Department of
Environment and Conservation

A Biodiversity and Cultural Conservation Strategy for the Great Western Woodlands

The largest remaining area of intact Mediterranean-climate woodland on Earth

Acknowledgments

This strategy has been developed with guidance and input from the Great Western Woodlands Stakeholder Reference Group comprising representatives of the following:

- Amalgamated Prospectors and Leaseholders Association of Western Australia
- The Association of Mining and Exploration Companies Inc
- Australian Wildlife Conservancy
- Australia's Golden Outback Tourism Western Australia
- Chamber of Minerals and Energy
- City of Kalgoorlie-Boulder
- Forest Products Commission
- Goldfields Esperance Development Commission
- Goldfields Land and Sea Council
- Gondwana Link Ltd
- Kalgoorlie Boulder Urban Land Care Group
- Pastoralists and Graziers Association
- Shire of Coolgardie
- Shire of Dundas
- Shire of Esperance
- Shire of Kondinin
- Shire of Menzies
- Shire of Ravensthorpe
- Shire of Yilgarn
- The Wilderness Society.

Key government agencies have also contributed to the development of this strategy. Those involved were:

- Department of Environment and Conservation (lead agency)
- Department of Mines and Petroleum
- Department of State Development
- Goldfields Esperance Development Commission
- Department of Indigenous Affairs
- Department of Planning
- Department of Regional Development and Lands
- Forest Products Commission
- Fire and Emergency Services Authority
- Tourism Western Australia
- Department of Agriculture and Food.

Numerous other groups and individuals also lent their expertise. The contribution of all who attended meetings and workshops and otherwise provided input is greatly appreciated.

Foreword

The Great Western Woodlands represents the largest and most intact eucalypt woodland remaining in southern Australia and one of the best examples of its type in the world. It is home to an impressive 3,000 flowering plant species, 20 per cent of Australia's known flora, as well as a diverse range of animals dependent on its varied habitats. The area is well known for its diversity of eucalypts with some 160 species recorded. Aboriginal people have lived here for at least 22,000 years and maintain their strong connections to the land. The Great Western Woodlands has a real sense of place.

In addition to its extraordinary natural and cultural values, this is also a highly productive landscape. The Great Western Woodlands is located in one of the richest mineral provinces in Australia and contains 334 operating mines as well as an active exploration and prospecting sector. Pastoralism, timber harvesting and tourism are also important in the area. The people who live here have built strong communities based on natural resources.

The State Government has recognised the need for an integrated strategy for the Great Western Woodlands to ensure the long-term conservation of the area's remarkable natural and cultural values. Active management of feral animals, weeds, fire and other pressures will be essential to better protect and manage the area. This strategy will deliver more coordinated and integrated on-ground action and the State Government has committed $3.8 million to support its implementation.

This strategy has been prepared with the help of a Stakeholder Reference Group who I would especially like to thank for their input. The group represented the interests of conservationists, Indigenous people, miners and explorers, pastoralists, timber harvesters, tourists and local governments. Group members and government agency staff have lent their knowledge and expertise to the development of the strategy and I am grateful for their contribution to the process. Further stakeholder involvement will be an essential element in implementing the approaches outlined in this strategy.

This strategy provides the State Government with the blueprint for managing the Great Western Woodlands to ensure that the flow of benefits to Western Australia from activities such as mining, pastoralism, forestry, tourism and recreation and Indigenous and local government interests is maintained, at the same time as the natural and cultural values of the area are protected and managed for present and future generations.

Hon Donna Faragher JP MLC

MINISTER FOR ENVIRONMENT; YOUTH

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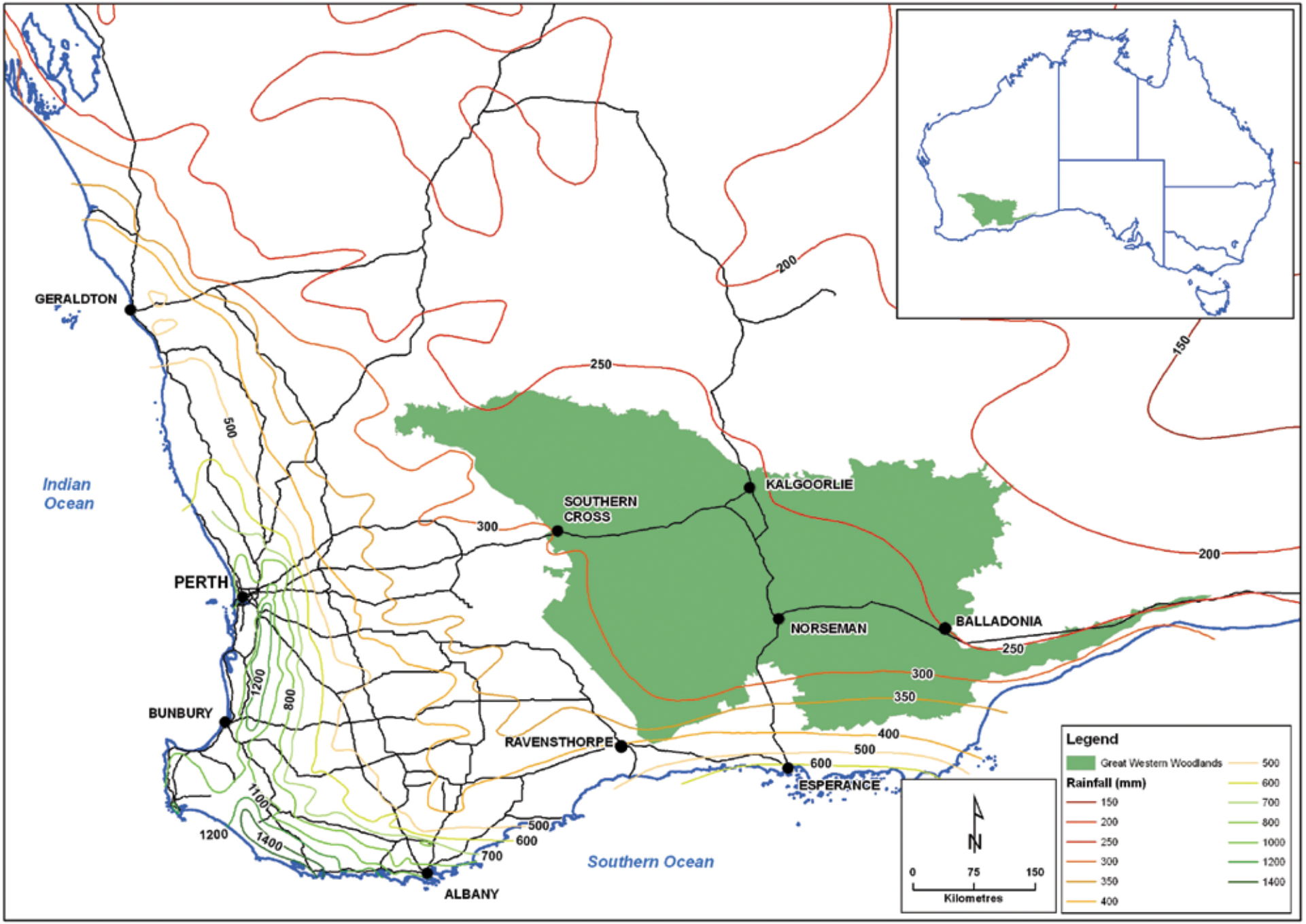


Introduction

What is the Great Western Woodlands?

The Great Western Woodlands is an internationally significant area of great biological richness. It is the largest remaining area of intact Mediterranean-climate woodland on Earth. Covering almost 16 million hectares—about the same size as England—this continuous band of native vegetation stretches from the edge of the Western Australian Wheatbelt to Kalgoorlie-Boulder in the north, to the inland deserts to the north-east and the Nullarbor Plain to the east (see Map 1).

This ancient landscape of broad, flat valleys and ridges experiences hot dry summers and frosty winters[1]. Elevations range from 140 metres in the south and east to 500 metres west of Kalgoorlie. There is almost no permanent water. Surface water flows into salt lakes from which it evaporates rather than draining to the sea. The low, variable rainfall and lack of potable groundwater made the Great Western Woodlands less attractive for agriculture and livestock grazing than the lands further south and west[2].

The Great Western Woodlands spans two climatic and botanical zones: the wetter south-west and the arid interzone. These conditions support more than 3,000 flowering plant species representing some 20 per cent of Australia's known flora, as well as numerous species of mammals, reptiles, frogs and birds. Aboriginal occupation has been dated to at least 22,000 years and the region has great cultural significance, with Aboriginal people retaining strong links with and responsibility for country.

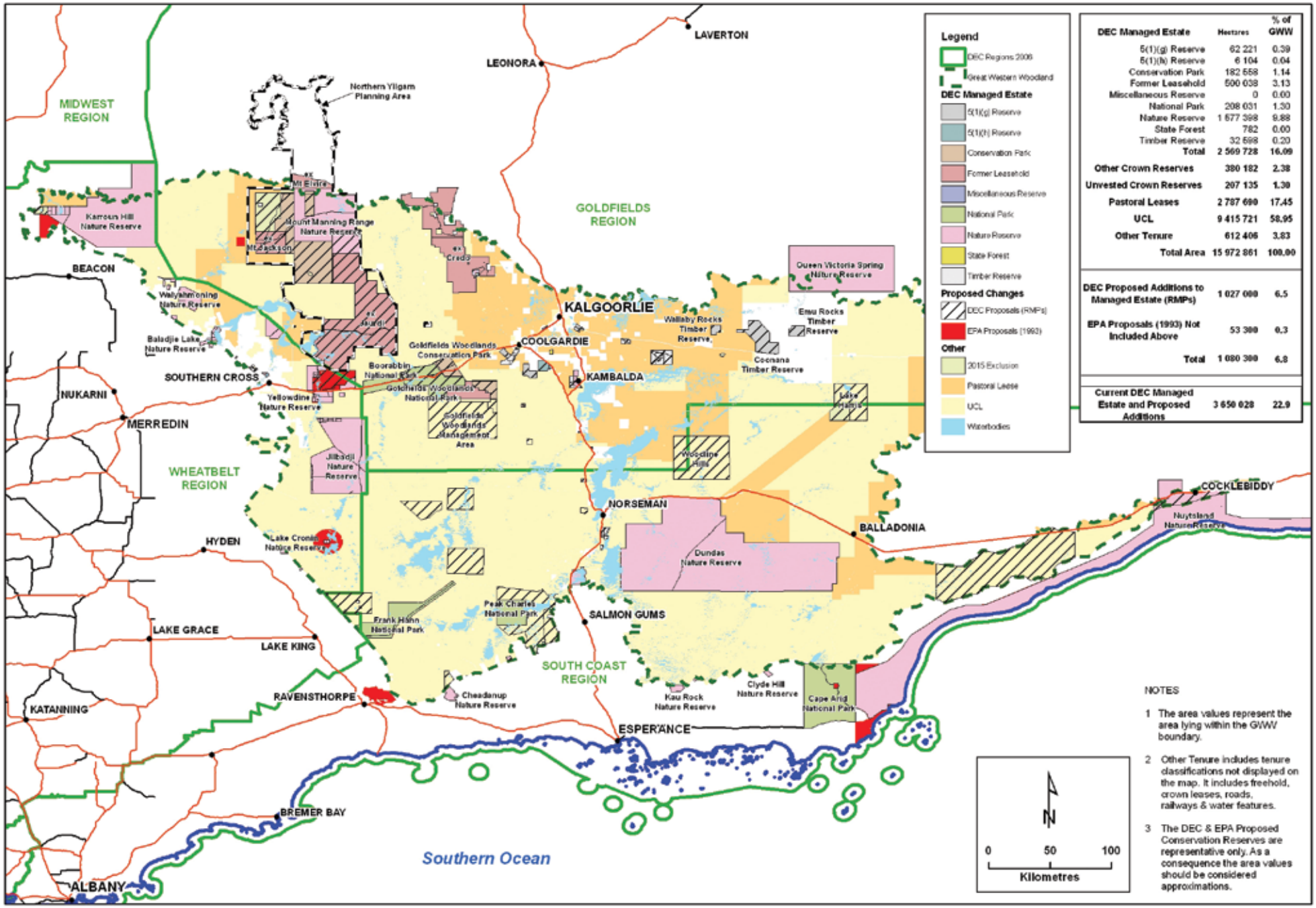
The Great Western Woodlands is predominantly on unallocated Crown land, but also includes significant areas of pastoral lease and conservation reserve (see Map 2).

Table 1 – Land tenure in the Great Western Woodlands

Tenure	Hectares	Proportion of GWW
UCL	9,415,721	58.9%
Pastoral leases	2,787,690	17.5%
DEC-managed estate (current)*	2,569,728	16.1%
Other Crown reserves	380,182	2.4%
Unvested Crown reserves	207,135	1.3%
Other tenure	612,406	3.4%
TOTAL	15,972,861	100.0%

*From pre-existing management plans and recommendations 1,080,300 hectares are proposed to be added to DEC-managed estate, which would take the total to 3,650,028 hectares (22.9 per cent of the Great Western Woodlands) if all proposals were implemented.

Map 2 Land tenure



DEC Managed Estate	Hectares	% of GWW
5(1)(g) Reserve	62 221	0.39
5(1)(h) Reserve	6 104	0.04
Conservation Park	182 658	1.14
Former Leasehold	500 038	3.13
Miscellaneous Reserve	0	0.00
National Park	208 031	1.30
Nature Reserve	1 577 398	9.88
State Forest	782	0.00
Timber Reserve	32 598	0.20
Total	**2 569 728**	**16.09**
Other Crown Reserves	**380 182**	**2.38**
Unvested Crown Reserves	**207 135**	**1.30**
Pastoral Leases	**2 787 690**	**17.45**
UCL	**9 415 721**	**58.95**
Other Tenure	**612 406**	**3.83**
Total Area	**15 972 861**	**100.00**
DEC Proposed Additions to Managed Estate (RMPs)	**1 027 000**	**6.5**
EPA Proposals (1993) Not Included Above	**53 300**	**0.3**
Total	**1 080 300**	**6.8**
Current DEC Managed Estate and Proposed Additions	**3 650 028**	**22.9**

NOTES

1 The area values represent the area lying within the GWW boundary.

2 Other Tenure includes tenure classifications not displayed on the map. It includes freehold, crown leases, roads, railways & water features.

3 The DEC & EPA Proposed Conservation Reserves are representative only. As a consequence the area values should be considered approximations.

More than 60 per cent of the Great Western Woodlands is covered by operating mines, granted mineral tenements and tenement applications (see '*Prospecting, exploration and mining*' on page 21).

Although still essentially intact, the Great Western Woodlands is under increasing pressure from pest animals, weeds and bushfires and if not effectively managed, these influences could seriously degrade or even destroy natural and cultural values in the area. Uses such as mining and exploration, pastoralism, timber harvesting and increasing recreation and tourism are vital to the local and WA economies, and must be able to coexist within an area of very high biodiversity and cultural significance.

This strategy

The Great Western Woodlands needs a strategy to spell out approaches to management and protection which will ensure the long-term conservation of its unique natural and cultural values. The strategy is founded on integrating the planning and management of the various uses of the Great Western Woodlands to achieve a sustainable overall outcome, so the many uses do not detract from its unique values.

The purpose of this strategy is to provide an overarching framework under which diverse planning and management processes can be integrated. It is a strategic document rather than a plan of management specifying detailed actions. It does not replace existing legislative responsibilities or sectoral activities but rather complements these efforts through providing a mechanism for coordination.

The strategy outlines the many challenges and opportunities facing the Great Western Woodlands. It establishes a vision for the region and provides principles and approaches to guide future management. As well as dealing with the environmental and cultural issues faced by those involved in managing the Great Western Woodlands, the strategy provides direction for integration of conservation with economic and social prosperity in the region.

The mission for the development of this strategy is: *To integrate the ideas and activities of stakeholders and members of the public in developing, resourcing and implementing agreed approaches to management of the Great Western Woodlands to ensure the identification and long-term conservation of its natural and cultural values.*

The aim is to assist residents, visitors, managers and policy-makers, State Government agencies and other stakeholders to work together under the guidance of this strategy to protect the important environmental and cultural values of the Great Western Woodlands, along with the social and economic benefits they provide.

Vision for the Great Western Woodlands – what will be different in the future?

Collaborative and integrated management based on sound information will be protecting the biodiversity and cultural values of the Great Western Woodlands while sustaining a flow of economic and social benefits.

Guiding principles

1. Integration

Largely intact, functional landscapes are of great value in protecting biodiversity and cultural values and thus integrated management across tenures is required.

2. Protection

Protecting the innate resilience of large landscapes is far more effective and cost-efficient than piecemeal approaches or waiting until restoration is required.

3. Respect

Acknowledging that Aboriginal people are the original managers of the Great Western Woodlands and according to traditional rules and customs have a continuing responsibility, along with other land managers, for its management today and into the future.

4. Sustainability

Resilient landscapes require less management input than those which are fragmented or severely degraded, which provides the opportunity to conserve environmental values, while enhancing the flow of social and economic benefits derived from compatible land uses without compromising future opportunities.

5. Engagement

Caring for the Woodlands is a shared responsibility and needs the engagement of a wide spectrum of participants from community, industry and government.

6. Cooperation

The resources required to properly care for and manage the Woodlands can only be achieved through partnerships and linkages where science, common sense and management skills are combined to boost management capacity.

7. Responsiveness

Conservation of the Great Western Woodlands must be responsive to changing circumstances and will require an adaptive framework.

8. Knowledge

The combination, continual improvement and open sharing of many streams of knowledge is required to ensure management of the Woodlands is based on the best possible information.

Values and issues for their conservation

The significance of the natural and cultural values of the Great Western Woodlands is enhanced by the scale and relative intactness of the area. The landscape scale at which the Great Western Woodlands still functions makes its long-term conservation not only vitally important, but also more achievable than would be the case in smaller areas.

Current management responses are inadequate to ensure the long-term protection of the full range of natural and cultural values in the Great Western Woodlands; however, numerous organisations and individuals are undertaking at least some management activities. State and local governments, resource companies, non-government organisations, community groups and committed individuals have all been active in implementing various conservation programs in the Great Western Woodlands. While much has been accomplished, more could be achieved by better coordination, integration and resourcing of these efforts. Similarly, although many individual research projects have been carried out, no integrated approach to inventory, research and monitoring exists at present.

Biodiversity values

The Great Western Woodlands is increasingly recognised as an area of great biological richness. It partially overlaps and is otherwise contiguous with the north-eastern edge of the South West Botanical Province, an internationally recognised biodiversity hotspot (see Map 3). Although relatively little biological survey work has been carried out to date, it is expected that the known richness of the area will increase significantly as further work is undertaken.

Woodland communities cover approximately 63 per cent of the Great Western Woodlands. Shrubland comprises 20 per cent and mallee vegetation 10 per cent, with bare areas (five per cent) and grassland (two per cent) over the remainder (see Map 3).

The area supports more than 3,000 flowering plant species[3]—some 20 per cent of Australia's known flora—and is a centre for *Eucalyptus* species diversity. Some 750 distinct *Eucalyptus* species are known in Australia, with more than 160 of them being found in the Great Western Woodlands. Many of these are endemic, growing nowhere else in the world. Thirty-eight plant species are listed as threatened (seven critically endangered, six endangered and 25 vulnerable) with many of these species also endemic to the area. A further 217 plant species are listed by the Department of Environment and Conservation (DEC) as priority species (possibly threatened but require more survey work to determine their status). Fifteen priority ecological communities are also recognised within the Great Western Woodlands, many of which are associated with banded iron formations and greenstone ranges (see Map 6). Vegetation communities are highly changeable across the area of the Great Western Woodlands[5].

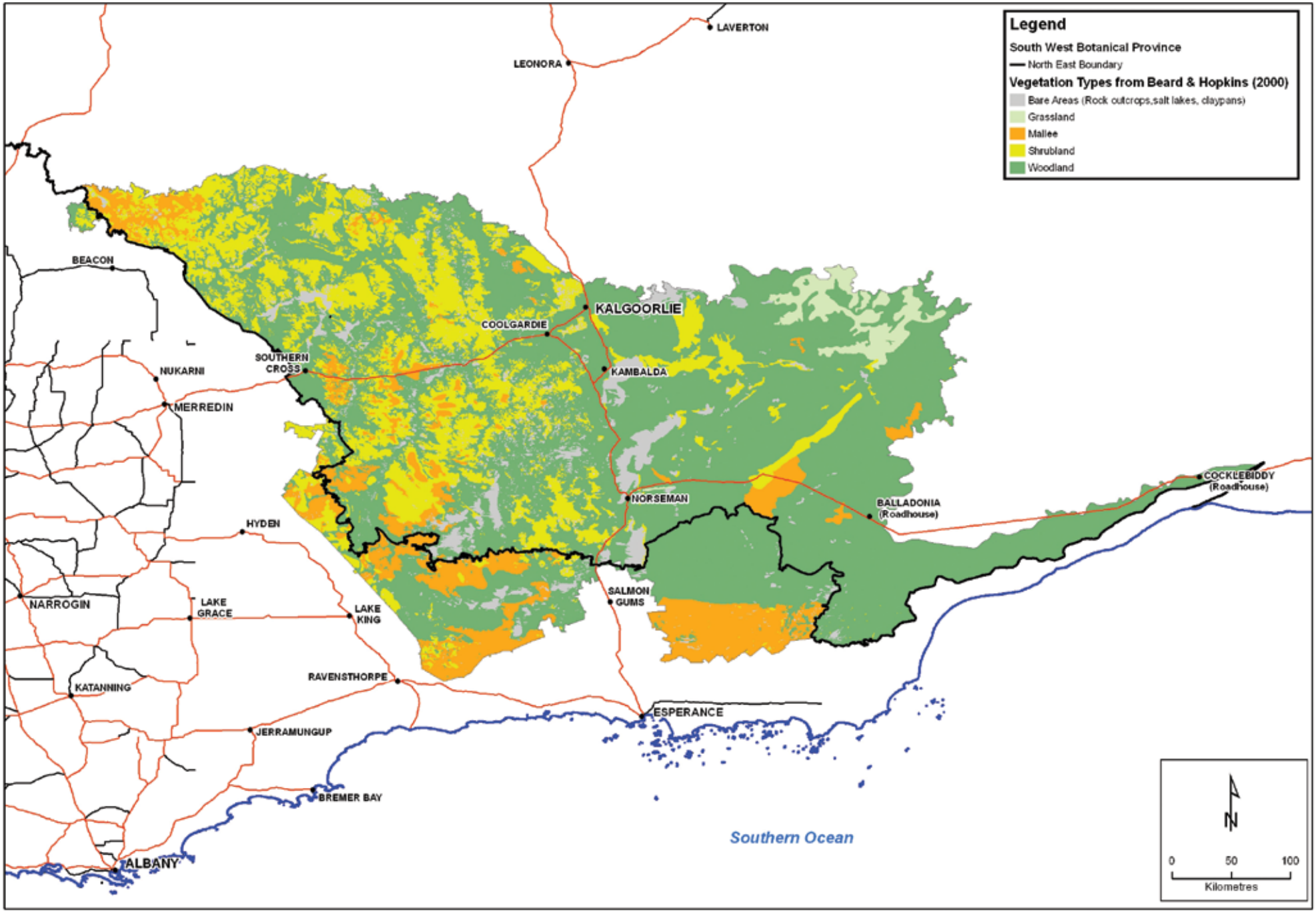
Forty-nine mammal, 138 reptile, 14 frog and 215 bird species live within the Great Western Woodlands[3] of which seven species are listed as threatened and a further 10 species, including the iconic and nationally threatened malleefowl, are listed by DEC as priority species. The Lake Cronin snake is endemic to the region. A further 20 mammal species once occurred in the region but are no longer present and two of these species are now globally extinct (see '*Pest animals*' on page 13). Three species of butterfly that are of conservation interest are known from the region including the iconic and critically endangered arid bronze azure. The area also supports a number of range-restricted endemic invertebrates and species living underground (often associated with banded iron formation ranges) that occur nowhere else in the world.

The total number of species is difficult to quantify as there have been few surveys and many new species remain to be discovered. A wetland of national importance, the Rowles Lagoon freshwater lake complex, lies within the Great Western Woodlands.

Compared to more densely settled areas, the Great Western Woodlands is still in excellent biological condition[3]. In 2001–02, the then Department of Conservation and Land Management undertook an extensive audit of the state's terrestrial biodiversity, as part of the National Land and Water Resources Audit Biodiversity Assessment (see Bioregional Summary of the *2002 Biodiversity Audit of Western Australia*[6] available at http://www.dec.wa.gov.au/pdf/science/bio_audit/2002_bio_summary.pdf). The audit considered the condition of biodiversity in each bioregion of WA. Bioregions—large geographically distinct areas of similar climate, geology, landform, vegetation and animal communities—are further broken down into sub-regions. The Great Western Woodlands lies predominantly within the Coolgardie Bioregion, with some in the Mallee Bioregion and small portions also in the Avon Wheatbelt, Nullarbor and Murchison bioregions.

A number of biological surveys have been carried out in the Great Western Woodlands. The *Biological Survey of the Eastern Goldfields of Western Australia* conducted

Map 3 - Vegetation types (from Beard and Hopkins 2000)



in the 1980s and 1990s divided the Eastern Goldfields into 12 study areas in which vegetation, flora and vertebrate fauna were surveyed. Seven of these study areas were wholly or partly within the Great Western Woodlands. Vegetation was mapped by Beard in the 1970s at a scale of 1:1,000,000 and the accompanying memoirs provide much useful biodiversity information[7, 8]. Numerous smaller studies have also been conducted by agencies and tertiary institutions. In addition to direct contributions to biological research, mining companies have financed surveys of each of the more than 7,000 existing and proposed tenements in the Great Western Woodlands. The results of these various studies have not yet been collated. The Western Australian Herbarium and Western Australian Museum retain data on species and their distribution and will need to be involved in efforts to collate information on the biodiversity of the Great Western Woodlands.

The Great Western Woodlands lies within three DEC regions. Two regions (South Coast and Goldfields) have statutory Regional Plans which cover the protection of biodiversity in vested conservation reserves and the operation of the *Wildlife Conservation Act 1950* on all lands. DEC carries out some ecological monitoring such as the response to fire of impacted populations of threatened flora.

There are a number of major issues facing biodiversity conservation in the Great Western Woodlands. A brief outline of each issue and current management responses follows.

Fire

Although it is a natural part of the Australian landscape, fire has the potential to degrade conservation values and threaten human life and community assets. Fire impacts are determined by a combination of their frequency, intensity, season and size. The management of fire, including the use of fire, fire suppression and bushfire prevention, is regulated by the *Bush Fires Act 1954, Conservation and Land Management Act 1984* and precedents established under Common Law.

Plant and animal species have evolved with fire in the landscape, with strategies for adaptation ranging from those that permit survival to those that make fire a necessary stage in the life cycle. However, organisms may not be adapted to fire *per se*, but rather to a particular range of fire regimes[9]. Aboriginal people have used fire as a management tool for thousands of years. Throughout much of the south-west of WA, fires of differing intensities were often used to create a mosaic of relatively small patches to manage food resources and movement corridors. However, it is not clear whether such practices were applied in drier inland areas such as the Great Western Woodlands. Increased numbers of people living in and visiting the Great Western Woodlands and increased infrastructure in the area have led to greater potential for fire to threaten life and community assets.

While the differing vegetation types found in the Great Western Woodlands (see Map 3) have different fire behaviours and responses, there is limited science-based knowledge of fire history, behaviour and ecology in these communities. In their original state, woodland communities appear to burn much less frequently than shrubland or mallee communities due to the widely spaced trees and discontinuous fuels on the ground with research indicating fire intervals of hundreds of years in some areas. Clearing for mine timber along the 'woodlines' (see '*Timber harvesting*' on page 21) and subsequent regeneration after fire has resulted in regrowth woodlands with closer-spaced trees and more ground litter which can carry and sustain fire more easily. Shrubland communities in the Great Western Woodlands are better adapted to fire than other vegetation types and tend to burn more frequently and to involve larger fires often in mild weather conditions. Fires in mallee communities are predominantly wind driven, with rates of spread in excess of 2,000–3,000 metres per hour common. In mallee and shrubland vegetation that has fire intervals greater than 10–15 years, fires are particularly prone to sudden, violent and often unpredictable changes in behaviour. Fire spread in fuels younger than this is usually limited to periods of extreme weather. Fire-prone grasslands will burn annually in many cases.

Research indicates that the typical fire interval for woodland communities has been much longer than for either mallee or shrubland. Fire frequencies are likely to be heterogeneous in the Great Western Woodlands due to the protective influence of natural firebreaks such as salt lakes and granite outcrops as well as significant variation in vegetation structure and fuel ages. Without deliberate intervention in fire management in the Great Western Woodlands, it is unlikely that long inter-fire intervals will be able to be maintained. Changes to woodland communities would result and may already be occurring.

In many environments, it is accepted that a fine grained mosaic of vegetation age classes benefits biodiversity and reduces the extent and adverse impacts of bushfire. However, there is uncertainty about the most ecologically appropriate fire regimes (fire interval, season, scale and patchiness) to apply to the major ecosystems in the Great Western Woodlands in order to deliver biodiversity outcomes and prevent the large, damaging bushfires which have been experienced in recent years. Inappropriate fire regimes can also significantly reduce carbon stores held in the Great Western Woodlands[1].

There is an ongoing need for community engagement in the management of fire in the Great Western Woodlands. Efforts need to be made to ensure that land managers and members of the public understand the potential impacts of bushfire and the rationale for fire management activities. Community support is a vital part in the success of all operations.

There is evidence that fire regimes in the Great Western Woodlands have changed in recent decades. For thousands of years, fires in the area were caused by lightning or Aboriginal burning practices, however, in more recent times new ignition sources have proliferated along road and rail links and from fires burning into the Great Western Woodlands from townships and adjacent developed areas. The absence of accurate historical data makes it difficult to assess the magnitude of change over time and to ascertain whether factors such as climate change are having an impact.

Under a Memorandum of Understanding (MoU) with the Department of Regional Development and Lands (which has legislative responsibility for management of unallocated Crown lands), fire management responsibilities on unallocated Crown lands outside townsites are shared between the DEC and local authorities, with DEC responsible for fire preparedness, and shires, with assistance from the Fire and Emergency Services Authority (FESA), responsible for suppression of bushfires. DEC is responsible for all aspects of fire management on conservation reserves while pastoralists, mining companies and other private landowners and leaseholders undertake fire management on and adjacent to lands for which they are responsible.

FESA and DEC plan jointly using a technique known as Bushfire Threat Analysis, which identifies valuable community and biodiversity assets which need protection from fire through mitigation, detection

and suppression (see Map 4 showing infrastructure in the Great Western Woodlands). The technique also considers the likelihood of ignition, potential fire behaviour and response factors.

Aerial and ground prescribed burning of strategic areas has been conducted to protect infrastructure such as major roads, railways, telecommunication facilities, powerlines and water pipelines. Some broad-scale prescribed burning of delineated cells has also been trialled. Low fuel buffers have been created using scrub rolling and prescribed burning of strips 80 to 100 metres wide along the private land interface, key roads and railway lines.

An extensive network of strategic access tracks has been established and is maintained by DEC, pastoralists and other land managers. DEC develops annual fire preparedness and response plans for all lands for which it is responsible. FESA and DEC also conduct education activities with stakeholders including local authorities.

FESA and DEC conduct satellite, aerial and ground assessment and monitoring of reported bushfires. DEC, local authorities and FESA work collaboratively to suppress some bushfires based on known values and risks, weather forecasts, fire behaviour and commitment of fire fighting resources across the region and the state. A decision to undertake direct attack will usually involve a resource commitment of at least four to six days and thus must be made in the light of pre-existing and predicted fire situations. Where bushfires cannot be attacked directly, aerial observation and satellite monitoring are maintained until the incident abates naturally, resources become available or circumstances change.

Pest animals

Several introduced (or feral) animals have become established in the Great Western Woodlands and are having serious impacts on conservation values.

Introduced feral predators (cats, foxes and wild dogs) are a particular problem as they prey on native wildlife species, and have been linked to the extinction or decline of a number of ground-dwelling small to medium sized mammals, reptiles and birds. For example, in the Coolgardie Bioregion (which comprises more than 80 per cent of the Great Western Woodlands), 20 mammal species which once occurred are now considered regionally extinct[1]. The situation is similar in the Mallee Bioregion which comprises a further 16 per cent of the area (see Table 2). The majority of mammals which have become regionally extinct are within the critical small-medium weight range that is particularly susceptible to feral predators. Such extinctions are likely to have considerable flow-on effects on the food web and ecological processes in which these prey species are involved.

Feral herbivores such as rabbits, goats and camels are also widespread in the Great Western Woodlands[13] and have considerable impact on vegetation composition, cover and health which in turn can lead to increased erosion and habitat destruction. Donkeys, horses, pigs and sheep are also feral in parts of the Great Western Woodlands but are not considered to be as pervasive or to be causing the same level of impact. Other impacts include competition for food and territory, fouling of water sources, introduction and transmission of disease and hazards to motorists.

Map 4 - Infrastructure

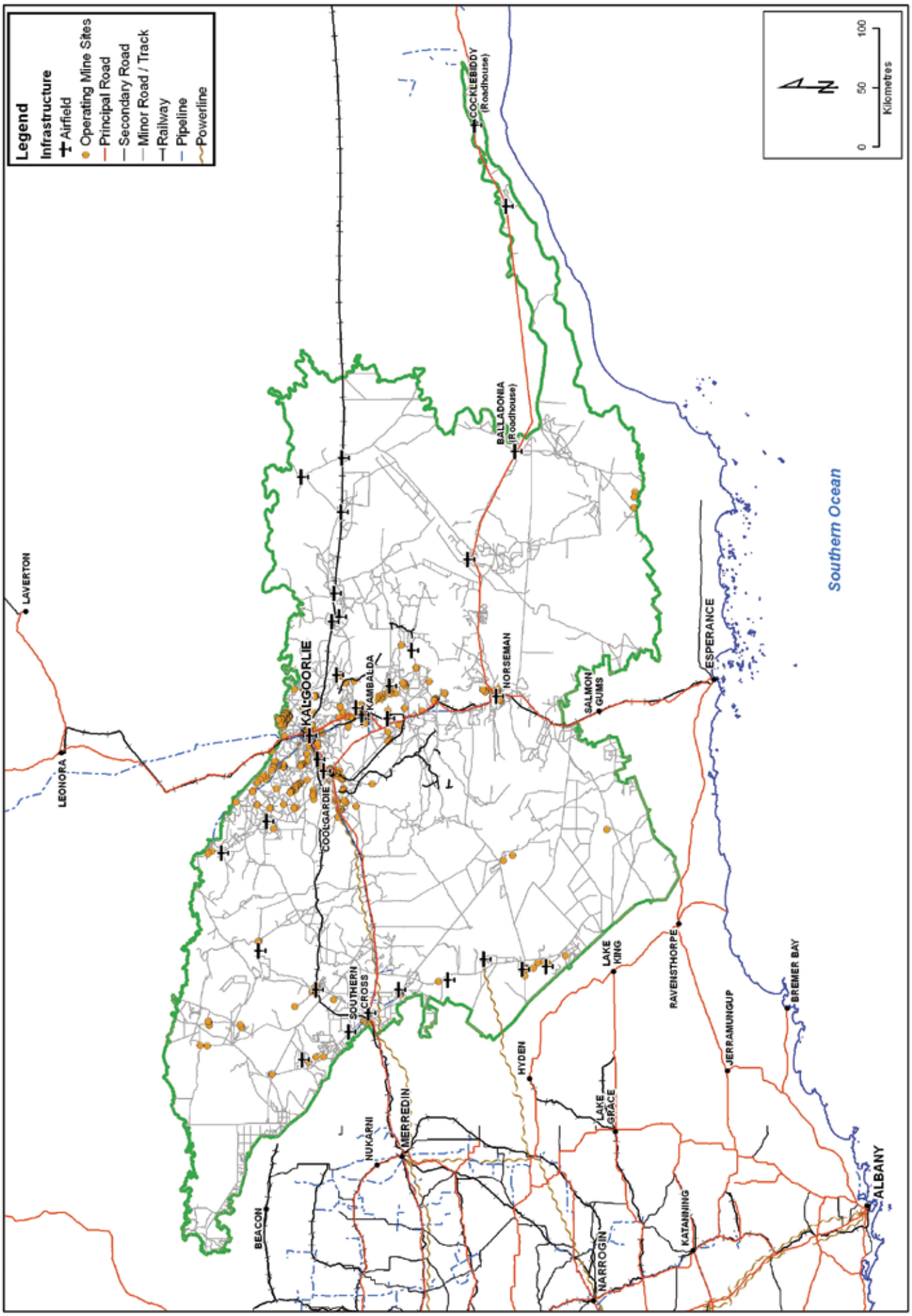


Table 2 – Status of selected mammal species

Common name	Genus	Species	Coolgardie Bioregion	Mallee Bioregion
Boodie	*Bettongia*	*lesueur*	Extinct	Extinct
Woylie	*Bettongia*	*penicillata*	Extinct	Extinct
Nullarbor dwarf bettong	*Bettongia*	*pusilla*		Extinct
Mulgara	*Dasycercus*	*cristicauda*	Extinct	Extinct
Chuditch	*Dasyurus*	*geoffroii*	Severe decline	Severe decline
Southern brown bandicoot	*Isoodon*	*obesulus*		Severe decline
Rufous hare-wallaby	*Lagorchestes*	*hirsutus*	Extinct	Extinct
Banded hare-wallaby	*Lagostrophus*	*fasciatus*		Extinct
Lesser stick-nest rat	*Leporillus*	*apicalis*	Extinct	Extinct
Greater stick-nest rat	*Leporillus*	*conditor*	Extinct	Extinct
Tammar wallaby	*Macropus*	*eugenii*		Extinct
Bilby	*Macrotis*	*lagotis*	Extinct	Extinct
Numbat	*Myrmecobius*	*fasciatus*	Extinct	Extinct
Djawalpa, crescent nailtail wallaby	*Onychogalea*	*lunata*	Extinct	Extinct
Dibbler	*Parantechinus*	*apicalis*		Extinct
Western barred bandicoot	*Perameles*	*bougainville*	Extinct	Extinct
Warru, black-footed rock-wallaby	*Petrogale*	*lateralis*	Extinct	Extinct
Red-tailed phascogale	*Phascogale*	*calura*	Extinct	Extinct
Wambenger	*Phascogale*	*sp.*	Extinct	Decline
Broad-faced potoroo	*Potorous*	*platyops*		Extinct
Western ringtail possum	*Pseudocheirus*	*occidentalis*	Extinct	
Walyadji, western mouse	*Pseudomys*	*occidentalis*	Extinct	
Plains rat	*Pseudomys*	*australis*	Extinct	Extinct
Ngadji, western pebble-mound mouse	*Pseudomys*	*chapmani*	Extinct	
Djoongari, shark bay mouse	*Pseudomys*	*fieldi*	Extinct	
Dayang, heath rat	*Pseudomys*	*shortridgei*		Decline
Mayaroo, long-haired rat	*Rattus*	*villosissimus*	Extinct	
Brushtail possum	*Trichosurus*	*vulpecula*	Extinct	Decline

Wild dogs are impacting pastoral lands within the Great Western Woodlands and adjacent agricultural and pastoral lands and can pose a major threat to the viability of these businesses[14]. Wild dogs can kill stock and may threaten people when in packs. Wild dog management is coordinated by Zone Control Authorities. The Kalgoorlie Zone (Zone 9) covers the majority of the Great Western Woodlands. A wild dog management plan has been prepared by the Agriculture Protection Board for the entire state[15] in addition to one covering Zone 9[16].

Interactions among introduced animals (such as predator-prey relationships) are not well understood in the Great Western Woodlands. Dingoes and wild dogs are known to prey on foxes, cats and goats for example, but net impacts are not well understood.

Both introduced and native species may be declared as pest animals under the *Agriculture and Related Resources Protection Act 1976* and managers of any land are required by law to carry out control measures for 'declared species' under the Act, aimed at containing deleterious effects. Control options for pest animals include ground and aerial baiting, shooting, trapping, fencing, biological control and mustering and removal to markets.

Full-time doggers are currently ground baiting and trapping wild dogs on private property, pastoral leases, reserves and unallocated Crown lands in accordance with Wild Dog Management Plans. This work concentrates on baiting in buffer areas along the agricultural and pastoral interface. Aerial baiting for wild dogs is also under way over parts of the Great Western Woodlands, generally in buffers and on pastoral leases. Wild dog control programs are also being conducted by Declared Species Groups working with Zone Control Authorities, DEC, pastoral and agricultural managers and neighbours. DEC is responsible for feral animal control on conservation reserves and under an MoU with the Department of Regional Development and Lands, on unallocated Crown lands outside townsites as well.

Dingoes, which are an important component of the native biodiversity in the Great Western Woodlands, have inter-bred with wild dogs. Genetic variation in wild

dog populations in the area is being studied to gain an understanding of the distribution of and degree of inter-breeding between pure dingoes and wild dogs. A feral camel DNA project is also under way to improve understanding of camel population structure and migration patterns to assist in the development of effective control measures.

Some shooting of camels and donkeys occurs in the Great Western Woodlands. Baiting for cats (and other predators) is being carried out in conjunction with research and there is some mustering and culling of feral goats. Doggers and land managers report on the presence of and undertake opportunistic control of other pest animals.

Weeds

Despite its relative intactness, the Great Western Woodlands is subject to environmental impacts from the presence of introduced weeds. As defined in the *Environmental Weed Strategy for WA*[17], environmental weeds are 'plants that establish themselves in natural ecosystems (marine, aquatic and terrestrial) and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade'. If not effectively controlled, weeds could become a significant environmental problem in the Great Western Woodlands. Climate change may lead to expansions or contractions in the ranges of some weed species.

Impacts of environmental weeds on ecosystem function include resource competition, prevention of seedling recruitment, alteration to geomorphological processes, alteration of hydrological cycle, changes to soil nutrient status, alteration of fire regime, changes to the abundance of indigenous fauna and genetic changes[17].

There are 189 weed species recorded in the Western Australian Herbarium database for the Great Western Woodlands, including six weeds declared under the *Agriculture and Related Resources Protection Act 1976*: horehound (*Marrubium vulgare*), mintweed (*Salvia reflexa*), thornapple (*Datura spp*), Bathurst burr (*Xanthium spinosum*), saffron thistle (*Carthamus lanatus*) and double gee (*Emex australis*). The responsible manager of any land on which any declared species occurs is required by law to carry out control measures. Local authorities can also prescribe 'pest' plants under this legislation for their local government area. Control options include controlling ecosystem degradation processes which favour weeds, herbicides, biological control, manual control and fire management. Revegetation is often required in parallel with weed control strategies.

Both the Zone Control Authority (for pastoral areas) and DEC have conducted reviews of weeds in the Goldfields Region, and DEC is developing a weed plan which includes the Great Western Woodlands. Pastoralists, mining companies and other land managers also carry out weed control programs, mainly for declared weeds. The Department of Agriculture and Food manages declared weeds and issues works notices under the *Agriculture and Related Resources Protection Act 1976*. DEC is responsible for weed control on conservation reserves and under an MoU with the Department of Regional Development and Lands, on unallocated Crown lands outside townsites. DEC conducts some control of problem weeds at recreation sites in conservation reserves.

Disease

Plant and animal diseases are potential threats to biodiversity. Fortunately, dieback disease (caused by *Phytophthora* species) which is killing plants throughout the south-west, does not appear to be a problem in the Great Western Woodlands. The disease does occur south of the area and as a precaution, dieback hygiene measures such as cleaning soil from vehicles and plant before performing any work on the conservation estate are required in some areas. No other diseases are known to be currently affecting biodiversity in the area though it is not known what role disease may have played in the decline in the numbers of mammals over the past century. It will be necessary to monitor this situation in the future.

Native vegetation removal

The predominantly undeveloped Great Western Woodlands has experienced less pressure for the removal of native vegetation than many other areas in the south of WA. However, clearing for residential, mining and industrial development, other infrastructure and occasional illegal clearing are ongoing issues. Habitat loss and impacts on threatened species and communities are major considerations to be addressed in any application for clearing of native vegetation. Fragmentation caused by removal of vegetation can also exacerbate problems such as weed invasion and bushfire by providing additional opportunities for these to enter native vegetation from adjacent cleared lands. Legal action and public education play important roles in prevention of illegal clearing.

Native vegetation clearing is regulated by DEC, and for mining activities by the Department of Mines and Petroleum, under the *Environmental Protection Act 1986* in conjunction with state agencies and local authorities. Environmental impacts are assessed before permits to clear are issued. Some exemptions apply for clearing of native vegetation for mining and petroleum activities under Regulation 5 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004, though these do not apply in designated 'Environmentally Sensitive Areas'.

Secondary salinity

The removal of deep-rooted, perennial native vegetation and its replacement with shallow-rooted, annual pastures and crops throughout the WA wheatbelt has disturbed the hydrological balance and allowed saline groundwater to rise to the surface causing secondary salinisation of land. While there are many primarily saline areas in the Great Western Woodlands, the existence of intact native vegetation means that it does not exhibit anywhere near the level of secondary salinity found on the cleared farmlands to the west and south. Some signs of salinity can be found adjacent to cleared lands and remedial action such as the re-establishment of deep-rooted vegetation in affected catchments will be required to restore natural values in these areas. The intact native vegetation of the Great Western Woodlands prevents salinisation of the headwaters of catchments which flow from it into the adjacent agricultural zone.

Climate change

There is general consensus in the scientific community that the effects of human-induced changes in levels of greenhouse gases in the Earth's atmosphere are causing accelerated climate change. Although there is still uncertainty about the precise nature and magnitude of the likely changes, climate models for the south-west of WA predict general warming and drying trends, with changes in the distribution and seasonality of rainfall. Extreme weather events such as storms are also predicted to increase. Ecosystems, communities and species will all be affected by these changes and will need to adapt or migrate if they are to persist.

The Great Western Woodlands, covering an area more than twice the size of Tasmania, provides an outstanding opportunity to assist in global efforts to counter climate change. A report on the biomass carbon stocks in the Great Western Woodlands, released by the Australian National University in October 2009[1], showed there were currently almost one billion tonnes of carbon stored in the soils and vegetation of the Great Western Woodlands—almost 50 times WA's annual emissions. With more effective management of fire (as proposed by this strategy), there is potential to store an additional 500 million tonnes of carbon. This represents an extraordinary global and local opportunity to significantly reduce greenhouse gas pollution.

The Great Western Woodlands spans two climatic and botanical zones and may be affected by climate change. As a result, planning and management for this extensive area will need to consider long-term climate trends to ensure the conservation of its ecosystems. One of the most effective responses to climate change, if biodiversity is to be conserved, is to maintain and enhance ecosystem resilience. The landscape-scale management and protection approaches outlined in this strategy are intended to provide the Great Western Woodlands with the resilience required to give it the best conditions for adapting to climate change.

Cultural, social and economic values

The Great Western Woodlands has great cultural significance for both Aboriginal people and other Australians and is an economically valuable and socially vibrant region. Economic and social statistics for the Goldfields-Esperance Region are shown in Table 3 (78 per cent of the area of the Great Western Woodlands is contained within the boundary of the statistical region, 84 per cent of which lies outside the Woodlands – including the Esperance area).

Aboriginal heritage and culture

Aboriginal people have lived in the Great Western Woodlands for at least 22,000 years and their close relationship with this land continues today. Aboriginal people are the original managers of this land and according to traditional rules and customs have a responsibility for its management today and into the future. These rules and customs focus on principles of respect and preservation for long-term sustainable use. They are incorporated in the regulation of traditional use of the land's varied resources.

Much of the Great Western Woodlands is subject to one or more native title claims, with eight separate registered and four unregistered claims in all (see Map 5). The largest registered claim is the Ngadju claim covering nearly seven million hectares within the boundary of the Great Western Woodlands.

Map 5 - Registered and unregistered native title claims

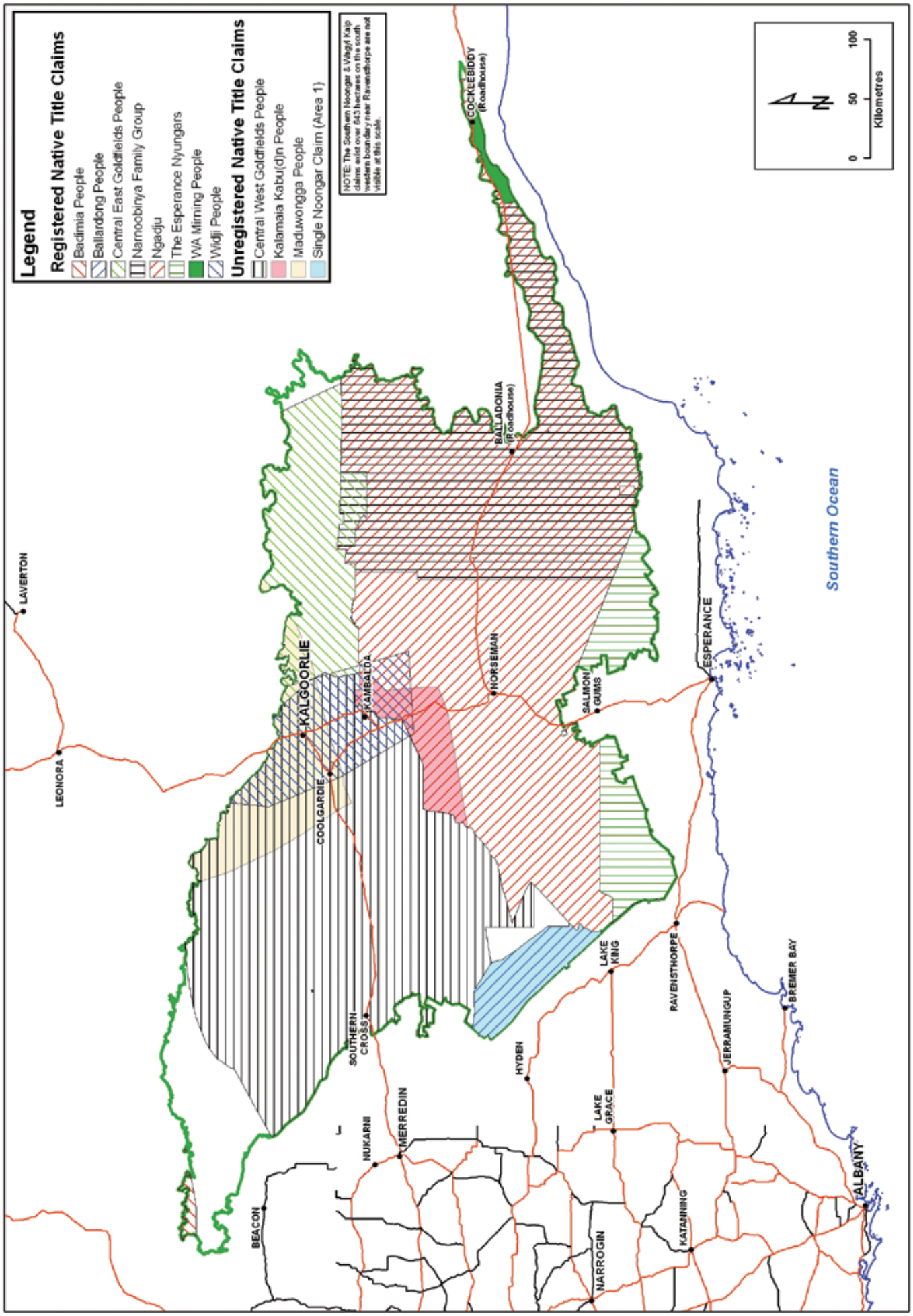


Table 3 – Characteristics of the Goldfields-Esperance statistical region

	Year	Goldfields-Esperance Region total	% of Western Australian total
Area[1]		771,276 km²	30.5%
Population[1]	2008	58,074	2.7%
Gross regional product ($ million)[1]	2006/07	7,029	5.0%
Value of mining ($ million)[1]	2006/07	10,189	19.1%
Workforce employment in the mining industry[2]	2006	4,566 (18.1% of regional workforce)	11.4%
Agricultural production ($ million)[1]	2004/05	411	8.0%
Sandalwood production ($ million)[3]	2006/07	~15	~30.0%
Workforce employment in agriculture, forestry and fishing[2]	2006	1,514 (6.0% of regional workforce)	4.9%
Number of international visitors[1]	2005-07 (mean)	40,400	3.9%
Number of domestic visitors[1]	2005-07 (mean)	453,000	6.4%
Number of employed persons[1]	2008/09	29,609	2.6%

Source: 1 Statistical Snapshot of the Goldfields-Esperance Region. Department of Regional Development and Lands (2009).
2 Derived from figures in above.
3 Forest Products Commission estimate.

The registered claimants and their nominated representatives are:

- Badimia – Yamatji Land and Sea Council
- Ballardong – South West Aboriginal Land and Sea Council
- Central East Goldfields – Goldfields Land and Sea Council
- Mirning – Goldfields Land and Sea Council
- Narnoobinya – Dorothy Ann Tucker
- Ngadju – Goldfields Land and Sea Council
- Southern Noongar – South West Aboriginal Land and Sea Council
- The Esperance Nyungars – Goldfields Land and Sea Council
- Wagyl Kaip – South West Aboriginal Land and Sea Council
- Widji – Indigenous Exploration and Drilling Pty Ltd.

The unregistered Native Title claims in the Great Western Woodlands are:

- Central West Goldfields
- Kalamaia Kabu(d)n
- Maduwongga
- Single Noongar Claim (Area1).

There are significant sites and other physical evidence of this living association throughout the Great Western Woodlands. Some of these places and artefacts—such as 'water trees'—are vulnerable to the effects of land management activities. Water trees were created when groups moving through an area jammed a rock into the fork of a sapling to create a bowl at the base of the multiple stems. As the tree grew, larger rocks were substituted until a sizable water dish was formed to provide vital pools of water in a dry landscape. These, along with trees used for spears and other implements, can be destroyed by a single fire. Dwelling structures (or wiltjas), ceremonial and other sites are also vulnerable. Wherever possible and appropriate, the location of such features should be recorded so they can be appropriately managed in conjunction with traditional owners.

It is important to incorporate Aboriginal traditional knowledge into approaches developed to protect the values of the Great Western Woodlands. Although some knowledge is not allowed to be made public, all those managing land in the Great Western Woodlands stand to deepen their understanding of the task through the sharing of traditional knowledge. Similarly, modern scientific knowledge can be used to assist in achieving Indigenous land management goals. Aboriginal people have responsibilities to manage and protect their country under their own laws and customs. These responsibilities mean that they want to be directly involved in the management of their traditional lands and are actively seeking such opportunities.

The Department of Indigenous Affairs coordinates the State Government's role in the management of Aboriginal issues in WA. Aboriginal people have expressed a strong desire to continue to protect the conservation, cultural and heritage values of the Great Western Woodlands but require further resources to expand these efforts. There is a need for further cultural surveys and other information gathering projects in the Great Western Woodlands.

Native title claims over the Great Western Woodlands are yet to be resolved through formal processes, though a number of overlapping claims have been rationalised. The Goldfields Land and Sea Council has negotiated agreements with resource users in the Great Western Woodlands. A Goldfields Regional Heritage Protection Protocol detailing how to better protect Aboriginal heritage in the region was signed by the State Government, mining and prospecting industry organisations and the Goldfields Land and Sea Council in 2001.

Pastoralism

The search for new pastoral lands first brought Europeans to the Great Western Woodlands. As early as the 1860s, the area's potential for pastoralism was assessed and today, around 17 per cent of the Great Western Woodlands is covered by pastoral leases. Approximately 20 per cent of the lease area is owned by mining companies.

Pastoralists consider sustainability a key issue in ensuring the continuity of their businesses. Growing numbers of pastoralists are embracing diversification into enterprises such as tourism. A number of pastoral leases have been purchased by the State Government and are now managed primarily for conservation. Organisations such as the Australian Wildlife Conservancy have also expressed interest in making such purchases. Pastoralism can lead to the degradation of natural values, though when sustainably managed, it provides jobs and people in the landscape and can assist in natural resource management activities. Wild dogs pose a major threat to the viability of pastoral businesses.

Pastoral leases in WA are administered by the Department for Regional Development and Lands through the Pastoral Lands Board, which is responsible for ensuring that pastoral leases are managed on an ecologically sustainable basis. The State Government is considering the recommendations of a recently completed review of the Southern Rangelands[14]. Long-term viability of pastoral businesses is an ongoing concern and many leaseholders are diversifying to stabilise income streams. Pastoralists are the front-line land managers in significant areas of the Great Western Woodlands. Many are involved in projects to protect biodiversity and heritage values and there is potential for further participation.

Prospecting, exploration and mining

Prospectors came to the Great Western Woodlands in the 1890s, particularly searching for gold. The discovery of gold in the Coolgardie area in 1892 attracted more people to the area and led to the discovery of the Golden Mile in Kalgoorlie the following year and to the ensuing gold rush. People arrived from all over the world to make their fortunes with many having to walk to the goldfields from the coast. Conditions on the early goldfields were extremely harsh, with most people living in canvas and hessian huts. Supplies were limited with miners being forced to pay high prices for water and other essentials of life. Disease was common and many died on the goldfields.

A total of 1,400 tonnes of gold have now been extracted from the rich 'greenstone' ores, more than from any other single source in Australia. The Eastern Goldfields of WA is now one of the richest mineral provinces of the world, with nickel and other resources being extracted in addition to gold (see Map 6). The mining sector is the major employer in the goldfields and provides the economic base for its residents. With a workforce in the Goldfields-Esperance Region of more than 4,500 in 2006, the industry here accounted for more than 11 per cent of the WA mining workforce. The industry is also a significant contributor to state and national revenues generating in excess of $10 billion in the Goldfields-Esperance Region in 2006–07. The area has 334 operating mines, and hosts an active exploration and prospecting sector. There are more than 5,000 existing mineral tenements in the Great Western Woodlands and almost 2,000 pending. These tenements cover nearly 10 million of the 16 million hectares in the Great Western Woodlands.

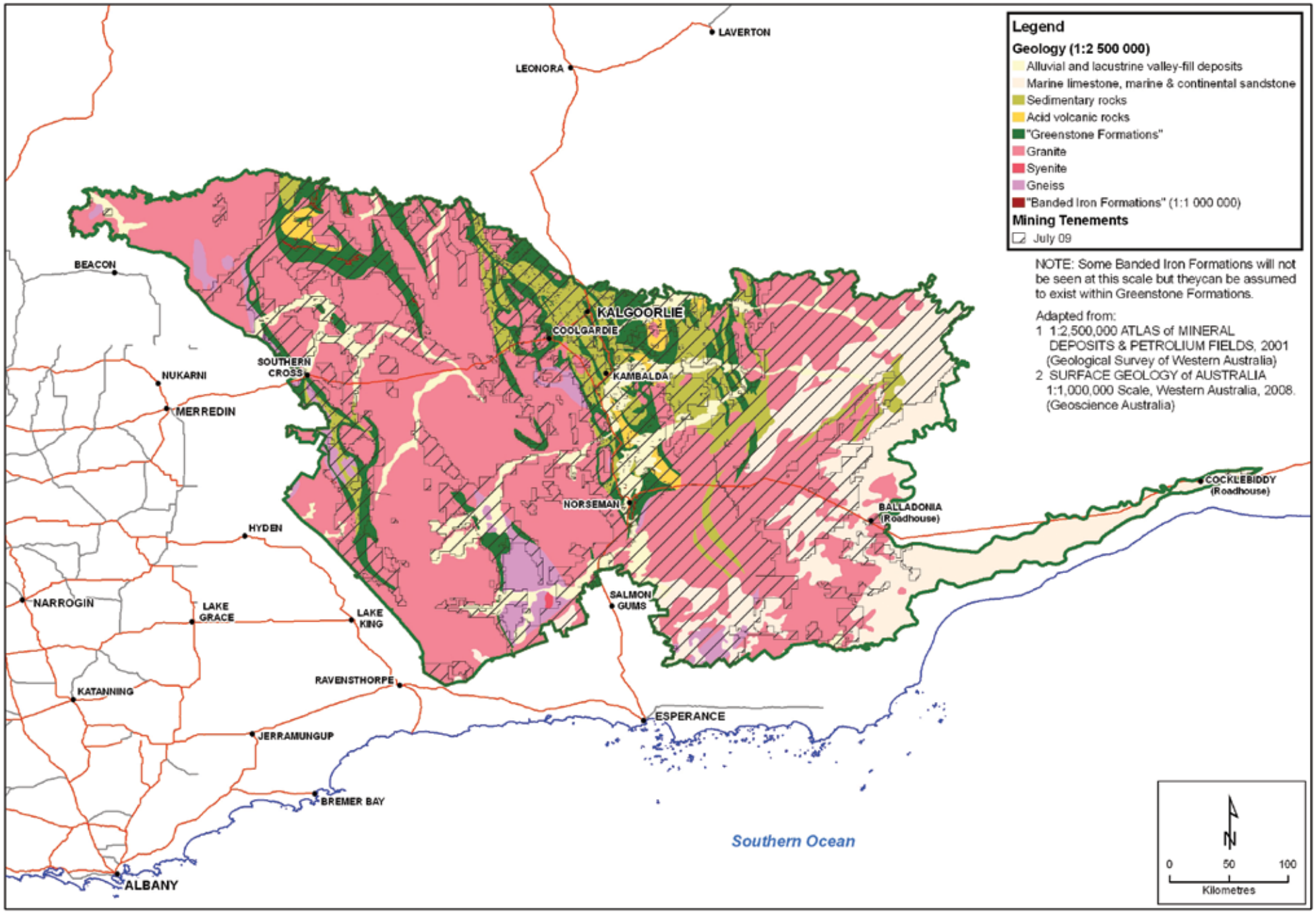
Mining, exploration and prospecting can affect biodiversity and cultural values, although in most cases these impacts are restricted to small areas. Rehabilitation is now the norm in the industry although some areas from the industry's past remain to be rehabilitated. Biological surveys conducted by the mining industry have added significantly to the store of knowledge about the flora and fauna of the Great Western Woodlands (see '*Biodiversity values*' on page 9).

Mining, mineral exploration, prospecting and fossicking are regulated under the *Mining Act 1978*. The Department of Mines and Petroleum refers significant proposals to the Environmental Protection Authority under agreed guidelines. Mining companies operating in the Great Western Woodlands have begun to fund conservation projects in the area and have expressed a willingness to enter further partnerships to help conserve biodiversity and cultural values.

Timber harvesting

The early history of mineral extraction and processing in the Great Western Woodlands is closely intertwined with the exploitation of local timber resources. From the early 1900s, woodland timbers were cut to supply fuel to roast ore during the gold extraction process and for pit props for mines. Firewood was also essential for pumps and winders, production of fresh water in condensers, pump stations along the water pipeline, electricity generation and domestic use. Transported on an extensive narrow-gauge rail network known as the 'woodlines', which radiated from Kalgoorlie, more than 30 million tonnes of

Map 6 - Geology and mining tenements



hardwood timber were harvested between the 1890s and the 1960s. Immigrants, mainly from Europe, came to the goldfields to cut and haul timber and lived in extremely harsh conditions at the limits of the rail network, known as the 'head of the line'[19]. Evidence of the woodlines is still common in the Great Western Woodlands and deserves to be protected as an important part of the area's heritage. Although most of the three million hectares which were cut-over have regrown, the ecological impacts of the woodline cutting are still evident, with regrowth vegetation exhibiting structural differences, showing very different responses to fire and providing altered habitats for native wildlife.

Western Australian sandalwood (*Santalum spicatum*) was the basis of one of the earliest industries in WA with the wood being first exported in 1845. For most of the industry's history, the resource has been derived from natural stands. Sandalwood is exported to South-East Asia to manufacture incense or joss sticks and to India for production of oil. It is used as an ingredient in the finest perfumes, and in medicine, incense and soaps, while the timber is valued for craft use. Sandalwood oil is also extracted for use in cosmetic and therapeutic products in WA. Both dead and green sandalwood trees are harvested. A significant proportion of the state's current annual wild sandalwood harvest is derived from the Great Western Woodlands.

Goldfields hardwoods are famed for their craftwood qualities, with a small demand for musical instruments, fine furniture, crafts and other specialty products. A small specialty timber industry supplies these markets, with about 20 tonnes harvested per year. The Great Western Woodlands also supplies dry firewood as well as some mining timbers and fence posts. Management of these activities is required to minimise impacts on conservation values.

Responsibility for timber resource management is shared between two government agencies. DEC is responsible for environmental management while the Forest Products Commission (FPC) is responsible for the commercial harvesting, regeneration, marketing and development of the timber industry both in plantations and natural resource areas. FPC has initiated and funded a number of projects to help land managers and pastoralists adapt current land management practices to facilitate the natural regeneration of sandalwood. Research is also being conducted into ways of improving the success of sandalwood regeneration and sustainability of harvesting. Regeneration efforts are currently concentrated into areas where feral goat numbers are controlled so that seedlings are less likely to be grazed.

Recreation and tourism

Desert areas, woodlands, rock formations and a diverse range of flora and fauna exclusive to the Great Western Woodlands combine to provide a seemingly untouched escape for travellers and locals alike. Popular drive trails such as the Holland Track, Granite Woodlands Discovery Trail and Golden Quest Discovery Trail, all of which traverse the Great Western Woodlands, help promote the area and draw increasing numbers of tourists.

Statistics from Tourism Research Australia indicate that 'Australia's Golden Outback' which encompasses the Great Western Woodlands (plus considerable additional areas) attracts 79 per cent of its visitors from within WA, 15 per cent from elsewhere in Australia and six per cent from overseas.

Self-drive tourism includes conducted four-wheel-drive tours as well as trips by organised groups and individuals. A number of remote campgrounds have been developed within the Great Western Woodlands to accommodate these visitors. Quality information, access and directional and interpretive signage are major issues for visitors while track maintenance, rubbish removal and the potential for bushfires to be started by unwary visitors are issues for managers.

There are clear opportunities to attract higher yield and environmentally aware visitors to the Great Western Woodlands. Statewide in 2007, 14.8 million domestic overnight visitors, 14.5 million day visitors and 3.4 million international visitors participated in nature-based activities. The biodiversity, landscape, culture and remote outback nature of the Great Western Woodlands provide significant scope to attract 'experience seekers', looking for authentic, active holidays in which they can get thoroughly involved.

Tourism Australia has identified 15 'National Landscapes' which are world-class landscapes distinctive to Australia. The southern part of the Great Western Woodlands is included in the Western Australian South Coast National Landscape which has passed the initial assessment for acceptance into the program. This new status will significantly raise the profile of the area with experience-seeking tourists.

The Great Western Woodlands is an important recreation destination for residents of the area. Activities such as four-wheel driving, prospecting, bush camping, yabbying in pastoral dams and shooting of feral animals are popular with local people. Some damaging use by trail bikes and four-wheel drives occurs. When full, some ephemeral lakes are used for water-based recreation.

Numerous recreation sites have been developed at places of interest throughout the Great Western Woodlands and some management is in place. Sites on conservation lands are managed by DEC, and many other sites have been provided by local authorities. As many access roads double as fire management tracks, they are developed and maintained in conjunction with the fire preparedness actions implemented throughout the area.

Beekeeping

The Great Western Woodlands is a valuable resource for the production of honey. Flowering patterns can be significantly different from those in the south-west and south coast, providing an essential alternative location for hives in times when the season is poor elsewhere. There are more than 1,200 registered apiary sites in the Great Western Woodlands. The management of fire and maintenance of access are major concerns to beekeepers.

Under the provisions of the *Western Australian Beekeepers Act 1963* all keepers of honeybees are required to register with the Department of Agriculture and Food. The Act was introduced to better provide for the eradication of diseases and pests of honeybees, the orderly conduct of the industry and for the improvement of the products from beekeeping. DEC manages beekeeper access to all public land under the *Conservation and Land Management Act 1984*. DEC issues permits for apiary sites on Crown lands and applies environmental conditions to ensure compliance with management requirements, water catchment guidelines, dieback control and fire prevention. Introduced bees are known to compete with native fauna for tree hollows and other resources.

Strategic directions for the Great Western Woodlands

This conservation strategy aims to improve coordination and integration of the many fragmented planning and management elements in the area to ensure that biodiversity and cultural values in the Great Western Woodlands are conserved for all time.

The Great Western Woodlands has a remarkable sense of place. Its high biodiversity and cultural values, coupled with its relative intactness, instil it with a special significance obvious to local people and visitors alike. But place is not the only sense imparted by the Great Western Woodlands: there is also a sense of inclusion of the people who live, work and visit there; a sense of security because of the livelihoods it provides; a sense of curiosity encouraging us to learn more about the area; a sense of purpose in its management and protection; and a sense of responsibility for protecting the area for future generations.

Together these 'six senses' provide a focus for the ambitions, objectives and approaches to be adopted for the management of this unique area.

1. A sense of place – the special nature and heritage of the Great Western Woodlands	
Priority objectives	**Approach**
Intactness ***10-year ambition: A net improvement in native vegetation condition and connectedness***	
1.1. To retain the composition, structure and function of native ecosystems in the Great Western Woodlands	• Limit habitat degradation through appropriate management • Rehabilitate degraded areas • Integrate land management activities (see also '*Integration*' on page 34) • Assist land managers in minimising the impacts of their activities • Promote the benefits of retaining the Great Western Woodlands as an intact system
1.2. To restore or maintain physical connections with native vegetation elsewhere in the south-west of WA	• Promote the management of adjacent natural areas in a manner complementary to that outlined in this strategy • Re-establish connections with surrounding natural areas through programs such as Gondwana Link
Aboriginal heritage ***10-year ambition: Aboriginal connections to the Great Western Woodlands are strong and respected and Aboriginal people are intimately involved in planning and managing the Great Western Woodlands***	
1.3. To engage with traditional owners in all land management planning processes	• Ensure culturally appropriate consultation with traditional owners in planning processes • Include Indigenous representation on decision-making and advisory bodies
1.4. To implement joint management of conservation lands	• Introduce legislative changes to enable joint management of land under agreement between traditional owners and the State Government • In conjunction with Aboriginal people, develop and implement a suitable joint management model for conservation lands in the Great Western Woodlands
1.5. To develop economic opportunities for Aboriginal people in management of the Great Western Woodlands	• Consult with Aboriginal people about suitable economic opportunities in the Great Western Woodlands • Develop, resource and implement Aboriginal economic initiatives such as land management, ranger programs and cultural tourism ventures
1.6. To support the resolution of native title claims	• Continue processes in accordance with native title legislative requirements • Consult with traditional owners in all planning processes affecting land use
1.7. To protect significant places and cultural heritage	• Work with Aboriginal people to identify Aboriginal heritage values and to record and register values where appropriate • Develop and implement protection strategies • Facilitate the continuity of Aboriginal cultural practices • Use cultural tourism ventures and other initiatives to educate users and the broader community in the relationship between Aboriginal people and the Great Western Woodlands
Non-Aboriginal heritage ***10-year ambition: The non-Aboriginal heritage of the Great Western Woodlands is understood, valued and protected***	
1.8. To protect significant places and cultural heritage	• Identify, record and register non-Aboriginal heritage values • Develop and implement protection strategies
1.9. To engage with stakeholders in heritage planning and management processes	• Provide opportunities for input to planning and management by interested stakeholders and members of the public • Develop and disseminate a range of educational materials detailing the heritage values of the Great Western Woodlands and the measures required to conserve them

2. A sense of inclusion – awareness, understanding and involvement	
Priority objectives	**Approach**
Public awareness ***10-year ambition: Members of the public understand the important values of the Great Western Woodlands and support efforts to conserve them***	
2.1. To help visitors appreciate that they are in a unique, internationally significant area	• Develop eye-catching, aesthetically pleasing signage that captures the values of the region at all entry points to and key recreation sites within the Great Western Woodlands • Provide high-quality visitor information at key recreation sites
Public engagement ***10-year ambition: Residents and visitors are actively involved in efforts to conserve the values of the Great Western Woodlands***	
2.2. To publicise widely the values of and management approaches in the Great Western Woodlands	• Develop and disseminate a range of educational materials detailing the importance of the Great Western Woodlands and the measures required to conserve them • Provide information packages for use in schools • Work with industries operating in the Great Western Woodlands to ensure that companies and their employees are aware of the importance of minimising detrimental impacts and contributing to improved management of the area
2.3. To provide opportunities for public involvement	• Establish a significant volunteer program in the Great Western Woodlands • Develop management programs in which interested people are able to participate • Maintain a register of interested people and their areas of expertise
2.4. To make information on opportunities for involvement readily available	• Develop and promote an initial point of contact, such as a website, for information detailing activities taking place in the Great Western Woodlands and volunteer training available • Develop and widely disseminate a brochure promoting volunteering in the Great Western Woodlands
Promotion ***10-year ambition: The Great Western Woodlands is widely recognised as a distinct area with high conservation values worthy of protection***	
2.5. To promote the Great Western Woodlands as an identifiable location	• Encourage tourism and other businesses in the Great Western Woodlands to specifically identify their products and services with the Great Western Woodlands badging • Explore merchandising opportunities • Encourage authors and publishers to produce books and magazine articles covering aspects of the Great Western Woodlands

2.6. To promote the Great Western Woodlands as a unique tourist destination	• Work with Tourism WA, Australia's Golden Outback Regional Tourism Association, local authorities, commercial tour operators and other service providers to promote the Great Western Woodlands as an outback and nature-based tourist destination • Publish a self-drive guide featuring the heritage, natural history and trails of the Great Western Woodlands • Develop and disseminate newsworthy stories for local and international print and media outlets to achieve increased awareness for Great Western Woodlands • Ensure trails and other facilities within the Great Western Woodlands are included on relevant guide maps
2.7. To provide a consistent appearance for information on the Great Western Woodlands	• Develop a style guide so information packages, literature and media releases have a standard appearance • Develop visual badging for the Great Western Woodlands

3. A sense of security – integrating conservation and economic prosperity	
Priority objectives	**Approach**
Sustainable development ***10-year ambition: Local and Western Australian communities benefit from compatible land uses which are productive and profitable and which make a positive contribution to the conservation of natural and cultural values***	
3.1. To develop communities and economic opportunities in a way which helps protect the region's unique character	• Encourage sustainable development that delivers economic and social benefits and is sensitive to the environmental and cultural values of the Great Western Woodlands • Encourage development that delivers best practice in the engagement of Aboriginal people • Ensure planning for the Great Western Woodlands includes engagement with land users to encourage development to be undertaken in such a way that is consistent with the region's character • Ensure compatibility of neighbouring land uses and activities through integrated and strategic planning
3.2. To engage land users in planning and managing for conservation outcomes	• Involve representatives of land users in decision making and advisory bodies • Promote voluntary partnerships to coordinate and extend on-ground efforts • Encourage financial and other contributions to conservation projects from land users • Work with land users to define conservation objectives for any lands under their direct management • Encourage industry groups to report on conservation issues and undertake conservation projects on lands on which they operate • Regulate land uses in accordance with relevant legislation, regulations and policies • Promote the involvement and contribution of land users to conservation in the Great Western Woodlands

3.3. To provide for safe and enjoyable recreation and tourism experiences	• Develop a recreation and tourism master plan for the Great Western Woodlands which identifies tourism nodes and sites and considers the development of Naturebank accommodation experiences • Provide suitable access to and appropriate facilities and services at key recreation and tourism sites • Manage visitor risks at key recreation and tourism sites • Identify and promote appropriate recreation opportunities • Provide a range of on and off-site information (including signage and safety information) tailored to the needs of visitors

4. A sense of curiosity – knowledge gathering and management	
Priority objectives	**Approach**
Research ***10-year ambition: Planning and management are based on a sound understanding of environmental, social and economic dimensions of the Great Western Woodlands***	
4.1. To coordinate research activity	• Establish a focus on Great Western Woodlands research by integrating government and non-government activities • Maintain a register of research projects • Encourage input from public, private and tertiary education sector funders and researchers
4.2. To develop an inventory of species and communities	• Collate the results of surveys which have already been conducted by governments, tertiary institutions and the private sector • Conduct biological surveys throughout the Great Western Woodlands • Formally describe new species when they are found • Monitor changes in the condition of natural values and adapt management in accordance with findings
4.3. To understand fundamental ecosystem processes	• Encourage hydrological research to improve understanding of water cycles and the potential impacts of climate change (see also *'Climate change'* on page 33) • Encourage other research to test hypotheses leading to an understanding of patterns and processes in ecosystems
4.4. To understand social and economic dynamics	• Encourage social and economic research programs
4.5. To incorporate research findings into land use and management approaches	• Actively communicate the results of research and monitoring programs to managers and other land users • Make research and monitoring results easily accessible to managers and other land users (see also *'Information storage and accessibility'* on this page)
Information storage and accessibility ***10-year ambition: Comprehensive information on the Great Western Woodlands is freely available to those seeking it***	
4.6. To make public all relevant research results	• Encourage publishing of all research results • Publicise the existence of research findings
4.7. To make research information available through a single portal	• Store research findings and other information in a single Geographic Information System • Provide an easily accessible web portal for access by planners, managers and members of the public

5. A sense of purpose - management to conserve biodiversity and cultural values	
Priority objectives	**Approach**
Native species and communities ***10-year ambition: Native species and communities are conserved and their values are widely understood and appreciated***	
5.1. To stabilise and, where appropriate and feasible, increase populations of threatened species	• Identify and monitor occurrences of threatened and potentially threatened species and communities • Develop and implement recovery plans for threatened species and communities • Expand existing management programs (such as translocations of threatened species) within and to the Great Western Woodlands where appropriate
5.2. To adjust land management practices to favour the conservation of native species and communities	• Monitor impacts of land management activities • Interpret results and disseminate to land managers • Provide expert advice to land managers on alternatives to detrimental practices
Areas requiring more intensive conservation management ***10-year ambition: Areas requiring more intensive conservation management in the Great Western Woodlands have been systematically identified and measures taken to secure their long-term management***	
5.3. To identify areas of the Great Western Woodlands requiring more intensive conservation management	• Encourage a systematic review of conservation values and challenges in the Great Western Woodlands • In conjunction with stakeholders and members of the public, develop principles for the production of a land use map which includes identification of areas requiring more intensive conservation management • Promote surveys for species with poorly known distributions
5.4. To refine management approaches for areas requiring more intensive conservation management	• Through a public consultation process, develop and implement management plans for areas requiring more intensive conservation management • Monitor outcomes and modify management approaches if required
5.5. To secure the future of areas requiring more intensive conservation management	• Evaluate the need for more intensive conservation management of particular areas using the best available scientific information • In conjunction with stakeholders and members of the public, determine the most effective methods for securing the future of areas requiring more intensive conservation management (including tenure-based and other approaches) • Work with stakeholders to progress existing conservation reserve proposals
Fire ***10-year ambition: Fire management contributes to the maintenance and restoration of biodiversity and natural processes in the Great Western Woodlands and provides protection to community and cultural assets***	
5.6. To understand the role of fire in shaping and maintaining the ecosystems of the Great Western Woodlands	• Formulate hypotheses to explain the relationships between fire and the ecosystems of the Great Western Woodlands • Design and conduct specific fire ecology research • Test hypotheses through research as well as monitoring the outcomes of all planned and unplanned fires • Refine hypotheses in the light of operational experience and research findings

5.7. To maximise the effectiveness of fire management activities	• Conduct an integrated bushfire threat analysis for the Great Western Woodlands • Develop an integrated fire management plan for the Great Western Woodlands • Produce and maintain a comprehensive GIS fire history data set for the Great Western Woodlands • Further develop and maintain bushfire detection and reporting processes • Determine priority areas where bushfire suppression will be attempted to protect human life, infrastructure, commercially valuable vegetation and natural and cultural values • Develop and maintain strategic access and water points for fire suppression • Use climatic and other data to predict the likely nature of future fire seasons • Suppress bushfires in priority areas according to resource availability • Accelerate research into the short and long-term effectiveness and impact of various fire management approaches and link this information to regular reviews of fire management programs
5.8. To protect the lives of residents and visitors from fire	• Give the highest priority to suppression of bushfires which could threaten human lives • Mitigate the potential for fire to threaten human lives through fuel management in priority areas, fire suppression and education
5.9. To ensure fire management is consistent with conservation of biodiversity, habitats and ecosystem processes	• Collate the best available information on fire ecology for use in fire planning and management • Reduce the incidence and extent of bushfire in woodland communities by maintaining a mosaic of fire ages in surrounding vegetation • Use fire at a landscape level to maintain vegetation and habitat diversity • Use natural barriers where available as boundaries for landscape-scale prescribed fires • Develop and implement specific fire treatment plans for fire-vulnerable species and communities • Determine and implement appropriate fire management regimes for range-restricted communities such as those associated with greenstone belts and banded iron ranges • Give a high priority to suppression of bushfires which are likely to threaten vulnerable species and communities • Encourage the rehabilitation of significant areas which are disturbed during fire management operations • Develop and implement systematic monitoring of the outcomes and impacts of planned and unplanned fire events and modify approaches as required

5.10. To protect cultural sites from damage or destruction by fire	• Develop and implement strategies to protect Aboriginal and other sites from the impacts of fire and incorporate them into fire management programs
5.11. To protect developed lands from the detrimental impacts of fire	• Develop and maintain fuel reduced zones (using techniques such as prescribed burning, scrub-rolling and linking natural barriers) at the interface of the Great Western Woodlands with agricultural and other developed lands • Give a high priority to suppression of bushfires which are likely to threaten developed lands
5.12. To raise community awareness of fire and its management	• Develop and disseminate information on fire and its management • Provide publicly accessible fire history mapping over the Great Western Woodlands • Make public the results of monitoring of the outcome of all planned and unplanned fires
5.13. To protect lifelines and other infrastructure from unplanned fire	• Develop and maintain fuel reduced zones (using techniques such as prescribed burning, scrub-rolling and linking natural barriers) to protect lifelines and other infrastructure • Encourage consideration of fire vulnerability in the planning, design and construction of infrastructure • Continue to seek contributions to fire management programs from the owners of vulnerable assets • Give a high priority to suppression of bushfires which are likely to threaten lifelines and other infrastructure
5.14. To engage stakeholders in planning and managing fire	• Involve industries, conservation groups and other interests in fire management planning • Provide information to stakeholders and members of the public on fire impacts and their management • Provide up-to-date information to stakeholders and members of the community on prescribed burning and bushfire suppression operations
Native vegetation loss ***10-year ambition: No net loss of native vegetation cover occurs during the life of this strategy***	
5.15. To decrease net loss of native vegetation	• Manage clearing permits and deal with unauthorised clearing according to relevant legislation and regulations • Revegetate cleared areas where appropriate using local provenance plants • Raise awareness of the need to retain native vegetation as detailed in the section titled *'A sense of inclusion'* on page 26
5.16. To minimise the adverse impacts of authorised clearing of native vegetation	• Engage with land users who clear native vegetation under permit or under exemptions to the Environmental Protection Regulations and provide advice on approaches to clearing which will minimise adverse impacts on biodiversity values • Engage affected land users and other stakeholders in any decisions about the boundaries of Environmentally Sensitive Areas under the *Environmental Protection Act 1986*

5.17. To monitor net loss of native vegetation within the Great Western Woodlands	• Use a range of approaches (such as remote sensing tools and direct observation) to monitor native vegetation cover • Publicly report statistics on the removal and rehabilitation of native vegetation
Pest animals ***10-year ambition: Feral animal distributions are known and their impacts are understood and controlled***	
5.18. To better understand the distribution, impacts and control options for pest animals	• Map the current and predicted distribution of pest animals in the Great Western Woodlands • Conduct research to improve understanding of the impact of feral predators and herbivores on populations of native species • Identify those species and locations most significantly impacted by pest animals • Investigate the use of alternative pest animal control strategies (including biological control) to assist in the control of feral animals
5.19. To control adverse effects of pest animals on biodiversity	• Develop and implement pest animal control programs targeting those species and locations identified as the suffering the most significant impacts • Monitor the success of pest animal control and refine approaches if required • Monitor possible new introductions of pest animals and conduct control programs as required
5.20. To control the impact of wild dogs on pastoral and agricultural properties	• Control dingoes and wild dogs in a buffer adjacent to agricultural and pastoral lands through a combination of baiting, trapping and shooting • Continue to maintain and extend the State Barrier Fence • Further develop the range of control techniques which can be successfully implemented in the Great Western Woodlands • Monitor the positive and negative impacts of dingo and wild dog control and refine approaches if required
5.21. To inform members of the public about the management of pest animals	• Provide information to stakeholders and members of the public on pest animals and their management
Environmental weeds ***10-year ambition: Major environmental weeds have been identified, mapped and their spread contained***	
5.22. To identify significant environmental weed populations	• Map the current and predicted distribution of environmental weeds in the Great Western Woodlands • Prioritise environmental weeds on the basis of potential environmental impact
5.23. To control or eradicate priority environmental weeds	• Conduct coordinated environmental weed control operations to contain or if possible eradicate priority weeds
5.24. To prevent the introduction of new weed species	• Monitor new environmental weed occurrences and implement control programs as required
5.25. To engage members of the public in managing environmental weeds	• Provide information on environmental weeds and their management to residents, adjacent landowners and users • Provide opportunities for interested members of the public to contribute to weed control programs

Climate change ***10-year ambition: Potential impacts of climate change are broadly understood and measures to retain natural resilience are being implemented***	
5.26. To determine potential climate trends and impacts	• Encourage regional research to better understand the impact of climate change in the Great Western Woodlands • Encourage research into potential biological and other responses to climate change
5.27. To adapt management responses to account for climate change	• Review all management prescriptions in the light of evidence of climate change
5.28. To understand the response of natural systems and processes to climate change	• Encourage the establishment of a network of permanent monitoring stations throughout the Great Western Woodlands
5.29. To manage the Great Western Woodlands as a carbon sink	• Investigate and promote the environmental and possible economic value of the Great Western Woodlands as a significant carbon sink • Consider the potential impact of all management proposals on carbon stocks
Disease ***10-year ambition: Existing disease occurrences are known and being treated and no new plant or animal diseases are negatively impacting native species***	
5.30. To manage disease occurrence and impacts	• Monitor plant and animal populations for signs of disease • Manage and, where possible, eradicate new disease occurrences • Provide information on disease spread and impacts
Secondary salinity ***10-year ambition: Locations affected by secondary salinity are known and remedial works are being undertaken***	
5.31. To better understand the distribution and causes of secondary salinity	• Encourage mapping of the current and predicted distribution and spread of secondary salinity in the Great Western Woodlands • Assess the level of environmental impact at each affected location • Prioritise occurrences of secondary salinity on the basis of present and potential environmental impact
5.32. To halt the spread of secondary salinity	• Develop programs to halt the spread of secondary salinity such as the rehabilitation of cleared areas which are contributing to its occurrence • Engage with adjacent land managers to coordinate salinity mitigation works • Monitor the success of salinity mitigation works and refine approaches if required

6. A sense of responsibility – working together	
Priority objectives	**Approach**
Governance ***10-year ambition: An inclusive and coordinated management structure for the Great Western Woodlands***	
6.1. To engage stakeholders and coordinate input to implementation of this strategy on an ongoing basis	• Appoint a Great Western Woodlands Reference Group based in Kalgoorlie and comprising representatives of key stakeholder groups, using a partnership approach to oversee implementation of this strategy • Develop terms of reference which enable the reference group to contribute to all aspects of planning and management in the Great Western Woodlands • Provide executive support for the reference group • Involve State, Commonwealth and local governments in planning and management • Create opportunities for wider stakeholder engagement in planning and management • Develop and promote cooperative agreements such as DEC's *Good Neighbour Policy*
Integration ***10-year ambition: Integrated and cross-sectoral planning and management of the Great Western Woodlands***	
6.2. To integrate planning and management among stakeholders	• Use implementation of this strategy as a focus for integration of the activities of government, industry, NGOs, community groups and members of the public • Report on progress with implementation of this strategy each year in DEC's annual report • Through engagement with government and non-government stakeholders and members of the public, conduct a land-use planning process to identify the spatial extent of natural and cultural values and priority land uses throughout the Great Western Woodlands to provide base information for more detailed planning processes
6.3. To coordinate activities across sectors	• Coordinate the involvement of different sectors in the Great Western Woodlands and remove duplication of effort • Develop and promote an initial point of contact, such as a website, for information detailing activities taking place in the Great Western Woodlands (see *'Public engagement'* on page 26)
Resources ***10-year ambition: Substantial progress with implementation of all components of this strategy by 2020***	
6.4. To obtain and deploy sufficient resources for the implementation of this strategy	• Foster state, national and international partnerships • Aggregate and leverage from existing resources allocated to the Great Western Woodlands • Explore innovative resourcing approaches with mining and other industry partners, NGOs and the philanthropic sector
6.5. To implement actions in priority order	• Allocate priorities to the approaches detailed within this strategy • Implement approaches in order of priority, subject to availability of resources

Implementation

In line with the broad directions and approaches for the future planning and management of the Great Western Woodlands set out above, the following strategic outcomes are priorities:

1 Greater awareness of the unique character of the Great Western Woodlands. The area will be promoted through a public awareness campaign, including appropriate signage at entry points and key sites, publications and web pages.

2 Voluntary partnerships to coordinate activities across different tenures. Existing partnerships will be fostered and new partnerships sought to integrate actions, such as fire prevention and pest animal control, and to multiply individual efforts.

3 Establishment of a Great Western Woodlands Reference Group. Building on the success of the Stakeholder Reference Group established by the Minister for Environment to help develop this strategy, a group will be set up to oversee initial strategic management outcomes.

4 An integrated fire management plan for the Great Western Woodlands. This will be developed incrementally, starting with the coordination of the fire prevention and bushfire suppression activities of the three DEC regions in the area, and the activities of local authorities and FESA. Further development will occur through voluntary partnerships to coordinate fire management activities across the landscape, improving protection of life and property, and natural and cultural values, as well as maximising the area's potential for carbon storage.

5 Joint management of conservation reserves and the creation of employment and training opportunities for Aboriginal people. The State Government is committed to putting in place the legislative requirements to enable joint management of land under agreement between traditional owners and DEC. This will generate jobs for Aboriginal people, as will extra effort in fire management and feral animal control.

6 Better control of pest animals and weeds. Existing efforts will be coordinated and further resources directed to pest animal and weed control in the Great Western Woodlands, in particular the control of wild dogs.

7 An increased knowledge base to guide management and use of the Great Western Woodlands. Further research and monitoring will be encouraged by government agencies, non-government organisations and industry to support sound decision making. Easy access to existing information on natural and cultural values, where appropriate, will be made possible through the development of a web portal.

Initially, this strategy will guide the expenditure of the $3.8 million committed to the Great Western Woodlands by the State Government. Action plans will be developed to detail all steps required in implementing each of the strategic priorities and will indicate timeframes, responsibilities and appropriate actions for implementation of the priority approaches put forward in this strategy. These plans will be made publicly available and will be used to guide the activities of land managers and others in putting this conservation strategy on the ground.

Implementation will be coordinated through DEC in consultation with the Great Western Woodlands Reference Group. There will be opportunities for wider stakeholder engagement (see '*Governance'* on page 34) and partnerships (see '*Resources'* on page 34). The mining sector, for example, has already expressed its willingness to increase existing contributions to conservation work in the Great Western Woodlands through new and innovative partnerships with government and other stakeholders.

This is a 10-year strategy. Progress with implementation will be monitored throughout its period of currency and reported in DEC's annual report. Any necessary modifications to approaches will be made in consultation with the Great Western Woodlands Reference Group. In the longer term, the strategy will provide an overarching framework providing direction to the planning and management activities of the various government and non-government interests.

ACRONYMS

DEC	Western Australian Department of Environment and Conservation
FESA	Western Australian Fire and Emergency Services Authority
FPC	Western Australian Forest Products Commission
GWW	Great Western Woodlands
MoU	Memorandum of Understanding
UCL	Unallocated Crown land
WA	Western Australia

FOOTNOTES

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The Great Western Woodlands is almost 16 million hectares in size, stretching from the edge of the wheatbelt to Kalgoorlie-Boulder in the north, to inland deserts to the north-east and to the Nullarbor Plain to the east.

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