A, B, C, F.

Stakeholders: Australian, state and territory governments, local government, community groups, individuals.

Priority: 1–3 (varies by region).

Time scale: 5 years, then review.

Action 3.02 Implement strategies which minimise the impacts of dogs on koala populations.

Relates to: Outputs B, C, D, E, F.

Stakeholders: State and territory governments, local government, community groups, individuals.

Priority: 1–3 (more important in urban areas).

Time scale: 5 years, then review.

Action 3.03 Assess and develop appropriate methods to reduce vulnerability of populations to disease.

Relates to: Outputs C, D, E, F.

Stakeholders: Research agencies, universities, Australian, state and territory governments.

Priority: 2

Time scale: 5 years.

Category 4 Community involvement

The koala is an Australian icon and engenders much public support for conservation effort. This enthusiasm for the species can be harnessed to provide a powerful tool to bolster many of the actions listed elsewhere in this implementation plan. The public can provide information useful for monitoring, be active in on-ground action for both habitat maintenance and restoration, assist in rescue of injured or sick animals and lobby government and industry groups to support koala conservation measures.

Action 4.01 Provide extension and advisory services to encourage retention and restoration of koala habitat and to encourage management practices on private land which are not harmful to koalas or koala habitat.

Relates to: Outputs A, C, E, F.

Stakeholders: Australian, state and territory governments, local government, community groups, businesses.

Priority: 2

Time scale: 1–3 years.

Action 4.02 Develop and distribute educational material.

Includes supporting and building on existing community, and state and local government information to develop and distribute comprehensive national information resources to promote better understanding of the koala, its status, and actions needed for its recovery.

Relates to: Outputs C, E, F.

Stakeholders: Australian, state and territory governments, local government, non-government organisations, koala carer groups, zoos, ecotourism operators.

Priority: 3

Time scale: 2–3 years.

Action 4.03 Extend community involvement in koala conservation and engagement with government.

This includes developing and maintaining productive, integrated partnerships to influence, and achieve greater funding for, actions, particularly with community groups, the private sector and philanthropists.

Relates to: Outputs C, E, F.

Stakeholders: Australian, state and territory governments, local government, non-government organisations, community groups, private sector, philanthropists.

Priority: 1

Time scale: Ongoing: 1–3 years to establish.

Category 5 Caring for koalas in captivity

Koalas may be held in captivity for several reasons. They may be held for short periods following rescue from injury or disease, or for research. They may be held for long periods for public display or because, post-rehabilitation, they are unlikely to be able to survive in the wild. In any case, it is important to ensure they are cared for in an appropriately humane manner.

Action 5.01 Develop national guidelines with states for all aspects of care, handling and management of captive, sick, injured or orphaned koalas.

The development of new national guidelines would need to take account of any existing guidelines such as those adopted by state governments. The guidelines would include guidance about where care and rehabilitation should and should not be used, including the rehabilitation for release of reproductively capable koalas.

Relates to: Outputs D, E, F.

Stakeholders: Australian, state and territory governments, (in particular, NRMMC), Australasian Regional Association of Zoological Parks and Aquaria, associations of wildlife exhibitors, koala carer groups.

Priority: 2–3

Time scale: 1–2 years.

Action 5.02 Review as necessary conditions and agreements under the *Environment Protection and Biodiversity Conservation Act 1999* (Part 13A) for export of koalas.

Relates to: Output D.

Stakeholders: Australian Government.

Priority: 5

Time scale: 3–4 years or as required.

Category 6 Research

Understanding both the biology of an animal and the nature of the problems it faces, are critical to the design of appropriate management responses. The koala has been the subject of extensive research and some of the threats to populations are well understood, as indicated by the actions described above. Nevertheless, there is considerable variation in research methods and there are large gaps in understanding of factors like genetic variability and national abundance. Further, koalas live in a changing world, and our understanding of them and their environment will continue to improve as research results accrue. These new insights will allow us to refine the actions described above, and to identify new management actions to benefit koalas.

We note here too, the statement made earlier under Category 1. To do research well takes time, for the design and execution of the data collection program and for the analysis and interpretation of the data. Then the significance of the results for management must be evaluated and management actions initiated. Nevertheless, some of the threats to koalas are current and pressing and require immediate action. Some research will directly refine or complement the knowledge, and associated

high priority actions, identified above and thus will be of high priority. Other research may be more indirect and its value to management less explicit, and thus may be afforded lower priority given the resource limitations inherent in any conservation plan.

Action 6.01 Develop techniques for, and undertake, broad-scale remote sensing to identify areas for further analysis of koala habitat and distribution.

The koala's range is extensive, and survey of its distribution over this scale is extremely laborious and time-consuming. Remote sensing offers a method by which viable habitat can be assessed over appropriate scales. However, this requires development of techniques that can either discern tree species and/or measure nutritional or other attributes important to koalas. This is technically possible, but requires further research and development and ground-truthing.

- Incorporate into the above, measures to assess the condition of koala habitat.

Relates to: Outputs A, B, C.

Stakeholders: Research agencies, universities.

Priority: 1

Time scale: 1–2 years per state.

Action 6.02 Identify and prioritise knowledge gaps in koala research.

Focal areas may include methods for conservation of habitat, improving design of programs for population monitoring or understanding the habitat requirements of koalas.

Relates to: Outputs A, B, C.

Stakeholders: Research agencies, universities, Australian, state and territory governments, local government, non-government organisations, community groups.

Priority: 1

Time scale: 1–2 years; commence in year 3 and run for 3–5 years.

Action 6.03 Identify directions for research on effects of climate change on koalas.

As noted at 1.09 climate change is a complex process that carries with it significant implications for koalas. These effects may be in the form of altered drought and fire regimes, and more directly through the effects of carbon dioxide on eucalypt leaf chemistry. The additional stresses imposed may further exacerbate existing problems of habitat loss etc. Due to the complexity of the problem we must enact both short-term precautionary and anticipatory measures, but also conduct research to better understand, and adjust, these management approaches.

Relates to: Outputs A, B, C.

Stakeholders: Research agencies, universities, Australian, state and territory governments, local government, non-government organisations, community groups.

Priority: 1

Time scale: 1–2 years; commence in year 3 and run for 3–5 years.

Action 6.04 Facilitate development of a network to support koala research.

- A virtual network should be established to help researchers and management practitioners communicate and share information about the latest developments in koala conservation.
- State governments could maintain research units/expertise including conservation biologists/teams with koala conservation expertise.

Relates to: Outputs A, B, C.

Stakeholders: Research agencies, universities, Australian, state and territory governments, local government, non-government organisations, community groups.

Priority: 1

Time scale: 5–10 years; distribution network established within one year.

Action 6.05 Develop methods for enabling comparison of disparate data on koala distribution and abundance.

Some existing datasets are valuable in their own right, but would become more valuable if they could be incorporated in analyses at a broader spatial or temporal scale. To do so requires the development of measures by which one method can be calibrated against another. Links to Action 1.06.

Relates to: Outputs A, B, C.

Stakeholders: Research agencies, universities, Australian, state and territory governments, local government, non-government organisations, community groups.

Priority: 1

Time scale: 1–2 years.

Action 6.06 Develop mechanisms to support access to funding, or conduct and disseminate dedicated research.

Research actions or directions identified above may be too expensive for direct funding by the agencies party to this strategy. However, these agencies may facilitate the conduct of that research by identifying avenues whereby funding can be secured from other sources, such as private companies, research funds or conservation organisations, and supporting applications for this funding.

Research could be disseminated more widely by funding to place selected koala articles in the open domain.

Relates to: Output F.

Stakeholders: Research agencies, universities, Australian, state and territory governments, local government, non-government organisations, community groups.

Priority: 2

Time scale: 1–2 years.

Appendix 2: Actions summary

Category	Action	Description	Contributes to outputs	Responsibility	Priority	Time scale
1 – Habitat identification and protection	1.01	Incorporate koala habitat conservation into existing multi-species or landscape scale conservation programs.	A, B, C	Australian/state/territory governments, local government, catchment management authorities, regional bodies	1	1–2 years; review after 5 years
	1.02	Assess, develop and implement options for protecting priority koala habitat on public lands using legislation, covenants or agreements, or by new acquisition of koala habitat.	A, B, C	State/territory governments, local government	1	1–2 years for guidelines/process to be rolled out; 5 years for implementation; then review
	1.03	Assess, develop and implement options for protecting koala habitat on private lands.	A, C, E, F	Australian/state/territory governments, local government, individuals	1–2	1–5 years; then review
	1.04	Prioritise conservation of populations under immediate pressure.	A, B, C	Australian/state/territory governments	1	6–12 months
	1.05	Revegetate habitat to facilitate natural dispersal and reduce fragmentation effects.	A, B, C, E, F	Australian/state/territory governments, local govt, community groups, individual landholders	1–2	1 year to develop 5 years to implement; then review
	1.06	Develop standard monitoring/habitat assessment protocols.	A, B, C	Australian/state/territory governments, local government, researchers	1	6–18 months
	1.07	Establish a national database of koala population distribution and density and habitat mapping data.	A, B, C	Australian/state/territory governments, researchers, koala carer groups	2	1–5 years
	1.08	Establish or continue surveying and monitoring programs.	A, B, C	Australian/state/territory governments, local government, researchers	1	2 years to identify programs for continued support or additional work
	1.09	Incorporate causes of habitat loss or degradation, other than land clearing, into planning for koala habitat conservation.	A, B, C, E, F	State/territory governments, local government, community groups	1–3	1 year to integrate; review after 5 years

Category	Action	Description	Contributes to outputs	Responsibility	Priority	Time scale
2 – Over-browsed habitats	2.01	Continue and refine management programs to regulate koala density to a level below that which causes severe tree defoliation.	A, B, C	Australian/state/territory governments, local government, community groups	1	1–5 years
	2.02	Identify potential problems at an early stage through regular assessment of koala abundance and the extent of crown defoliation of preferred food tree species.	A, B, C, E, F	State/territory governments, community groups, individual landholders	1	1–3 years
	2.03	Develop and adopt national translocation guidelines for translocation of koalas for introduction, reintroduction and supplementation, and for management of overabundant populations	A, B, C, E	Australian/state/territory governments, local government, koala carer groups	5	1 year
3 – Direct mortality of individual koalas	3.01	Develop appropriate national guidelines for road design in koala habitat.	A, B, C, F	Australian/state/territory governments, local government, community groups, individuals	1–3	5 years; then review
	3.02	Implement strategies which minimise the impacts of dogs on koala populations in both urban and peri-urban areas.	B, C, D, E, F	State/territory governments, local government, community groups, individuals	1–3	5 years; then review
	3.03	Assess and develop appropriate methods to reduce vulnerability of populations to disease.	C, D, E, F	Research agencies, universities, Australian/state/territory governments	2	5 years
4 – Community involvement	4.01	Provide extension and advisory services to encourage retention and restoration of koala habitat and to encourage management practices on private land which are not harmful to koalas or koala habitat.	A, C, E, F	Australian/state/territory governments, local government, community groups, businesses	2	1–3 years
	4.02	Develop and distribute educational material.	C, E, F	Australian/state/territory governments, local government, non-government organisations, koala carer groups, zoos, ecotourism operators	3	2–3 years
	4.03	Extend community involvement in koala conservation and engagement with government.	C, E, F	Australian/state/territory governments, local government, non-government organisations, community groups, private sector, philanthropists	1	1–3 years to establish; ongoing

Category	Action	Description	Contributes to outputs	Responsibility	Priority	Time scale
5 – Caring for koalas in captivity	5.01	Develop national guidelines with states for all aspects of care, handling and management of captive, sick, injured or orphaned koalas.	D, E, F	Australian/state/territory governments (in particular, NRMMC), Australasian Regional Association of Zoological Parks and Aquaria, associations of wildlife exhibitors, koala carer groups	2–3	1–2 years
	5.02	Review as necessary conditions and agreements under the *Environment Protection and Biodiversity Conservation Act 1999* (Part 13A) for export of koalas.	D	Australian Government	5	3–4 years or as required
6 – Research	6.01	Develop techniques for, and undertake, broad-scale remote sensing to identify areas for further analysis of koala habitat and distribution.	A, B, C	Research agencies, universities	1	1–2 years per state
	6.02	Identify and prioritise knowledge gaps in koala research.	A, B, C	Research agencies, universities, Australian/state/territory governments, local government, non-government organisations, community groups	1	1–2 years; commence in year 3 and run for 3–5 years
	6.03	Identify directions for research on effects of climate change on koalas.	A, B, C	Research agencies, universities, Australian/state/territory governments, local government, non-government organisations, community groups	1	1–2 years; commence in year 3 and run for 3-5 years
	6.04	Facilitate development of a network to support koala research.	A, B, C	Research agencies, universities, Australian/state/territory governments, local government, non-government organisations, community groups	1	5–10 years; distribution network established within one year
	6.05	Develop methods for enabling comparison of disparate data on koala distribution and abundance.	A, B, C	Research agencies, universities, Australian/state/territory governments, local government, non-government organisations, community groups	1	1–2 years
	6.06	Develop mechanisms to support access to funding, or conduct and disseminate dedicated research	F	Research agencies, universities, Australian/state/territory governments, local government, non-government organisations, community groups	2	1–2 years

Acknowledgments

This draft strategy was revised by the National Koala Conservation Strategy Steering Committee on behalf of the Natural Resource Management Ministerial Council.

The National Koala Conservation Strategy Steering Committee members are:

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The Australian Koala Foundation has expressed concern about some aspects of the draft strategy.

Other contributors were:

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The draft strategy was released for public consultation for two months in June–August 2009. Fifty-three submissions were received and considered in the development of this revised draft.

Expert reference group:

A reference group of experts provided input to the draft strategy during a workshop in December 2008. Members of the reference group were:

Mr John Callaghan (Gold Coast City Council)
Dr Frank Carrick (University of Queensland)
Dr Greg Gordon (previously Environment Protection Authority, Queensland, now retired)
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During the evaluation of the 1998 National Koala Conservation Strategy, public comment was sought through interviews and written submissions from a broad range of interested parties including state and local governments, universities, non-government organisations, community groups and individuals.

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