Wheatbelt Region parks and reserves

draft management plan

2019

GOVERNMENT OF WESTERN AUSTRALIA

Conservation and Parks Commission

Department of **Biodiversity, Conservation and Attractions**

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Front cover photos

Main View of Mount Stirling Nature Reserve Shire of Quairading from Mount Caroline Nature Reserve in the Shire of Kellerberrin across the Salt River. *Photo – Brett Beecham/DBCA*

Top left Numbats (*Myrmecobius fasciatus*) in Dryandra Woodland. *Photo – John Lawson*

Top right The endangered matchstick banksia (*Banksia cuneata*) occurs in the shires of Brookton, Bruce Rock, Cuballing and Quairading. *Photo – Hayden Cannon/DBCA*

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INVITATION TO COMMENT

This draft management plan has been released for a two-month period to provide the public with an opportunity to comment on how the reserves covered by the plan are proposed to be managed during the next 10 years.

To ensure your submission is as effective as possible:

- be clear and concise
- refer your points to the page numbers or specific sections in the plan
- say whether you agree or disagree with any of or all the management arrangements – clearly state your reasons, particularly if you disagree
- give sources of information where possible
- suggest alternatives for those aspects of the plan with which you disagree.

The management plan will be reviewed in light of the submissions, according to the criteria outlined below. A summary of public submissions will be made available along with the final management plan.

The draft management plan may be modified if a submission:
(a) provides additional information of direct relevance to management
(b) indicates a change in (or clarifies) government legislation or management policy
(c) proposes strategies that would better achieve management objectives
(d) indicates omissions, inaccuracies or a lack of clarity.

The draft management plan may not be modified if a submission:
(a) clearly supports proposals in the plan or makes general or neutral statements
(b) refers to issues beyond the scope of the plan
(c) refers to issues that are already noted within the plan or already considered during its preparation
(d) is one among several widely divergent viewpoints received on the topic but the approach in the plan is still considered the best option
(e) contributes options that are not feasible (generally due to conflict with legislation or government policy)
(f) is based on unclear or factually incorrect information.

The plan can be viewed and submissions made online at dpaw.wa.gov.au/parks/management-plans/draft-plans-open-for-public-comment.

Alternatively, you can write to:

Planning Branch
Department of Biodiversity, Conservation and Attractions
Locked Bag 104
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Introduction

1. A special place

The Wheatbelt Region[1] of the Department of Biodiversity, Conservation and Attractions (the department or DBCA) generally extends from Dalwallinu and Karroun Hill Nature Reserve in the north to Cranbrook, Ongerup and Lake Magenta Nature Reserve in the south, and from York, Wandering and Darkan in the west to Yellowdine, Lake King and Jilbadji Nature Reserve in the east (Map 1). This vast area inland from Perth covers more than 131,000km^2 and accounts for six per cent of Western Australia (WA) (Map 1 Inset). Scale is a significant factor in the Wheatbelt with many reserves, many threatened species and many pressures on these natural assets.

Rapid and extensive agricultural development of the Wheatbelt from the early 1900s has led to what today is one of the most productive cropping regions in Australia. However, little natural vegetation remains, with 57 per cent of the South West Botanic Province (SWBP), more than 80 per cent of the Avon Wheatbelt bioregion and more than 90 per cent of some parts of the Wheatbelt Region cleared. In this highly fragmented agricultural landscape, the remnant vegetation that remains has high conservation value and is mostly on public Crown lands. Although regionally there are low levels of protection of vegetation in conservation reserves[2], they hold the best repositories of biodiversity often within the largest and most intact remnants.

Above left Typical western Wheatbelt landscape with mixed cropping for agriculture and scattered remnants and isolated trees in the Shire of Wickepin. Photo – Greg Durell/DBCA

Above right A long straight road with small woodland remnants on a narrow road reserve and paddocks either side is a common sight in the Wheatbelt. Photo – Greg Durell/DBCA

Highly localised distributions, rarity and small population sizes are natural features of many south-western plants. This combined with the extent of vegetation clearing and associated impacts of fragmentation, altered hydrology, inappropriate fire regimes and other pressures on plant diversity in the Wheatbelt, there is little surprise that the region contains the most number of threatened plant species in the State. High levels of floristic

[1] The 'Wheatbelt Region' (or region) refers to the department's administrative region. While the extent of the Wheatbelt can be interpreted in many ways, the wider agricultural region in the south-west of WA where cereal grain cropping mainly occurs is referred to as 'the Wheatbelt'.

[2] Conservation reserves are Crown reserves that are protected for conservation and have an International Union for Conservation of Nature (IUCN) category of I – IV. Generally, nature reserves, national and conservation parks are known as conservation reserves, although some section 5(1)(g) and 5(1)(h) reserves also meet these categories.

diversity and endemism together with significant threatening processes has resulted in the SWBP being recognised as one of the world's 25 biodiversity hotspots and the Central and Eastern Avon Wheatbelt as one of Australia's 15 national biodiversity hotspots. An essential part of the work by the department in the Wheatbelt Region is to conserve the remaining biodiversity and where possible manage threatening processes such as feral animals, weeds, altered hydrology (including salinity), dieback and other diseases, and inappropriate fire regimes at a range of different scales.

Conservation reserves provide many local environmental, cultural, economic and social benefits, and in the Wheatbelt are becoming more valued by people because of the range of experiences they offer. Aboriginal people and their historical occupation of the land (*budjar*[3]) have left a rich cultural heritage, with numerous sites of significance across the landscape. Local communities throughout the Wheatbelt Region often develop a personal attachment to specific reserves, and use granite outcrops, lookouts, breakaways, woodlands, lakes and river pools for recreation such as picnicking with friends or family. Wheatbelt reserves also provide the community with a range of other sustainable resource uses that support the commercial kangaroo industry, mineral exploration and development, water and other public utilities, and beekeeping.

The 28,000ha Dryandra Woodland in particular has a management focus for a range of differing and often conflicting values including the preservation of the many different plant communities, restoration of several threatened fauna species including the numbat (*Myrmecobius fasciatus*) and brush-tailed bettong or woylie (*Bettongia penicillata ogilbyi*), recreational opportunities, and production including honey and timber products from brown mallet or *mallat* (*Eucalyptus astringens*) plantations. Striking the right balance between the provision of human needs and the preservation of natural values is needed to ensure areas such as Dryandra Woodland continue to be important for conservation as well as other values where they are provided for.

Dryandra Woodland. Photo – Paul Roberts/DBCA

The successful protection and maintenance of key values and addressing of pressures is dependent on the involvement, support and cooperation of the community and the formation of partnerships. Off-reserve conservation programs and actions are important in achieving a landscape approach to biodiversity conservation. Areas set aside on private and leasehold lands and managed for conservation provide important stepping stones, linkages and corridors for plants and animals to move between reserves, and can achieve conservation of ecosystems where formal reservation may be difficult. While this plan contains strategies for the lands and waters managed by the department, it also includes broader strategies that aim to integrate and achieve consistent conservation approaches at landscape scales.

2. Planning area

This management plan, prepared by the Conservation and Parks Commission (the Commission) through the agency of the department, covers 728 existing reserves or parcels of land in the Wheatbelt Region (Appendix 1, Map 1). These reserves collectively total more than 1,110,442ha (or 9 per cent of the total area of the Wheatbelt Region), and are managed by the department in accordance with the *Conservation and Land Management Act 1984* (CALM Act). The lands covered by this management plan, referred to as the planning area[4], are located across 48 local government authorities (LGAs) (Map 2). While most of the reserves are vested solely with the Commission (Appendix 1), 15 reserves are jointly vested with the Shire of Wyalkatchem and one reserve with the Shire of Kondinin. The two statutory management plans that have been prepared for parts of the planning area are the *Dryandra Woodland Management Plan 2011* (DEC 2011) and *Nature Reserves of the Shire of*

[3] Many Aboriginal words may be spelt in different ways, and the spelling of words in this management plan may not necessarily be universally accepted.

[4] The terms 'planning area', 'parks and reserves', 'Wheatbelt reserves', 'Wheatbelt Region' and 'Region' are used inter-changeably throughout this plan.

Wyalkatchem Management Plan 1985–1995 (Moore and Williams 1985), although several reserves also have interim management guidelines. This management plan, once gazetted, will be the higher-level, overarching CALM Act management plan for all department-managed lands in the Region.

Existing reserves and other lands in the Region covered by this plan (Appendix 1, Map 1) include:

- **one national park** – only 1,258ha of the 67,539ha Frank Hann National Park lies within the Wheatbelt Region, and the park is managed as part of the South Coast Region. Part of Dryandra Woodland is intended to become a national park, and other areas may be potential candidate parks (DEC 2011, Section 5 *Management context*)
- **667 nature reserves** – have a total area of 1,069,945ha and include several large reserves:
  - Karroun Hill Nature Reserve (309,678ha) located about 140km north of Merredin[5]
  - Jilbadji Nature Reserve (208,866ha) located about 160km east-southeast of Merredin
  - Lake Magenta Nature Reserve (107,812ha) located about 145km east of Katanning
  - Lake King Nature Reserve (40,096ha) located about 220km east-northeast of Katanning.
- **four conservation parks** – have a total area of 4,796ha and include Totadgin Conservation Park (257ha) located about 10km southeast of Merredin
- **eight section 5(1)(g)[6] reserves** – have a total area of 328ha
- **23 section 5(1)(h) reserves** – have a total area of 1,282ha
- **three State forests** – have a total area of 28,351ha and include State forests 51 (Lol Gray), 52 (Highbury) and 53 (Montague) spread across 17 blocks around Narrogin as part of 'Dryandra[7] Woodland' (DEC 2011)
- **22 parcels of Crown freehold (department interest)[8]** – have a total area of 4,482ha.

There are more than 260 Crown reserves and parcels of land in the Wheatbelt Region that are proposed to be added to the conservation reserve system, including the 43,143ha ex-Ennuin unallocated Crown land[9] (UCL) (department interest) (Appendix 4). However, land acquisition proposals depend on several factors including relevant State and local government agency use and agreement, native title resolution, Statewide priorities, the values/assets of land, owner willingness to sell, land prices and available funding, and can take considerable time and resources to complete.

3. Key values and management issues

The following values[10] and management issues are the highest priority and/or best known in the planning area, are a focus for management, and form the basis for monitoring the effectiveness of implementation (Section 24 *Performance assessment*).

Key values

The planning area has importance for the following key values:

- the 'Toolibin Lake' Ramsar wetland of international significance, nine wetlands of national significance, four well-recognised diverse

The critically endangered lemon spider orchid (*Caladenia luteola*) occurs in three populations in the Katanning-Woodanilling area. Photo – Deanna Rasmussen/DBCA

[5] Distances and directions between individual department-managed lands and town sites are approximate.
[6] Section 5(1)(g) and 5(1)(h) reserves are categories of reserves under these sections of the CALM Act.
[7] Known as *Wilgadjny* by Noongar people.
[8] Crown freehold (department interest) lands are freehold lands owned by the State and managed by the department for conservation purposes.
[9] Unallocated Crown land is Crown land that is not subject to any interest (other than native title interests under the *Native Title Act 1993*) and which is not reserved, declared or otherwise dedicated under the *Land Administration Act 1997* or any other Act.
[10] Values (assets or features) and management issues (pressures, threats or stressors) may be defined and used differently, but are used in this plan in a general sense (Hockings *et al*. 2006, Wallace 2012).

landscape-scale areas (hereafter referred to as 'biodiverse catchments'), and many other wetlands of regional significance, including rock pools

- 130 State-listed threatened native plant species (50 critically endangered, 42 endangered and 38 vulnerable species), 118 nationally-listed threatened species (15 critically endangered, 77 endangered and 26 vulnerable species), 645 priority flora species and more than 400 species found only in fresh or naturally saline lowlands/wetlands in the Wheatbelt
- 23 State-listed threatened native animal species including the critically endangered woylie, arid bronze azure butterfly (*Ogyris subterrestris petrina*), Yorkrakine trapdoor spider (*Kwonkan eboracum*), Minnivale trapdoor spider (*Teyl* sp. [BY Main 1953/2683, 1984/13]) and night parrot (*Pezoporus occidentalis*), 14 other specially protected species,14 nationally-listed species and 24 priority animal species
- the State-listed critically endangered 'Toolibin Lake' and 'Lake Bryde' threatened ecological communities (TECs), four nationally-listed TECs including the critically endangered *Eucalypt woodlands of the Western Australian Wheatbelt*, 21 priority ecological communities (PECs), and 99 significant vegetation associations that have been extensively cleared, are poorly reserved or are of limited extent
- Dryandra Woodland is the largest remnant of original vegetation in the western Wheatbelt and is a multiple-use State forest that includes *Barna Mia* and a 1,000ha predator-proof enclosure for the numbat and woylie, *Dryandra Woodland Village*, *Gnaala Mia* and other campgrounds and day-use areas, and 9,800ha of brown mallet plantations.
- registered Aboriginal sites of archaeological, mythological, ceremonial, cultural and spiritual significance, and other cultural heritage sites associated with early exploration and settlement
- spectacular rock outcrops and breakaways, lakes, wetlands and riparian areas, dramatic displays of seasonal colour and distinctive natural vegetation combine to create Wheatbelt landscapes of outstanding scenic quality
- a diversity of recreational experiences, opportunities and sites/facilities such as bushwalking, picnicking, camping, birdwatching and nature appreciation across many reserves especially those associated with granite rocks or lake systems.

The critically endangered arid bronze azure butterfly (*Ogyris subterrestris petrina*) has a symbiotic relationship with the sugar ant (*Camponotus terebrans*) where butterfly larvae feed on or are fed by the ants, live entirely within the ant's nest during their development, and are protected from predators. The ants are thought to be rewarded with secretions produced by the larvae. Photo – Hayden Cannon/DBCA

Key management issues

Management issues in the planning area that have potential to significantly affect key values include:

- insufficient ecological and genetic resources to maintain viable populations, including the impact of small population sizes of many species and habitat fragmentation
- altered hydrology, including salinity and too regular inundation
- weeds and introduced animals such as the red fox (*Vulpes vulpes*), feral cat (*Felis catus*), rabbit (*Oryctolagus cuniculus*), and the impacts of wild dogs (*Canis familiaris*) and problem native species such as the western grey kangaroo (*Macropus fuliginosus*) and little corella (*Cacatua sanguinea*) on agricultural production
- plant and animal diseases, particularly the impacts of Phytophthora Dieback and associated other species on susceptible species and plant communities

The critically endangered granite tetratheca (*Tetratheca deltoidea*) only occurs in one population on a Wheatbelt granite outcrop in the Kellerberrin-Tammin-Quairading area. Photo – Natasha Moore/DBCA

- inappropriate fire regimes, particularly the lack of fire that leads to senescence of communities or species composition, and too frequent fire and large intense bushfire
- inappropriate human impacts and activities such as taking flora and fauna without a licence including unauthorised firewood removal, driving off roads and tracks and on rock outcrops, informal camping and campfires, and the dumping of rubbish, soil and weeds.

4. Vision and objectives

Vision

Wheatbelt parks and reserves, and their unique natural, cultural heritage and community values, are conserved and enhanced for present and future generations.

Objectives

Legislative or overarching objectives

The overarching objective of this plan, in accordance with section 56(1) of the CALM Act, is "*to achieve or promote the purpose for which land, defined in sections 5 and 6 of the CALM Act, is reserved as nature reserve, national park, conservation park, section 5(1)(g) reserve, section 5(1)(h) reserve, State forest and timber reserve*". In the case of State forests within Dryandra Woodland, the purposes as specified under section 55(1a) of the CALM Act are for '*timber production, recreation, conservation and water catchment protection*' for brown mallet plantation areas and for '*conservation, recreation and water catchment protection*' for the remaining non-plantation areas.

In accordance with section 56(2) of the CALM Act, this management plan also has the overarching objective "*to protect and conserve the value of the land to the culture and heritage of Aboriginal people, in particular from any material adverse effect caused by (i) entry on or the use of the land by other persons, or (ii) the taking or removal of the land's fauna, flora or forest produce, but in a manner that does not have an adverse effect on the protection or conservation of the land's fauna and flora*". This objective prevails over the section 56(1) objective where there is any conflict or inconsistency, in accordance with section 56(3) of the CALM Act.

Strategic objectives

Management of reserves in the planning area seeks to protect and present the key values. Planning and the structure of this management plan are based around these values so that the links between the values, vision, objectives, strategies and the performance indicators are visible and understood. The following set of strategic objectives provide a link between the vision statement and the desired outcomes expressed through the management objectives identified throughout this plan, and provide broad direction for management to:

- protect and conserve the value of the land to the culture and heritage of Aboriginal people, and conserve and protect other cultural heritage for current and future generations
- protect and conserve biodiversity and ecological integrity, and the Wheatbelt landscape
- allow recreation, tourism and community experiences and use for the appreciation of the area's landscape, natural and cultural heritage values
- allow for sustainable resource use
- increase understanding of the values and management issues of Wheatbelt reserves, and gain knowledge to guide, adapt and improve management
- consider the needs and values of others, particularly the many neighbours that adjoin Wheatbelt reserves.

5. Management context

The reserves in the planning area will be managed in accordance with:

- the provisions of the CALM Act – which provides for the management of conservation reserves and other specific lands and waters. Section 54(1)(a) of the CALM Act requires all land that is vested in or under the care, control and management of the Commission (whether solely or jointly with a joint responsible body) to have a management plan, and this plan fulfils this need. The plan provides strategic direction through a summary of policies and guidelines, and operations proposed to be undertaken, also provides guidance for

operational plans that provide more specific on-ground management direction. Performance assessment processes will also feed into adaptive management at the strategic and operational planning level.

- *Biodiversity Conservation Act 2016* (Biodiversity Conservation Act) – which provides for the conservation and protection of all biodiversity across WA. While this plan covers the management of native flora and fauna on department-managed lands and waters in the Wheatbelt Region, more guidance for the management of native flora and fauna, including those on other lands, is provided through recovery plans (Section 9 *Native plants, animals and ecological communities*) and other initiatives (Section 19 *Involving the community*, Section 21 *Use of plants and animals*). The *Biodiversity Conservation Act 2016* received Assent on 21 September 2016 and was partially proclaimed on 3 December 2016. The Biodiversity Conservation Regulations 2018 were published in the *Government Gazette* on 14 September 2018, along with a second proclamation for the remaining provisions of the Act. The Regulations and remaining provisions of the Act came into operation on 1 January 2019 and fully replace the *Wildlife Conservation Act 1950* and *Sandalwood Act 1929* and their regulations.
- department policies
- other legislation mentioned throughout this plan.

The department also manages fire, feral animals and weeds on non-metropolitan, non-town site UCL and unmanaged reserves, as well as former pastoral leases, through informal arrangements with the Department of Planning, Lands and Heritage (DPLH) in accordance with this department's responsibilities to manage land for conservation and biodiversity protection purposes.

The Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relates to the protection of matters of national environmental significance such as threatened species and ecological communities listed under that Act, heritage, and wetlands and migratory species protected under international agreements.

Wongan Hills Nature Reserve, along with other reserves in the Shire of Wongan-Ballidu, is a potential candidate national park. Photo – Brett Beecham/DBCA

The values and management objectives of Wheatbelt reserves should be consistent with their land category, vesting, purpose and classification[11]. However, in some cases nature reserves used by local communities for recreation may be more suited to a conservation park or, where there are significant values, a national park. The *Dryandra Woodland Management Plan* (DEC 2011) has proposed that 16,337ha of the existing 28,351ha of State forest that comprises Dryandra Woodland become national park and 3,294ha become nature reserve. Two areas in the region: Wongan Hills nature reserves (comprising at least the class A Wongan Hills, Fowlers Gully, Rogers and Elphin nature reserves), and Dunn Rock and Lake King nature reserves, are considered to be potential candidate national parks because of the number of nationally-listed threatened species, distance from sealed roads and settlements, existing or potential for recreation and tourism, and other values[12]. These two areas will be investigated and proposed as national parks during the life of the plan.

Once finalised, this plan will guide the management of Wheatbelt reserves for 10 years from the date the plan is gazetted. During this time, amendments to the management plan may be made in accordance with section 61 of the CALM Act, which includes public notification of plan amendments under section 57 of the CALM Act. If the plan is not reviewed and replaced by the end of the 10-year period, this plan will remain in force until a new plan is approved.

[11] The security of tenure of Crown land reserves created under the *Land Administration Act 1997* varies depending on whether the reserve is classified as 'class A' or 'other than class A' (class C or unclassified).

[12] Wongan Hills also contains the culturally significant 'Speaker's Chair' [Heritage Place 12536], which is named after the Hon T.F. Quinlan, Speaker of the House of Assembly, who visited the site on 7 July 1908.

Management of reserves supports the IUCN's Protected Areas Program, and the reserves also contribute to a comprehensive, adequate and representative (CAR) National Reserve System of protected areas (Section 9 *Native plants, animals and ecological communities*).

Management objective: To ensure legislative requirements and other commitments are met during plan implementation.

Key management challenge

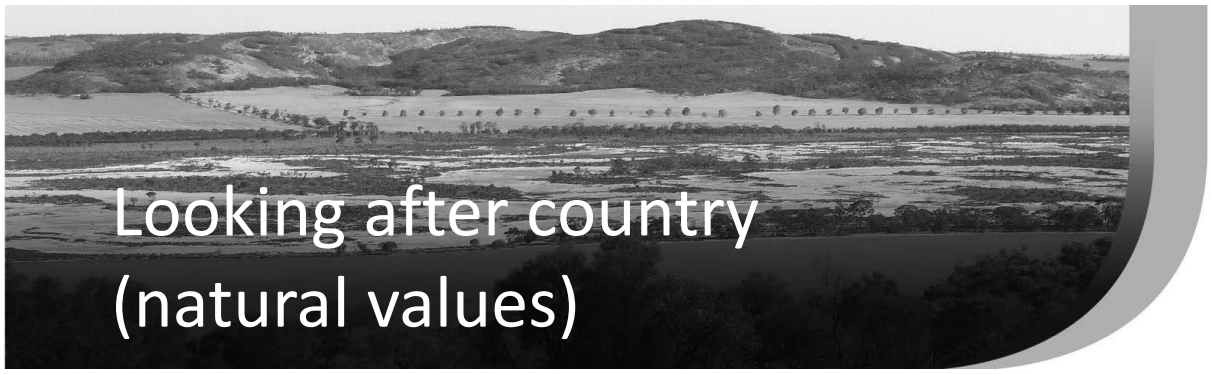
- Ensuring that the vesting, category, purpose and classification of reserves is appropriate, reflects their values, and is consistent with land management objectives.

Management considerations

- A variety of Acts, Regulations, policies, agreements and management documents apply or have relevance to this plan.
- All planned disturbance activities (excluding mining) on a day-to-day basis in parks and reserves are/need to be assessed using the department's online Disturbance Approval System.
- The department's *Corporate Guideline No. 4: Nomenclature guidelines* provide guidance on the naming of reserves, features or assets.

Management strategies

1. Ensure that management is consistent with relevant legislation, department policies, obligations and agreements, the category, vesting, purpose, classification and management objectives of reserves, and other key documents.
2. Review and change the category, vesting and/or purpose of reserves, particularly where nature reserves may be more suited to a national park, conservation park or other appropriate land category.
3. Where opportunistic, establish official names for unofficially named and un-named reserves or other features, or re-name reserves in accordance with the department's *Nomenclature Guidelines* and in consultation with Aboriginal people and other key stakeholders.
4. Assess all planned disturbance activities (excluding mining) using the department's online Disturbance Approval System.
5. Opportunistically, as resources permit, identify conservation reserves and other department-managed lands through signage consistent with department standards.



Looking after country (natural values)

Strategic objective

To protect and conserve biodiversity and ecological integrity, and the Wheatbelt landscape.

The main priorities during the life of the plan will be to:

- protect threatened species populations and ecological communities by focusing science and conservation programs to deliver on-ground conservation outcomes
- conserve, protect and build resilience into the Region's other native species and ecological communities by conserving, protecting and managing biodiverse catchments, and individual highly diverse reserves
- develop and promote landscape-scale restoration projects where possible
- mitigate other threatening processes that impact on important wildlife occurring on and off the conservation reserve system
- protect landscapes through promotion of sustainable natural resource management (NRM).

One of the main areas of management focus in the Wheatbelt Region is the conservation of natural biodiversity values and management of pressures on these values. Given the many reserves (Appendix 1) and the rich biodiversity present, prioritising actions is a challenge. The conceptual biodiversity conservation framework of Wallace *et al*. (2003) and the *Salinity Investment Framework* provide guidance on biodiversity conservation where management priorities in the Region are set against a range of project goals, operational management strategies, and spatial and temporal scales.

In a region where remaining natural habitat is highly fragmented, the department adopts several broad management approaches[13] including (i) ensuring that the pressures on biodiversity conservation are not accelerated, (ii) slowing the rate at which biodiversity values are being lost from agricultural areas, (iii) taking positive steps to conserve specific elements of the biota, (iv) taking positive steps to conserve all natural populations in an area, and (v) re-building landscapes and their natural biota.

The department's management in the Wheatbelt Region is delivered at three different spatial scales (i) species and populations, (ii) reserves and specific areas of bushland, and (iii) biodiverse catchments.

6. Climate

The mainly Mediterranean climate of the Wheatbelt, where winter rainfall dominates and it is dry for seven to eight months of the year, varies from west to east and south to north, and is classified differently depending on temperature/humidity, vegetation (Köppen) and seasonal rainfall. The rainfall generally decreases in an east-northeasterly direction, and annual averages range from 492mm in Narrogin to 285mm in Dalwallinu.

Because of the small size of most reserves, the climate can significantly affect the key values and increase the pressures on individual species and communities. The seasonal climate variations from year-to-year and climate cycles are important factors in determining vegetation patterns, their condition and vulnerability to other climate induced impacts such as bushfires, cyclonic summer rainfall, windstorms and drought.

Climate change

Climate change may have significant impacts on the key values. The south-west of WA is one of the most vulnerable of the world's 25 biodiversity hotspots to climate change (Malcolm *et al*. 2006). Rainfall in the south-

[13] These broad management strategies may be combined and are not a strict hierarchy, but generally are increasingly more resource demanding, more difficult to achieve, and inclusive of actions from previous strategies.

west is projected to continue decreasing throughout this century, and future increases in temperature and evaporation rates are also anticipated. This, coupled with a likely higher frequency of episodic events (flooding and drought), may exacerbate existing pressures such as dieback and the impact of fire, and reduce habitat suitability for many native plants and animals. The vulnerability of species may depend on a combination of life history traits, the degree of exposure to rapid climate change and the capacity of the species to adapt (Steffen *et al*. 2009). Species potentially most impacted by climate change include climate refugial and relictual species, species dependent on freshwater wetlands, geographically localised species, migratory species, and species occurring in highly fragmented/patchy habitats and small populations.

Above left Toolibin Lake view from pump 3 in 2017. Photo – Maria Lee/DBCA

Above right Toolibin Lake view from pump 3 in 2010. Photo – Maria Lee/DBCA

Integrating the results of climate change impact studies within current management strategies at a range of management levels (Dunlop and Brown 2008, Steffen *et al*. 2009), such as the regional (ecosystem), community (or landscape) and species (or operational) level, may help improve the survival and resilience of species, communities and ecosystems, increase the likelihood of successful adaptation and decrease their vulnerability to climate change. At the regional level, strategies include adding to the conservation reserve system, preserving vegetation corridors and implementing species recovery programs (Steffen *et al*. 2009). At the community or landscape level, strategies include improving resilience by increasing and refining existing management actions for other pressures (such as invasive plants and animals, diseases and inappropriate fire regimes). At the species or operational level, collecting seed and captive fauna breeding programs provide a fall-back mechanism for long-term species survival and potential re-introduction projects. Many existing actions used to manage protected areas and biodiversity will be important in future management, although the specific mixture of actions, how they are applied, the information to be managed and the objectives of management may change, and some actions may need to be abandoned, revised or new ones developed (Steffen *et al*. 2009).

Management objective: To minimise the impact of climate change on key values and to enhance the resilience and survival of species and ecosystems.

Key management challenge

- Understanding and, where possible, adapting to the potential impacts of climate change on native species and communities, and the associated impacts caused by bushfires, flooding, wind and drought.

Management considerations

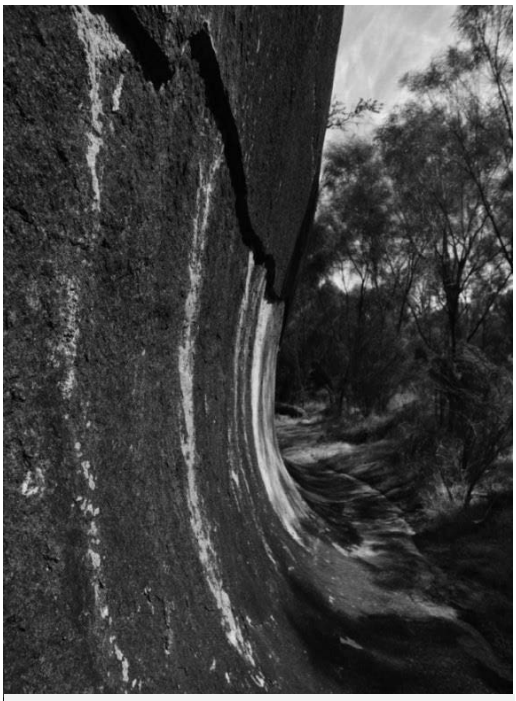
- Identifying important climate refugia such as granite outcrops and taking steps to protect them.
- Better understand the likely changes to communities and key stone species caused by climate.
- A drying climate is likely to cause large and more frequent bushfires, especially in the uncleared area of the region (Section 12 *Fire*).

Management strategies

1. Incorporate the potential for climate change impacts upon threatened species and communities, and develop effective response strategies.
2. Incorporate the results of climate change impact studies, as they become available, into current conservation strategies at the regional, community and species level.
3. Work with communities, operators and stakeholders to mitigate and adapt to climate change including through an infrastructure risk assessment to identify assets at risk from climate change impacts.
4. Continue existing long-term monitoring programs for significant plants, animals and communities that are expected to be impacted by climate change.
5. In conjunction with the Department of Fire and Emergency Services (DFES), LGAs, local bush fire brigades and the community, actively respond to

	bushfires with potential for significant expansion and/or damage in the uncleared area and larger reserve network.

7. Geology, landforms and soils



Kokerbin Rock in the Shire of Bruce Rock is the third largest monolith in Australia. Photo – Natasha Moore/DBCA

The planning area overlies the Archean-age (3,000–2,600 million years ago) Yilgarn Craton which mainly consists of crystalline basement of granitic and gneissic rock intruded by dolerite dykes. The upper surface of the Yilgarn Craton has not been glaciated, inundated by the sea, or subject to mountain building or volcanism since 250 million years ago. As a result, the terrain has eroded into a gently undulating landscape with poor drainage. Large rivers formed during the Jurassic (150–200 million years ago), Cretaceous (65–150 million years ago) and late Tertiary (45 million years ago) periods that shaped valleys known as palaeodrainages (DoE 2005). During the past 65 million years, landscape processes have profoundly influenced the Wheatbelt landscape. Firstly, deep weathering of the surface rock was followed by mineral leaching when the climate was subtropical and the landscape dominated by rainforest. This process led to the development of a deep pallid zone devoid of minerals. Secondly, lateritic surface 'crusts' formed as the climate became drier and more seasonal (that is, more Mediterranean). Finally, as these surface crusts eroded, deep sandplains formed. Hence, the soils of the Wheatbelt are relatively infertile.

Rifting due to the separation of Australia from other continents caused tilting and uplifting and had a major effect on the drainage systems. Rivers were cut off and the slopes of rivers were decreased or even reversed causing increased deposition of sediments and in-filling of river valleys. Uplift along the Darling Range during the Late Miocene to Early Pleistocene (11–2 million years ago) caused more changes to the palaeodrainage systems, rejuvenating drainage (i.e. forming new young drainage systems relatively narrow-floored and steep-sided with high gradients) as far east as the Meckering Line. To the east of the Meckering Line in the 'zone of ancient drainage', the palaeodrainages have become choked with, and lay hidden below, millions of years of sediments, which can be up to 60m thick. The valleys are much broader with flat floors, the drainage is generally sluggish and intermittent, and disconnected chains of salt lakes (playas) are common (Raper *et al*. 2014) and drainage only links up and flows during exceptionally wet years.

The region has generally subdued relief and the landscape is largely plateau with ranges of low hills. Granite forms large rocky outcrops that abound across the Wheatbelt such as Mt Hampton (443m above sea level [ASL]), Billyacatting Hill (418m ASL), Mt Stirling (345m ASL) and Kokerbin Rock (323m ASL). The granite outcrops vary significantly in form from the more common domes to boulder-strewn nubbins (such as Nangeen Hill) and flared slopes (such as Wave Rock and Elachbutting Rock). Granite rock outcrops throughout the Wheatbelt, in addition to their geological and landform value, often have a suite of biological, cultural and social values (McMillan 1989, Main 1997a, Section 9 *Native plants, animals and ecological communities*, Section 13 *Aboriginal cultural heritage*, Section 15 *Visitor experience*), which can often be significantly affected by visitors driving on rock outcrops and moving rock slabs (Main 1997b).

The soils of the Yilgarn Craton are formed mainly on laterite, truncated lateritic profiles, bedrock weathered in situ, colluvium and alluvium. On the catchment divides, soils are mainly sandy gravels with some pale deep sands. Grey sandy duplex soils, often with alkaline subsoils, are found on the valley slopes. Alkaline grey shallow loamy and sandy duplex soils, calcareous loamy earths and saline wet soils occur on the valley floors.

Management objective: To protect and conserve geological features, landforms and soils.

Key management challenges	Management strategies
• Water and wind erosion. • Protection of granite rock outcrops from inappropriate human disturbance. **Management considerations** • Granite rock outcrops provide important habitats, have cultural value and are often popular recreation sites.	1. Identify and protect geological features, landforms and soils vulnerable to erosion and other environmental damage. 2. Manage access to significant geological, landform and soil values that are vulnerable to erosion and other soil damage. 3. Assess the potential for impact on geological, landform and soil values from land uses, development proposals and management activities, and refer development proposals that may have significant impacts to the Department of Water and Environmental Regulation (DWER). 4. Liaise with relevant agencies and stakeholders on the protection, conservation and management of geological, landform and soil values, including Geological Survey of WA for geoheritage sites.

8. Hydrology

Surface and groundwater hydrology

Most of the Wheatbelt Region is covered by the Avon River basin, which consists of the Yilgarn, Lockhart, Mortlock, Salt River and main Avon catchments. The headwaters of other catchments occur around the fringes of the region including the Blackwood, Murray, Frankland and Pallinup river catchments in the south and the Moore River, YarraMonger and Lake Moore catchments in the north (Map 3). The total amount and duration of rainfall play a large part in the hydrology of the catchments, and the larger rivers do not continuously flow except when cyclones or severe thunderstorm activities lead to heavy, intense summer rainfall. The combination of variations due to rainfall (and its spatial distribution) and the internal storage or overflow of run-off leads to large variability in stream salinity from year to year.

There is an abundance of wetlands in the Wheatbelt Region, with the Avon NRM region alone containing about 13,900 basin wetlands (Jones *et al*. 2008). Most of the many wetlands are naturally saline playas that vary in size from less than a hectare to more than 100km^2, which become increasingly saline and seasonal with distance from the coast. Freshwater wetlands, mostly seasonal claypans and vegetated swamps are also common on the plateau but tend to occur higher in the landscape or in the higher rainfall south-western areas (Pinder *et al*. 2004). Important wetlands on reserves in the Wheatbelt Region include:

- **internationally significant wetlands** – the 493ha Toolibin Lake Ramsar site lies within Toolibin Nature Reserve about 40km east of Narrogin in the Shire of Wickepin (Map 1). The wetland was listed under the Ramsar Convention in June 1990 on the basis that it meets four criteria (Appendix 2). Australia accepts several responsibilities in relation to the listing, including managing the Ramsar site to maintain its 'ecological character' (McMahon 2006). The EPBC Act, through the Environment Protection and Biodiversity Conservation Regulations 2000, states general principles for Ramsar wetlands in Australia, including requirements for management, management planning, and environmental impact assessment and approval. The *Toolibin Lake Catchment Recovery Plan 2015-2035* (DBCA 2017) is the Ramsar management plan for the Toolibin Lake Ramsar site.

Toolibin Lake in the Shire of Wickepin. Photo – Deanna Rasmussen/DBCA

- **nationally significant wetlands** – nine wetlands in the Wheatbelt Region (Map 3) that are nationally significant are Toolibin Lake, Lake Bryde – East Lake Bryde, the Lake Grace System, Coyrecup Lake, Dumbleyung Lake, the Yealering Lakes System, Lake Cronin, Yorkrakine Rock Pools and the Balicup Lake System.
- **wetlands of regional or subregional significance**:
    - Mollerin Lake System, the Buntine to Marchagee Braided Saline Drainage Line, Cowcowing Lake and the Mortlock River System (McKenzie *et al*. 2003)
    - *biodiverse catchments* – Toolibin Lake and its associated wetlands in the Toolibin catchment including Dulbining, Dulbining 2 and 3 and Walbyring Lake; Lake Bryde-East Lake Bryde; Buntine-Marchagee (part) and Drummond (part) (Map 3), most of which have recovery plans. The recovery of these catchments focuses on ameliorating the impact of altered hydrology on biodiversity and conserving representative wetland communities and threatened and priority plants, animals and ecological communities (Halse *et al*. 2004, Wallace *et al*. 2011)
    - *South West Wetlands Monitoring Program* (SWWMP) – 101 wetlands have been monitored for water depth and salinity, and 25 of these have been intensively monitored for waterbirds and aquatic invertebrate communities, fringing plant communities, groundwater levels and detailed water chemistry (Cale *et al*. 2004, Lane *et al*. 2013). Wetlands of interest or concern include Dumbleyung, Hinds, Taarblin, Toolibin and Yaalup.
- wetlands important for migratory bird species – Coyrecup (5 species), Walyormouring (5 species), Altham (4 species), Coomelberrup (4 species), Toolibin (4 species) and Parkeyerring (3 species) wetlands
- intact rock pools associated with granite rocks
- the yate swamp communities in the Lake Bryde catchment.

Lake Cronin is a semi-permanent freshwater lake in the Shire of Kondinin. Photo – DBCA

Granite rock pool at Sandford Rocks Nature Reserve in the Shire of Westonia. Photo – DBCA

Most wetlands interact strongly with saline groundwater which is contained in semi-confined regional aquifers (within the partially weathered zone above bedrock), or in local ephemeral aquifers perched on clayey subsoils, or in aquifers in the alluvial and lacustrine sediments of the valleys (Pinder *et al*. 2004). In semi-arid inland areas, evapotranspiration greatly exceeds rainfall, so most of the salt imported in rainfall is retained in soil profiles rather than exported by the sluggish surface and groundwater drainages (Pinder *et al*. 2004). Acid groundwater (pH less than four) is common across the Wheatbelt Region where it can be found in eastern areas in valley groundwater systems, particularly near salt lakes, and in western areas as widespread but small hillside seeps that are associated with dolerite dykes (Ghauri 2004).

Altered hydrology

The deep pallid zone underlying the soil surface is thought to have been accumulating salt deposited inland by rain for thousands of years. Before the widespread clearing of vegetation, water use by native vegetation effectively used the annual water supply and mostly prevented water from entering the pallid zone. Replacement of deep rooted native perennials with shallow rooted annual crops and pasture has increased infiltration to the pallid zone. This has allowed salty groundwater to accumulate and rise, and led to, initially, salination of valley floors. As watertables continue to rise, the effects of altered hydrology can often be seen higher in the landscape.

Dead threatened ecological community vegetation at Taarblin Nature Reserve downstream from Toolibin Lake. Photo – DBCA

Salinity[14] and other altered hydrology has had and is having significant impacts on potable water supply, biodiversity, agricultural productivity, infrastructure, people and communities (Government of Western Australia 2000). The effects of secondary salinisation, which affects about 10 per cent of the Wheatbelt, include increased stream and wetland salinity, increased stream flow, more prolonged periods of wetland inundation, loss and/or changes of vegetation, altered water chemistry, formation of new wetlands where water-tables intersect the land surface, and degradation of naturally saline lakes (Halse *et al*. 2003).

Increased surface water run-off is associated with the clearing of the natural vegetation. Valley floor systems that were once only periodically wet when there was natural vegetation occurring are now becoming inundated more often. This is leading to the decline of natural vegetation and other values existing on reserves and other lands located in the valley floors and increasing soil salinity. More frequent inundation also leads to the need to establish better designed infrastructure such as appropriately sized culverts and floodways. In some cases, erosion of soil on tracks and roads on reserves is an issue. Building and maintenance works should be mindful of the potential damage that can arise from inappropriate works especially in fragile systems such as hilltops and granite rocks.

A Government approach (initially called the *Salinity Action Plan* and later known as the *Western Australian Salinity Strategy*) was established in the late 1990s to combat dryland salinisation in WA. The *Salinity Strategy* promotes a range of options for managing altered hydrology, including:

- **increasing water use by introducing deep-rooted perennial species** – the extended growing season of perennial plants and their deep root systems enables rainfall to be used as it falls, as well as exploiting any water available deep in the soil profile
- **collecting, using and disposing of surface water efficiently** – excess surface water can be collected and used to improve plant growth, reduce erosion and recharge, and to support new farm enterprises. Where it cannot be used, disposal needs to be carefully planned to minimise downstream impacts
- **draining, pumping and disposal of groundwater** – deep drains and groundwater pumping can lower groundwater levels in some cases, although costs are usually prohibitive at a catchment level. The department's main concern with disposal of groundwater is the cumulative environmental impacts downstream of the disposal point. These impacts include landholders and remnant vegetation receiving water that is a different quality or quantity than that normally received. Drainage for controlling salinity is regulated in WA by the Department of Primary Industries and Regional Development (DPIRD) under the *Soil and Land Conservation Act 1945* and Soil and Land Conservation Regulations 1992. The department uses surface water management, deep drainage and groundwater pumping (as part of an integrated package of measures along with a range of other water management practices such as revegetation) to protect some conservation areas from the pressures of high saline watertables and inundation/waterlogging (such as Toolibin Lake and Lake Bryde). Engineering options will generally only be pursued for the protection of areas of high biological value because of the high cost of installation, operation and ongoing maintenance
- **improving the protection and management of remnant native vegetation** – remnant vegetation is important for biodiversity conservation as well as water and soil conservation, and the protection of remnant vegetation is therefore imperative in any water control strategy. Mechanisms to improve the protection and management of remnant vegetation include (i) adding areas to the conservation reserve system, and (ii) covenant and voluntary management schemes.

The *Salinity Strategy* acknowledges that (i) no one option is likely to work in isolation, (ii) options will vary with catchments and objectives, (iii) options need to be appropriately located, and (iv) land use will need to change

[14] See agric.wa.gov.au/soil-salinity/dryland-salinity-western-australia-introduction and water.wa.gov.au/water-topics/water-quality/managing-water-quality/understanding-salinity.

significantly across a wide agricultural area. The *Salinity Investment Framework* prioritises projects that best protect assets of high public value.

Other altered hydrological processes such as inundation and nutrient enrichment can also have dramatic direct and indirect impacts on water quality and biodiversity. Land use activities such as clearing of native vegetation (especially riparian vegetation), use of fertilisers on adjacent land and input of large amounts of organic material such as sheep and cow manure following storms can generate increased levels of nutrients and lead to eutrophication and algal blooms in wetlands, which can result in stock, bird and fish deaths. Although floods have the potential to provide fresh water to the root zone of trees through infiltration processes, they also carry the risk of bringing saline groundwater into the zone of plant water uptake through recharge (Drake *et al*. 2013).

The department works closely with five NRM organisations (mostly the Avon, but also the Northern Agricultural, Peel Harvey, South Coast and South-west catchment councils) and a wide range of local community groups and landowners in the support and delivery of on-ground catchment management projects, particularly in surface water management and strategic revegetation.

Management objective: To protect and conserve hydrological values and processes, particularly wetlands, and minimise the impacts of altered hydrology on key values.

Key management challenges

- Protecting wetlands and valley floors, specific biota and other important areas from altered hydrology.
- Increased run-off into valley floor systems many of which are managed by the department.
- Water and wind erosion.
- Protection of granite rock pools from human disturbance.

Management considerations

- There is one wetland of international significance (Toolibin Lake), nine wetlands of national significance, and 13 wetlands of regional significance.
- Several TECs are associated with wetland systems.
- Four catchments in the Wheatbelt Region are important biodiverse catchments.
- The Commission's *Position Statement No. 11: The protection of surface and groundwater biodiversity values of lands vested in the Conservation Commission of Western Australia* provides guidance on proposals to take water from reserves.
- The department's *Wetlands conservation policy for Western Australia* provides guidance for managing wetlands in the Wheatbelt Region.
- The Commission has assessed the threat that salinity poses to biodiversity values of conservation lands vested in the Commission and the outcomes of salinity-related management actions on those lands.
- *A guide to managing and restoring wetlands in Western Australia* provides information about wetlands and the management of threats including altered hydrology.

Management strategies

1. Identify and protect hydrological values vulnerable to environmental damage, particularly from disturbance during management activities.
2. Assess the potential for impact on hydrological values from land uses, development proposals (such as Notices of Intent to Drain) and management activities, and refer development proposals that may have significant impacts to DWER.
3. Implement a cooperative approach to management of water and altered hydrology consistent with the department's *Corporate Policy Statement No. 65: Good neighbour policy*.
4. Use water management engineering options to protect high biodiversity conservation values as part of the implementation of integrated water management practices such as revegetation.
5. Liaise with landowners, NRM organisations and agencies to minimise disturbance on CALM Act lands, and encourage and support land use practices within catchments that protects, uses and improves water quality.
6. Continue to monitor wetlands and other hydrological features, and assess, maintain and improve the condition of wetlands of international, national and regional significance and other important watercourses, lakes and wetlands.
7. Liaise with relevant agencies and stakeholders on the protection, conservation and management of hydrological values, including DWER on issues of water quality and quantity.
8. Support the development of management strategies and agricultural systems that minimise the rise in groundwater.
9. Continue to demonstrate to farmers the value of deep-rooted perennial native vegetation in managing recharge of groundwater on revegetation sites at Toolibin Lake and Lake Bryde.

Key performance indicator

Water quality

Performance measure	The water depth and salinity of selected wetlands
Target	No sustained negative trends in water quality of Toolibin Lake, Lake Bryde and East Lake Bryde wetlands because of management activities
Reporting	Annually

9. Native plants, animals and ecological communities

Native plants and plant communities

The Wheatbelt Region makes up more than 42 per cent of the SWBP, and lies mostly[15] within the Avon, Roe and Darling botanical districts of the 309,840km^2 SWBP (Beard 1980). SWBP flora is characterised by sclerophyllous[16] vegetation, habitat specialisation, an intense level of speciation, and high levels of endemism (Hopper 1979, Beard *et al*. 2000, Hopper and Gioia 2004). The *Wheatbelt Biological Survey* has dramatically improved biodiversity knowledge, and has shown that the agricultural zone of WA is more biodiverse than previously recognised (Keighery *et al*. 2001, Keighery 2006). While some individual or small groups of reserves (such as Toolibin Lake, Dragon Rocks, Dongolocking, Dunn Rock and Wongan Hills) have vegetation information, a full list of data is mostly unavailable for many reserves.

Less than 250 critically endangered granite spider orchids (*Caladenia graniticola*) occur on several granite outcrops in the Pingaring – Newdegate area. Photo – Deanna Rasmussen/DBCA

More than 5,160 native vascular taxa and 467 non-vascular taxa have been recorded from conservation reserves in the Region, and about 60 per cent of the vascular flora is restricted to the area. The most species-rich of the 110 plant families are Fabaceae (legumes, peas and wattles – 619 taxa), Myrtaceae (eucalypts and paperbarks – 591 taxa) and Proteaceae (banksias and grevilleas – 409 taxa), and the most species-rich plant genera are *Acacia* (321 taxa), *Eucalyptus* (186 taxa), *Melaleuca* (127 taxa) and *Grevillea* (124 taxa). The Wheatbelt Region is the centre of species diversity for many of the species-rich groups (*Acacia*, *Dryandra*, *Eucalyptus*, *Grevillea* and *Verticordia*) that characterise the south-west of WA (Keighery 2006). More than a third of the vascular flora is found along valley floors. More than 400 species are found only in fresh or naturally saline lowlands/wetlands in the Wheatbelt, which are under threat of extinction by secondary salinisation (Lyons *et al*. 2004).

The high species diversity, high level of endemism and high level of threat to these values has led the SWBP to being recognised as one of only 25 global biodiversity hotspots (Myers *et al*. 2000). The 'Central and Eastern Avon Wheatbelt' is also one of Australia's 15 national biodiversity hotspots. Broadscale land clearing in the Wheatbelt since colonial settlement has resulted in the loss of more than 80 per cent of pre-European vegetation[17] (Appendix 3) and the fragmentation of remaining vegetation into many small scattered remnants, with 81 per cent of conservation reserves being less than 500ha and 49 per cent being less than 100ha.

The National Reserve System helps conserve Australia's biodiversity through a CAR system of protected areas, and progress towards building a CAR reserve system is monitored through the Interim Biogeographic Regionalisation for Australia (IBRA). There are eight IBRA regions and ten subregions in the Wheatbelt Region,

[15] Parts of the Wheatbelt Region may extend into the Irwin and Eyre botanical districts and the Southwestern Interzone.
[16] Sclerophyllous vegetation (typically scrub, but also woodland) in which the leaves of the trees and shrubs are evergreen, small, hard, thick, and leathery. These adaptations allow the plants to survive the pronounced hot, dry season of the Mediterranean-type climate in which sclerophyllous vegetation is best developed.
[17] Pre-European' (or 'pre-1750'), while not corresponding exactly with the year of colonial settlement in Australia, is used for the National Vegetation Information System because of its international usage in greenhouse science and vegetation monitoring to describe the time just before industrialisation in relation to estimates of changes in vegetation types and cover since colonial settlement.

although most of the region lies within the Avon Wheatbelt and Mallee IBRA regions (Appendix 3). The Avon Wheatbelt IBRA region vegetation is characterised by woodland on the better-drained valley floors and lower slopes, halophytic vegetation in saline areas, mallee on the mid-slopes, and kwongan on the sandy soils of the uplands. Mallee IBRA region vegetation is dominated by mallee eucalypts on duplex soils (Beard 1990). While six of the eight IBRA regions in the Wheatbelt Region each have less than 17 per cent of their vegetation protected in conservation reserves, the Avon Wheatbelt IBRA region is the most highly degraded IBRA region in WA and is among the most poorly reserved IBRAs in Australia with only 1.3 per cent protected in conservation reserves (Appendix 3). Almost all the vegetation associations in the Avon Wheatbelt IBRA region are under-represented in reserves (Appendix 3).

Yate (*Eucalyptus occidentalis*) woodland at Lake Bryde in the Shire of Kent. Photo – DBCA

There are 120 vegetation associations[18] within existing reserves of the planning area and of these, 99 have Statewide conservation significance (Appendix 3, Hopkins 2000). Five vegetation associations have less than 10 per cent of their pre-1750 extent remaining and can therefore be considered endangered. Thirty-seven vegetation associations have less than 30 per cent of their pre-1750 extent remaining and can therefore be considered vulnerable. Fourteen vegetation associations are of limited extent (that is, they have less than 2,000ha remaining), and 95 vegetation associations are poorly reserved. Twenty-one vegetation associations are also potentially at risk from altered hydrology (Hopkins 2000).

Wandoo woodland at Dryandra. Photo – Paul Roberts/DBCA

Of the 99 vegetation associations that have Statewide conservation significance, 39 are low to medium woodlands. While Wheatbelt woodlands are as equally diverse (for herbs rather than shrubs) as the Mt Lesueur northern sandplains and the Fitzgerald River/Stirling Range sandplains (Keighery 2006), they were among the vegetation types most extensively cleared for agriculture and only three per cent of the original cover of wandoo or *dooto* (*Eucalyptus wandoo* and *E. capillosa*), York gum or *daarwet* (*E. loxophleba*) and salmon gum or *warak/weerluk* (*E. salmonophloia*) woodlands remain (Standish *et al*. 2009). However, eastern parts of the region contain relatively intact woodlands within the biologically rich *Great Western Woodlands*. Granite outcrops in the Wheatbelt have exceptionally rich floras, with high numbers of obligate seeders, endemic species and plants of restricted distribution (Hopper *et al*. 1997). Toolibin Lake is the last large swamp sheoak-dominated wetland with mostly living trees in the inland agricultural area of southwest Australia (McMahon 2006), and the maintenance of the natural composition of vegetation characteristic of this Ramsar-listed wetland with successful reproduction is a management target for this wetland (DBCA 2017).

More than 260 proposed Crown reserves and other lands in the Wheatbelt Region (Appendix 4) will improve the level of protection of vegetation in the conservation reserve system. Changes to the conservation reserve system need to be rigorously assessed and prioritised (through a standardised process) to obtain the best future vesting, land category, purpose, classification and use of reserves in consultation[19] with LGAs, Department of Mines, Industry Regulation and Safety (DMIRS) and other key stakeholders (Safstrom 1995, Appendix 5).

[18] See Statewide vegetation statistics reports on the pre-European and current extent of vegetation types of WA within IBRA or IBRA subregions.

[19] To achieve the best agreed outcome of allocation of reserves consultation is essential as many reserves may contain valuable infrastructure and/or resources needed for local communities such as gravel for road maintenance.

Flora of conservation significance

The Wheatbelt Region contains many plant species of conservation significance[20], including:

- 130 native plant species listed as threatened under Section 19 of the Biodiversity Conservation Act, including 50 critically endangered species, 42 endangered species, 38 vulnerable species and three species presumed to be extinct (*Acacia kingiana*, Cronin's tetratheca [*Tetratheca fasciculata*] [Graham and Mitchell 2000] and Mt. Holland thomasia [*Thomasia gardneri*] [Durell and Buehrig 2001])
- 118 threatened species listed under the EPBC Act[21], including 15 critically endangered species, 77 endangered species, 26 vulnerable species and three presumed extinct species
- 645 priority flora species[22], including 160 priority 1 species, 149 priority 2 species, 248 priority 3 species and 88 priority 4 species
- more than 400 species are found only in fresh or naturally saline lowlands/wetlands in the Wheatbelt.

The critically endangered smokebush (*Conospermum galeatum*) once occurred across five shires in the central Wheatbelt but is now confined to two populations in the Shires of Quairading and Tammin. Photo – Hayden Cannon/DBCA

Guidance on the management of threatened and priority flora species in the region is provided by single species recovery plans[23] (for 46 critically endangered species, 18 endangered species and 10 vulnerable species), wildlife management programs (Graham and Mitchell 2000, Durell and Buehrig 2001, Stack *et al*. 2006), recovery teams and the Wheatbelt regional nature conservation plan.

Threatened flora recovery is a management priority in the Wheatbelt Region, particularly the implementation of recovery actions for critically endangered species. While the recovery requirements for the many threatened species greatly exceed resources available, recovery actions for threatened and priority flora are prioritised based on an analysis of objectives, pressures, management options and costs, and the likelihood of success, and this prioritisation is used to guide threatened flora management.

Native animals[24] and habitats

Many species have substantially declined in their range and abundance in the Wheatbelt Region because of the widespread clearing and fragmentation of native vegetation and other pressures (Kitchener *et al*. 1980), particularly mammals in the critical weight range[25] (CWR) (Burbidge and McKenzie 1989, McKenzie *et al*. 2007). There is a heightened risk to the few remaining CWR mammals that are left in isolated populations across the region from introduced predators especially the fox and feral cat. Even though the broadscale clearing of vegetation ceased during the early 1980s, local and regional biodiversity decline and extinction continues

[20] These figures are for total numbers of species in the region. Although most (about 75 per cent) threatened and priority plant species have occurrences on department-managed lands, most (about 77 per cent) of the populations occur on other lands not-managed by the department such as road and rail reserves, other Crown reserves and private property (Section 5 *Management context*).

[21] See environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora. These species have profile information on the Species Profile and Threats Database, including a Conservation and/or Listing Advice and information about recovery plans.

[22] Priority 1 and 2 flora are still considered to be under threat even though they are not listed as 'threatened' under the Biodiversity Conservation Act.

[23] Some of these recovery plans have been adopted under the EPBC Act (see specific species in the *Species Profile and Threats Database*).

[24] Most species records are drawn from *NatureMap*. Animal names follow those used by *NatureMap* and the WA Museum, although there may be alternate spellings for many of the common and Aboriginal names for plants and animals (Abbott 1983, 2001, 2009).

[25] Critical weight range mammals are those weighing between 35 grams and 5.5 kilograms.

(Saunders 1989). While the trend in the status for some species is increasing, most species have decreased or are decreasing (Richardson *et al*. 2007, Saunders and Ingram 1995, Burbidge and Gole 2005).

Wheatbelt reserves contain a rich diversity of native animals with 60 mammals, 331 birds, 116 reptiles, 19 frogs, 17 fish and 648 invertebrates recorded. The *Wheatbelt Biological Survey* has considerably improved the knowledge of invertebrates (and vascular plants) in the Wheatbelt, with nearly 1,000 species of aquatic invertebrates found within the south-west agricultural region (Pinder *et al*. 2004). Dragon Rocks, Dunn Rock and Lake King, Karroun Hill, Lake Magenta and Kwobrup-Badgebup are 'important bird areas' or 'Key Biodiversity Areas' for the malleefowl or *ngawoo* [*Leipoa ocellata*] and south-west endemic species.

Eucalypt woodlands that provide nesting hollows used for breeding are critical habitat for the survival of the endangered Carnaby's cockatoo (*Calyptorhynchus latirostris*). Photo – DBCA

Fauna of conservation significance

The planning area contains many animal species of conservation significance, including:

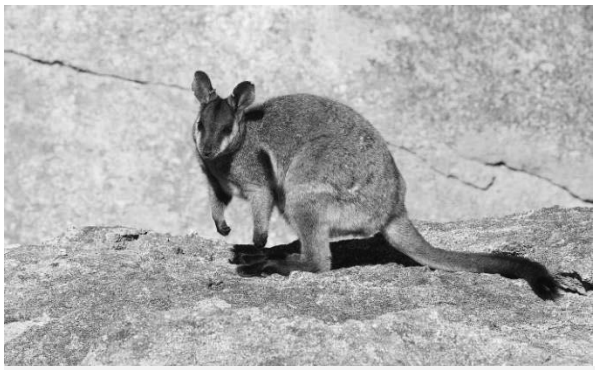
- 23 native animal species listed as threatened under Section 19 of the Biodiversity Conservation Act:
  - five critically endangered species – woylie, arid bronze azure butterfly, Yorkrakine trapdoor spider, Minnivale trapdoor spider and night parrot
  - eight endangered species – numbat, black-flanked rock-wallaby or *moorang* (*Petrogale lateralis lateralis*), Carnaby's cockatoo or *ngolak* (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*), Australasian bittern (*Botaurus poiciloptilus*), western whipbird (western heath) (*Psophodes nigrogularis nigrogularis*), Australian painted snipe (*Rostratula benghalensis australis*) and shield-backed trapdoor spider (*Idiosoma nigrum*)
  - 10 vulnerable species – chuditch or *djuditj* (*Dasyurus geoffroii*), bilby or *dalkitj* (*Macrotis lagotis*), brush-tailed phascogale or *wambenger* (*Phascogale tapoatafa wambenger*), heath mouse (*Pseudomys shortridgei*), curlew sandpiper (*Calidris ferruginea*), forest red-tailed black cockatoo or *ngoolyarak* (*Calyptorhynchus banksia naso*), red-tailed black cockatoo (inland)(*Calyptorhynchus banksii samueli*), malleefowl, western bristlebird (*Dasyornis longirostris*) and western spiny-tailed skink (*Egernia stokesii badia*)
- 10 species presumed to be extinct – burrowing bettong (inland) or *boodie* (*Bettongia lesueur graii*), dwarf Nullarbor bettong (*Bettongia pusilla*), pig-footed bandicoot (*Chaeropus ecaudatus*), rufous hare-wallaby (*Lagorchestes hirsutus*), lesser stick-nest rat (*Leporillus apicalis*), crescent nailtail wallaby (*Onychogalea lunata*), short-tailed hopping-mouse or *yoontoo* (*Notomys amplus*), long-tailed hopping-mouse or *koolawa* (*Notomys longicaudatus*), big-eared hopping mouse or *noompa* (*Notomys macrotis*) and broad-faced potoroo (*Potorous platyops*) (Abbott 2008, Burbidge *et al*. 2008)
- nine migratory bird species protected under an international agreement – fork-tailed swift (*Apus pacificus pacificus*), sharp-tailed sandpiper (*Calidris acuminata*), curlew sandpiper, red-necked stint (*Calidris ruficollis*), long-toed stint (*Calidris subminuta*), long-tailed skua (*Stercorarius longicaudus*), wood sandpiper (*Tringa glareola*), common sandpiper (*Tringa hypoleucos*) and common greenshank (*Tringa nebularia*). Seven species are listed under the Bonn Convention (including the black-winged stilt [*Himantopus himantopus*]), eight are listed under the China-Australia Migratory Bird Agreement, 10 are listed under the Japan-Australia Migratory Bird Agreement and eight are listed under the Republic of Korea-Australia Migratory Bird Agreement
- four conservation dependent species – Muir's corella (*Cacatua pastinator pastinator*), red-tailed phascogale (*Phascogale calura*), Shark Bay burrowing bettong or *boodie* (*Bettongia lesueur lesueur*) and greater stick-nest rat (*Leporillus conditor*)
- one other specially protected species – peregrine falcon (*Falco peregrinus*)

- 14 threatened species are listed under the EPBC Act[26]
- six threatened species are listed under the *IUCN Red List of Threatened Species*
- 24 priority species, including:
  - five priority 1 species: woma (southwest subpopulation)(*Aspidites ramsayi*), *Bothriembryon bradshawi*, *Daphnia jollyi*, *Ixalodectes flectocercus* and *Parartemia contracta*
  - one priority 2 species: barking owl or *wiroo* (*Ninox connivens connivens*)
  - five priority 3 species: masked owl (*Tyto novaehollandiae novaehollandiae*), southern death adder or *kwont* (*Acanthophis antarcticus*), Lake Cronin snake (*Paroplocephalus atriceps*), *Hylaeus globuliferus* and Mogumber bush cricket (*Throscodectes xederoides*)
  - 13 priority 4 species: western pygmy-possum (*Cercartetus concinnus*), western false pipistrelle (*Falsistrellus mackenziei*), water-rat or rakali (*Hydromys chrysogaster*), quenda (*Isoodon obesulus fusciventer*), tammar wallaby or *dhama* (*Macropus eugenii*), western brush wallaby or *kwer* (*Macropus irma*), western mouse (*Pseudomys occidentalis*), hooded plover (*Charadrius rubricollis*), crested shrike-tit (northern) (*Falcunculus frontatus whitei*), blue-billed duck (*Oxyura australis*), western rosella (inland) or *bardinaar* (*Platycercus icterotis xanthogenys*), western whipbird (*Psophodes nigrogularis oberon*) and tree-stem trapdoor spider (*Aganippe castellum*).

Tree-stem trapdoor spider (*Aganippe castellum*) burrow with lid open in sheoak scrub near Nungarin. Photo – Paul Roberts/DBCA

- endemic species – the threatened and priority invertebrates Yorkrakine trapdoor spider, Minnivale trapdoor spider, shield-backed trapdoor spider, *Bothriembryon bradshawi*, *Daphnia jollyi*, *Ixalodectes flectocercus* and *Parartemia contracta* are endemic to the Wheatbelt Region. More than 10 per cent of the almost 5,000 aquatic invertebrate species in the Wheatbelt are endemic, and saline playas and ephemeral pools on granite outcrops support most of these species (Pinder *et al*. 2004).

Guidance on the management of threatened and priority fauna species in the region is provided by recovery plans[27] (for Carnaby's cockatoo, black-flanked rock-wallaby, chuditch, western spiny-tailed skink, woylie, western whipbird [western heath], forest red-tailed black-cockatoo, malleefowl, bilby and Minnivale trapdoor spider), recovery teams and the Wheatbelt region nature conservation plan. Conservation plans for black-flanked rock-wallaby, red-tailed phascogale, heath mouse, western spiny-tailed skink, Minnivale trapdoor spider, Yorkrakine trapdoor spider, shield-backed trapdoor spider and tree-stem trapdoor spider have also been published by Wheatbelt NRM.



The endangered black-flanked rock-wallaby or *warru* (*Petrogale lateralis lateralis*) occurs on several central Wheatbelt granite rock reserves. Photo – Hayden Cannon/DBCA

There are 23 native mammal species that are extinct[28] from the bioregions represented in the Wheatbelt Region and another 18 species that are extinct from one or more bioregions (locally extinct) (Burbidge *et al*. 2008). Many threatened species have been successfully

[26] See environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna, Most of these species have profile information on the *Species Profile and Threats Database*, including a Conservation and/or Listing Advice and information about recovery plans.

[27] Some of these recovery plans have been adopted under the EPBC Act (see specific species in the *Species Profile and Threats Database*).

[28] See publish.csiro.au/zo/acc/ZO08027/ZO08027_AC.pdf .

reintroduced back into the Wheatbelt Region under the department's *Western Shield* program. *Barna Mia* (Sprigg 2004) and a 1,000ha predator-proof enclosure at Dryandra Woodland aims to provide secure habitat for selected threatened mammal species, such as the endangered numbat, western barred bandicoot (*Perameles bougainville*) and rufous hare-wallaby, and the vulnerable bilby, boodie and banded hare-wallaby (*Lagostrophus fasciatus*). Some species such as the numbat and woylie are being bred for re-release back into Dryandra Woodland and other reserves in the south-west. Several threatened species have been reintroduced into reserves across the region including Dryandra Woodland, Boyagin, Tutanning, Lake Magenta, Dragon Rocks, Karroun Hill nature reserves (Friend and Beecham 2004, Thomas *et al*. 2004, Thomas *et al*. 2005, Morris *et al*. 2010, Friend and Thomas 2001, Johnson 1998). Since 1990, black-flanked rock-wallabies have been translocated from several places in the central wheatbelt (such as Mt Caroline Nature Reserve) to Walyunga, Avon Valley, Cape Le Grand and Kalbarri national parks and other sites around WA (Pearson *et al*. 2016). Several threatened species that have historically been recorded in the Wheatbelt Region may be candidates for possible reintroductions or translocations (Abbott 2008).

Habitats

Wetlands and waterbirds

The pink-eared duck (*Malacorhynchus membranaceus*) at Toolibin Lake. Photo – Hayden Cannon/DBCA

Many wetlands in the planning area provide important habitat for a diverse array of waterbirds when they fill (Jaensch *et al*. 1988, Jaensch *et al*. 2009, Lane *et al*. 2013). Some wetlands are significant for large numbers of waterbirds, such as Dumbleyung Lake (24,839 birds, including 10,500 Eurasian coot [*Fulica atra*]), Lake Mears (10,958 birds, including 5,200 banded stilt [*Cladorhynchus leucocephalus*]) and Lake Hinds (9,614 birds, including 8,000 banded stilt) (Lane *et al*. 2015). Salinity has already caused a 50 per cent decline in the number of waterbirds occurring in freshwater wetlands of the south-west agricultural region. Of the 61 waterbird species recorded in south-western Australia, only 16 prefer saline or hypersaline wetlands compared to freshwater wetlands. The remaining freshwater and brackish lakes in the south-west are therefore extremely important for waterbird conservation.

Waterbirds and aquatic invertebrates are key components of the ecological character of Toolibin Lake Ramsar wetland (McMahon 2006). When the lake is flooded, the healthy thickets and woodlands provide nesting sites, protection for young birds from predators, and roosting sites and foraging areas for waterbirds (Halse 1987). Fifty waterbird species have been recorded, of which 25 species have been observed breeding, which is more than in any of the 251 wetlands surveyed in the south-west of WA (Jaensch *et al*. 1988, Froend and Storey 1996, Froend *et al*. 1997, Halse *et al*. 2000). Toolibin Lake is an important breeding area for several species including the freckled duck (*Stictonetta naevosa*) (Appendix 2). The freckled duck, Australian shelduck (*Tadorna tadornoides*), pink-eared duck (*Malacorhynchus membranaceus*), grey teal (*Anas gracilis*), black-winged stilt and Eurasian coot are indicator species that represent the range of feeding habits and life-histories of Toolibin waterbirds, and their numbers under suitable water depth and quality conditions act as indicators in meeting the management target for maintaining the waterbird character of the wetland (DBCA 2017).

Granite rock outcrops provide important habitat and shelter for a range of animals. Photo – Mike Fitzgerald/DBCA

Granite outcrops

Granite outcrops in the Wheatbelt Region provide valuable habitat for a range of native animals, including mammals and invertebrates. The larger and more complex granite outcrops, particularly those with caves, large boulders and rock piles, provide habitat for mammals such as the black-flanked rock-wallaby, chuditch, euro (*Macropus robustus*) and brush-tail possum (*Trichosurus vulpecula*) (Morris 2000), and important refuge from fox predation (Burbidge and McKenzie

1989). Pools and streams on granite outcrops are reliably filled, but highly seasonal, freshwater habitats that support a diverse array of aquatic invertebrates. The *Wheatbelt Biological Survey* has more than doubled the number of invertebrates, to at least 230 species, known from these habitats (Pinder *et al*. 2000). Granite outcrops contribute significantly to endemism in aquatic fauna in the inland south-west, and have conservation value for about 50 invertebrate species restricted to them (Pinder *et al*. 2000).

Ecological communities

There are two TECs in the Wheatbelt Region that are endorsed by the WA Minister for the Environment, both of which are critically endangered and have interim recovery plans:

- 'Perched wetlands of the Wheatbelt region with extensive stands of living swamp sheoak (*Casuarina obesa*) and paperbark (*Melaleuca strobophylla*) across the lake floor' (Toolibin TEC) (DBCA 2017, McMahon 2006)
- 'Unwooded freshwater wetlands of the southern Wheatbelt of WA, dominated by *Muehlenbeckia horrida* subsp. *abdita* and *Tecticornia verrucosa* across the lake floor' (Bryde TEC) (Hamilton-Brown and Blyth 2001).

Toolibin Lake threatened ecological community. Photo – Maria Lee/DBCA

There are four TECs in the Wheatbelt Region that have been listed under the EPBC Act, which all have priority conservation actions listed in their 'conservation advice' or 'listing advice'[29]:

- 'Eucalypt woodlands of the Western Australian Wheatbelt' – critically endangered
- 'Claypans of the Swan Coastal Plain' – critically endangered
- 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia' – endangered
- Toolibin TEC – endangered.

There are also 21 PECs that occur in the Wheatbelt Region, 12 of which are priority 1 PECs, four are priority 2 PECs, four are priority 3 PECs and one is a priority 4 PEC (Appendix 6).

Management objectives:

- to identify, protect and conserve native plants, animals and ecological communities, particularly those of conservation significance.
- to increase the protection of vegetation within IBRA regions in conservation reserves.

Key management challenges	Management strategies
• Protecting many populations of native plants and plant communities facing many pressures from external and human activities, such as weeds, introduced and problem animals, diseases, inappropriate fire and human disturbances. • The many threatened species and their recovery requirements greatly exceed the management resources available. • Protecting the significant proportion of species and communities of conservation significance that occur on lands under private or other management. • Local communities may not know about many species and plant communities of conservation significance, or may value some less than others, particularly less identifiable plant species.	1. Manage native plants, animals and ecological communities consistent with relevant legislation, policy, guidelines, recovery and other plans, and priorities, and implement management actions to minimise the impacts from pressures. 2. Identify, assess and where necessary propose statutory protection for species and communities of conservation significance. 3. Assess and provide advice on proposed operations and development proposals for potential impacts on native plants, animals and ecological communities, and refer proposals that may have significant impacts to DWER for assessment. 4. Develop, review, revise and implement recovery and translocation plans for species and communities of

[29] 'Conservation advice' or 'listing advice' and other information on species and communities listed under the EPBC Act is provided on the *Species Profile and Threats Database*.

- Adequately prioritising management at a species level.

Management considerations

- The Wheatbelt Region contains:
  - more than 5,160 native vascular plant taxa
  - 130 threatened plant species, 50 of which are 'critically endangered'
  - five TECs, four of which are 'critically endangered'
  - 120 vegetation associations on department-managed reserves, of which 82 per cent have Statewide conservation significance and 39 of these are low to medium woodlands
  - 37 threatened and other specially protected vertebrate fauna species including five species that are 'critically endangered'.
- Dryandra Woodland is a source of mammal species for translocation to other reserves and a potential location for future releases.
- The department's *Corporate Policy Statement No. 35: Conserving threatened species and ecological communities* provides guidance for the protection and management of threatened plants, animals and ecological communities.
- The department's *Corporate Policy Statement No. 36: Conservation reserve system* and the Commission's *Position Statement No. 2: Implementation of conservation reserve proposals* provide guidance on establishing, effectively managing and achieving a CAR conservation reserve system.
- The clearing of native vegetation is regulated in WA by DWER under the *Environmental Protection Act 1986* (Environmental Protection Act) and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (clearing regulations). Under the Environmental Protection Act and clearing regulations, native vegetation can only be cleared with a clearing permit unless exempt.

conservation significance, particularly for critically endangered species.

5. Resolve evaluation criteria for land to be added to and retained in the conservation reserve system, and identify, assess and prioritise areas to be included based on these criteria.
6. Implement the tenure recommendations in Appendix 4 and DEC (2011), and add land to the conservation reserve system in consultation with relevant LGAs, agencies and stakeholders, subject to Strategy 5 and government consideration and determination.
7. Manage any proposed reserve additions that become vested with the Commission or managed by the department under the CALM Act in accordance with this management plan.
8. Identify and rehabilitate areas of degraded habitat.
9. Survey priority plant and animal species and ecological communities, consistent with regional priorities, to resolve current knowledge gaps and confirm their conservation status.
10. Improve the biological and ecological knowledge about threatened flora, fauna and ecological communities, and use this to implement, adapt and improve management.
11. Establish baseline plant, animal and ecological community information for the Toolibin Lake Ramsar wetland and Lake Bryde.

Key performance indicator

Threatened plants, animals and ecological communities	
Performance measure	The conservation status of threatened plants, animals and ecological communities
Target	No decline in the conservation status of threatened plants, animals and ecological communities
Reporting	Every five years, or as per recovery plans if applicable

10. Invasive plants and animals

Weeds

Introduced plants

There are 446 introduced plant species considered to be weeds that have been recorded on Wheatbelt reserves. Many reserves, particularly small reserves, are severely degraded by weeds, and weeds are the greatest single threat to many populations of threatened plants (Brown *et al*. 1998).

The vulnerable *Grevillea dryandroides* subsp. *hirsuta* (foreground) under immense competition from grassy weeds, which is a common occurrence for many threatened plants across the Wheatbelt Region. Photo – Deanna Rasmussen/DBCA

The department applies the regionally-based *Weed Prioritisation Process*, which involves the biennial prioritisation of weed species[30] through a 'species-led' approach, an 'asset-protection-based' approach and other social, cultural, economic, good neighbour and resource considerations, including plants that are declared pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), or are listed as *Weeds of National Significance* or on the *National Environmental Alert List*. It is important to maintain surveillance and mapping/recording systems for monitoring weeds, and develop and maintain a weed plan to guide the prioritising and allocation of available resources. While the BAM Act preserves the department's right to decide priorities and the level of control according to the availability of resources, a 'good neighbour' approach to the management of weeds is adopted. The inappropriate application of chemicals, particularly spray drift, can have significant direct and indirect impacts on the natural environment[31].

Problem native plants

Native animals have developed some immunity to poisonous plants such as *Gastrolobium* spp., thickets of which are considered vital to the survival of some species, especially CWR mammals. However, domestic stock can be severely impacted, and fencing of remnant vegetation to exclude stock is important to protect biodiversity and domestic animals.

While revegetation in the Wheatbelt Region, often with non-local native species, hybrids and provenances, has been extensive and has brought significant environmental and economic benefits, there may be risks to existing natural biodiversity from genetic contamination that may impact on the viability and adaptation of native vegetation (Potts *et al*. 2001, Byrne *et al*. 2008). Extensive pollen dispersal (up to 2km) observed in York gum and orange wattle (*Acacia saligna*) (which have widespread distributions in WA, are represented in subspecies and are widely used in agroforestry programs) poses a significant risk of genetic contamination of remnant populations. A risk management framework is needed to ensure that agroforestry programs can be developed to achieve rehabilitation outcomes without negative impacts on remnant patches of biodiversity (Byrne *et al*. 2008).

Lack of appropriate fire on reserves in the western portion of the region is leading to a change in keystone species in some ecosystems. This is particularly evident in kwongan (heath land) vegetation where loss of some species and the invasion of some native species such as rock sheoak *(Allocasuarina huegeliana*) and silver wattle (*Acacia lasiocalyx*) is occurring. The resulting impact is the replacement of heath species with a dominant overstorey of rock sheoak (Maher 2008).

Introduced and other problem animals

Introduced animals

The most common and significant introduced animals in the Wheatbelt Region are foxes, feral cats, wild dogs, rabbits and some insect species, although a range of other species such as the declared feral pig (*Sus scrofa*) also occur. Introduced animal control is a partnership, and the department works wherever possible with the community, especially with neighbours and biosecurity groups, to share in the control and optimise the benefits from works undertaken (Section 19 *Involving the community*).

Foxes and feral cats

[30] Priority weed species means weeds identified as very high or high through the department's species prioritisation process and/or weeds considered by the department to have the greatest impact on key assets/values, where management is feasible.
[31] See apvma.gov.au/chemicals-and-products/chemical-review/listing and pesticideinfo.org/.

The detrimental impact of foxes and feral cats on ground-dwelling birds and CWR mammals has become increasingly evident through research across Australia which has linked these introduced predators to the decline and extinction of many native fauna species. The department's *Western Shield* program seeks to ameliorate this impact to native wildlife in WA through: (i) the systematic control of foxes and feral cats, primarily through baiting, across large areas of department-managed lands, (ii) research into improved introduced predator control, and (iii) where feasible, returning native animals to areas where they were once found.

Research in the Wheatbelt Region played a key role in demonstrating the potential of fox baiting as a biodiversity conservation tool. In the late 1970s and early 1980s the success of fox baiting of isolated colonies of black-flanked rock-wallaby near Kellerberrin encouraged more research into the impacts of foxes on numbats at Dryandra Woodland. Not only did numbats increase in number but also woylies, tammar wallabies and western brush wallabies. About 3.9 million hectares of conservation reserves and State forest are baited for foxes and feral cats as part of *Western Shield*, which has resulted in significant population increases in several native species such as the quenda and tammar wallaby which have been taken off the State's threatened fauna list. The area baited is even greater when the efforts of adjoining landowners and community groups are included. For example, the North Central Malleefowl Preservation Group in the north of the Wheatbelt Region coordinate annual baiting with more than 100 farmers, which bait almost 300,000ha of farmland and remnant vegetation. Fox baiting occurs on several Wheatbelt reserves including Dryandra Woodland and Lake Magenta, Mount Caroline, Boyagin and Tutanning nature reserves. Larger reserves are generally baited on a quarterly basis from the air, while the smaller reserves are baited on the ground at least monthly.

Feral cats are the primary reason for many mammal species such as pig-footed bandicoot and the crescent nailtail wallaby going extinct, and predation by feral cats is the primary threat to many threatened species (Burbidge *et al*. 2015). Feral cats were observed to be the main predator of woylies in Dryandra Woodland and Tutanning Nature Reserve and accounted for 65 per cent of woylie mortalities (Marlow *et al*. 2015). Feral cats are more difficult to control than foxes because they do not readily take poison baits. As the removal of foxes accentuates feral cat numbers, feral cat control methods need to be integrated with current fox baiting programs so that effective and efficient control of both introduced predators is achieved (Moseby *et al*. 2009, Berry *et al*. 2012). If predation by introduced predators can be reduced through (i) the removal of rabbits, (ii) direct control, and (iii) habitat augmentation by fire, woylies and other endemic threatened species in Wheatbelt sites may recover to their earlier abundances (Marlow *et al*. 2015). *Eradicat*[32] is a registered baiting product that is being used at Dryandra Woodland in conjunction with existing fox baiting to control feral cats.

Two integrated fauna management projects in the region, the Greater Dryandra numbat and woylie recovery project and the black-flanked rock-wallaby project, aim to undertake a series of management actions in conjunction with baiting to maintain and recover fauna species.

Other introduced animals

Wild dogs[33] can be a significant problem in the eastern agricultural parts of the region, especially in areas adjoining UCL. The priorities and programs for wild dog control (using aerial baiting and on-ground dogging methods) on department-managed lands and UCL are developed in collaboration with DPIRD, LGAs, landowners and local Recognised Biosecurity Groups such as the Central Wheatbelt Biosecurity Association and Eastern Wheatbelt Biosecurity Group.

Rabbits can damage crops and revegetation (including perennial crops, amenity and biodiversity plantings), compete with stock for feed and water, and are a major threat to the survival and recovery of many threatened plant species. Rabbits may also compete with native fauna for food and habitat and influence predator numbers with flow-on effects upon native fauna. Rabbits are more likely to occupy disturbed sites such as gravel pits, and these areas together with threatened flora populations should be a focus for control measures.

Some introduced insects also damage revegetation, including the leaf blister sawfly (*Phylacteophaga froggatti*) and the Autumn gum moth (*Mnesampela privata*). Feral European honeybees (*Apis mellifera*) may compete with native fauna (such as endangered cockatoo species) for tree hollows and other plant resources, disrupt natural

[32] Cats are very sensitive to 1080 but prefer live prey, so they do not normally eat the dried meat baits used to control foxes. Department scientists have developed smaller, tastier and moister 1080 sausage baits that are more appetising to feral cats, called Eradicat® (Algar *et al*. 2015).

[33] 'Wild dogs' encompass dingoes, feral dogs and their hybrids. The Australian dingo should not be recognised as a separate subspecies, although it still has heritage, cultural, scientific, ecological and conservation significance (Jackson *et al.* 2017).

pollination processes, increase seed-set in some weeds, and threaten the amenity and safety of visitors (Paton 1996, Hay and Clunies-Ross 2006).

Problem native animals

Some native animals, such as the western grey kangaroo, little corella, galah (*Cacatua rosiecapilla*), twenty-eight parrot (*Barnardius zonarius*), emu or *waitj* (*Dromaius novaehollandiae*) and Australian plague locust (*Chortoicetes terminifera*), can have significant social and economic impacts on local communities, local agricultural production and visitors to reserves. Native animals are protected under the Biodiversity Conservation Act, which places limits on the control of problem species on private and other lands. Some species such as kangaroos may be declared a pest of agriculture under the BAM Act, which allows for the approval and implementation of a management program in selected areas of the State. The Region will continue to implement actions to manage problem native species by issuing appropriate licenses (Section 21 *Use of plants and animals*).

Some rare species such as the black-flanked rock wallaby, tammar wallaby, Muir's corella, and Carnaby's, Baudin's and red-tailed black cockatoos have caused and may cause damage. However, these species are specially protected under the Biodiversity Conservation Act. Management options include translocations, changes to management regimes, or a range of non-lethal mechanisms such as exclusion fencing and bird scaring.

The native Australian plague locust can cause significant damage in agricultural regions. Although locust control activities are unlikely to be necessary or productive on department-managed lands, circumstances may arise where control of plague locusts may be appropriate on some fringes, and the department has guidelines that determine when the use of insecticides for the control of plague locusts could be considered appropriate on department-managed lands and environmentally sensitive areas. The control of plague locusts on department-managed lands using registered insecticides will only be considered in those areas defined by DPIRD as 'extreme risk' areas and where lands managed by the department are immediately next to locust-affected private property. Wood boring beetles are also associated with the widespread and recent decline in wandoo.

Management objective: To minimise impacts of invasive plants and animals and their control on key values.

Key management challenges

- Controlling numerous invasive plant and animal species across the many reserves.
- Achieving landscape-scale control and coordination.
- Sporadic breeding cycles cause significant fluctuation in individual species numbers.
- Potential for new or 'sleeper' species to inhabit reserves, affect native species and spread or change their invasiveness through human activity, animals or other means such as climate change and fire.

Management considerations

- There are 446 weed species occurring in the department's Wheatbelt Region. On some conservation reserves across the Region weed species have often escaped from old school or town site reserves. Weed management is based more on an asset protection approach than the control of the species.
- The most common and significant introduced animals on reserves in the Wheatbelt Region are foxes, feral cats, wild dogs, rabbits and some insect species.
- The department's *Corporate Policy Statement No. 14: Weeds management* provides guidance on the management of weeds.
- The department's *Corporate Policy Statement No. 12: Management of pest animals* provides guidance on the management of introduced and other problem animals.
- The department's *Corporate Policy Statement No. 65: Good neighbour policy* provides guidance on a

Management strategies

1. Manage invasive plants and animals consistent with legislative responsibilities, department policies and operational guidelines.
2. Undertake biannual reviews of the regional weed database and update it with relevant new information.
3. Maintain surveillance and recording systems for monitoring significant existing priority or potentially new invasive plants and animals.
4. Liaise and work with relevant agencies, adjacent land managers, community groups, visitors and volunteers to facilitate effective, coordinated management of invasive plants and animals.
5. Identify the relative importance of areas for protection, and operational controls to minimise the risk of spread and impacts from priority species already present, including where possible and achievable, eradicating new populations before they spread.
6. Develop and implement control plans that prioritise the control of invasive plants and animals based firstly on an 'asset-protection-based' then a 'species-led' approach and other considerations.
7. Ensure staff are trained in invasive plant and animal management, and the appropriate and safe use of control measures.
8. Maintain fox and feral cat control at *Western Shield* sites to protect native wildlife from the threat of these introduced predators.
9. In conjunction with DPIRD, help farmers to prevent damage to vegetation and crops by parrots, plague

cooperative approach to management of weeds and introduced and other problem animals. • Key threatening processes under the EPBC Act include 'predation by the European red fox', 'predation by feral cats', 'competition and land degradation by rabbits', and 'predation, habitat degradation, competition and disease transmission by feral pigs', which are covered by Threat Abatement Plans. • The department's *Damage Prevention and Control Manual* provides guidance on the prevention and control of animals that can cause problems in WA.	locusts, kangaroos and other wildlife by providing advice on control and licenses when appropriate. 10. Ensure that plants promoted by the department as commercially prospective do not potentially become environmental weeds. 11. Limit the opportunity for weeds to be introduced and established by (i) applying appropriate hygiene practices to machinery entering reserves, (ii) minimising disturbance of soil during operations, and (iii) restricting the importation of soil to only those sources with strict soil quarantine. 12. Implement appropriate and cooperative means of managing pesticides consistent with relevant legislation, policies and guidelines, including application of pesticides that minimise the impact on native plants and animals, encouraging landholders to consider the application of pesticides and their impacts, and monitoring of impacts of pesticide use.

Key performance indicator	
Control plans	
Performance measure	Control plans that prioritise the control of invasive plants and animals
Target	Invasive plant and animal control plans are developed and implemented
Reporting	Every five years

11. Diseases[34]

Plant diseases

Phytophthora Dieback refers to the disease caused by soil-borne plant pathogens from the genus *Phytophthora*, although *P. cinnamomi* is considered the most significant plant disease in the Wheatbelt Region and is a high priority for the department. More than 40 per cent of plant species are susceptible to Phytophthora Dieback in south-west WA (Shearer *et al.* 2004), and *P. cinnamomi* can irreversibly change the composition of many plant and animal communities (Shearer *et al*. 2009). Phytophthora Dieback is restricted to western and southern areas of the region receiving more than 400mm annual rainfall and has been recorded within Dryandra Woodland and some other sites in the western wheatbelt. As *Phytophthora* species are all soil-borne pathogens, measures to reduce the spread of *P. cinnamomi* will be beneficial in reducing the spread of other *Phytophthora* species, other soil-borne pathogens and even some weed species. However, management measures may differ for different areas, circumstances and *Phytophthora* species depending on the potential impacts and feasibility of controlling introduction and spread, and may include disease hygiene practices as part of on-ground works and the application of phosphite treatments to maintain susceptible populations of threatened species and communities.

Other plant diseases that are or may be present in the Wheatbelt and may impact on native species and ecosystems include honey fungus (*Armillaria luteobubalina*) (Shearer *et al*. 1997), stem canker fungi such as *Botryosphaeria ribis* and *Cryptodiaporthe melanocraspeda* (DEC 2011), mundulla yellows (Hanold *et al*. 2002) and Wandoo Crown Decline (White and Manning 2005, Brouwers *et al*. 2011, Veneklaas and Manning 2007, Hooper *et al*. 2010). Myrtle rust (*Austropuccinia psidii*) occurs in all States and Territories of Australia except SA and WA, and is a biosecurity threat for WA, although climatic modelling suggests that the Wheatbelt Region is less suited to its establishment.

Animal diseases

Disease management is an important aspect of fauna management activities such as research, breeding, translocation and wildlife caring. Diseases can be transmitted (i) between animal populations within and between

[34] A disease in its broadest sense is an illness, ailment or a disordered or incorrectly functioning organ, part, structure or system of the body of a plant or animal resulting from the effect of genetic or developmental errors, infection, poisons, nutritional deficiency or imbalance, toxicity or unfavorable environmental factors.

species, (ii) from humans to animals (anthroponotic diseases), and (iii) from animals to humans (zoonotic diseases). Diseases in native animals can be a major contributing factor to poor population health, reduced fertility and local extinctions. Some of the diseases of concern in the Wheatbelt include Tammar Wallaby Sudden Death Syndrome, *Trypanosoma* species, epidemic blindness (*Chorioretinitis*), *Chlamydia* species, *Salmonella*, Q fever, bandicoot papillomatosis carcinomatosis viruses, Toxoplasmosis, Australian Bat Lyssavirus, *Psittacine beak and feather disease* and *Chytridiomycosis* (Aplin and Kirkpatrick 2001).

The department requires the establishment of appropriate hygiene protocols for any research, breeding and translocation program work involving animals.

Management objective: To minimise the impact and spread of plant and animal diseases.

Key management challenges

- Several diseases have the potential to significantly affect plants, animals and ecological communities, including several that are threatened.
- Although detecting disease occurrence is confounded by the remoteness and isolation of many reserves, these factors also help protect against diseases that thrive on disturbance such as *Phytophthora* and *Armillaria*.
- Attention to hygiene practices is needed for soil movement and fauna management activities.

Management considerations

- The department's *Corporate Policy Statement No. 3: Management of Phytophthora disease* and the Commission's *Position Statement No. 7: The threat of Phytophthora dieback to biodiversity values on land vested in the Conservation Commission of Western Australia* provide guidance on the management of Phytophthora Dieback.
- The department's 2017 *Phytophthora Dieback Management Manual* provides guidance on the preparation of a Phytophthora Dieback Management Plan to assess and mitigate the risks of spreading dieback during planned disturbance activities or when entering lands managed by the department.
- The management of *Phytophthora* in Dryandra Woodland is also guided by *Proposals for the Management of Phytophthora Root Rot in the Great Southern District* (Blankendaal 2007).
- 'Dieback caused by the root-rot fungus *P. cinnamomi*', 'Psittacine circoviral (beak and feather) disease affecting endangered psittacine species' and 'infection of amphibians with chytrid fungus resulting in chytridiomycosis' are key threatening processes under the EPBC Act and are covered by Threat Abatement Plans.
- The department's Standard Operating Procedure: *Managing disease risk in wildlife management* provides guidance for appropriate hygiene and quarantine protocols to minimise the risk of exposure to disease agents and minimise the risk of spreading disease.

Management strategies

1. Manage plant and animal diseases consistent with relevant policies and operational guidelines.
2. Maintain surveillance and recording systems for monitoring diseases and treatments, and review, adapt and improve the effectiveness and applicability of management.
3. Liaise and work with relevant agencies, adjacent land managers, organisations, community groups, visitors and volunteers to facilitate effective, coordinated management of diseases.
4. Identify the relative importance of areas for protection, assess the risk through the Impact Evaluation process for specific operations and where necessary implement controls to minimise the introduction or spread from diseases and syndromes already present.
5. Consider appropriate hygiene measures (including specific hygiene management plans) for management operations and proposed developments based on risk.
6. Ensure relevant staff and operators are trained in plant and animal disease management and the appropriate and safe use of control measures.
7. Consider the partial, full, temporary or permanent closure of access in areas susceptible to diseases when the risk of disease is high.
8. Manage recreation facilities and activities to minimise the risk of disease spread, and ensure the quality of visitor experiences is maintained.
9. Monitor the health of translocated and captive bred animals, and where evidence of animal diseases is found defer the translocation of animals until protocols are developed.
10. Inform all employees and wildlife carers handling or coming into contact with wildlife of precautions required to minimise their risk of exposure to animal diseases.
11. Review when needed the Region's plant and animal diseases management guidelines.

12. Fire

Fire is an important agent of change in the south west of WA. For millions of years, naturally occurring fires have shaped the evolution of the region's plants, animals and ecosystems. In recent millennia, the deliberate introduction and use of fire by humans to manage the availability of natural resources has brought more changes

to the distribution and abundance of biota in the landscape. Aboriginal people in the Wheatbelt Region used fire for a variety of cultural purposes (Ward 1998, Abbott 2003). Clearing of native vegetation for agriculture, particularly west of the State Barrier Fence, has fragmented the landscape disrupting patterns of fire ignition and spread (McCaw and Hanstrum 2003). Today, fire is an agent of renewal and destruction in the landscape, and is an important consideration in landscape management. The challenge is to devise practical and feasible approaches to fire management that protects life, property and livelihood from the adverse impacts of bushfires while conserving cultural and biodiversity values. The department actively manages bushfire and prescribed fire on land where it has management responsibility. This is regulated by legislation and guided by department policies, guidelines and the principles of risk management.

This section describes the department's principles for fire management in the Wheatbelt Region. Fire management is based upon distinct zones: Fire Management Area[35] (FMA) 1 'Agricultural Zone' (the predominantly cleared western part of the Region), and FMA 2 'Rangeland Zone' (the mostly uncleared area generally east and north of the State Barrier Fence). FMA 1 is divided into management classes based on reserve size, each with specific fire management objectives and strategies (Appendix 7), which has a major influence on fire behaviour and how biodiversity assets respond to fire and fire management actions. The department prepares several separate but complementary internal management documents (such as recovery and fire plans), based on the principles described in this plan, to provide guidance for day-to-day management of prescribed fire and bushfire suppression.

Prescribed burning at Tutanning Nature Reserve in the Shire of Pingelly. Photo – Greg Durell/DBCA

The basis of fire planning on CALM Act lands or other areas where the department manages fire in the region considers that:

- fire management is primarily focused on the protection of life and property values from bushfire
- fire management for each reserve will depend upon the risk posed to life, property and infrastructure, and the capacity to maintain biodiversity
- the incidence of bushfires on reserves within the 'Agricultural Zone' has declined in recent decades, predominantly through rapid suppression and active exclusion. The small size of many reserves also reduces the likelihood of bushfire spreading within and between reserves (Parsons and Gosper 2011)
- on some reserves, the time since the previous fire is longer than desirable to regenerate some vegetation communities or maintain important habitat. If the time between fires is too long, species reliant on fire may senesce and disappear, and community diversity and structure decline
- too frequent fire can also lead to loss of species, particularly those that only regenerate from seed after fire. In the 'Rangeland Zone', frequent bushfires caused by lightning have resulted in large areas of woodland being burnt too frequently and in some cases recovery may take hundreds of years
- the life history of key indicator species is used to identify appropriate fire regimes to conserve vegetation communities and fauna habitats. Some species depend on fire for their persistence or may be sensitive to fire such as plants that are readily killed by fire but often depend on fire to stimulate germination, have long juvenile periods and which store seeds in the canopy (Burrows 2008), and animals that have specific habitat requirements (such as long-unburnt vegetation), are sedentary and unable to seek refuge, are susceptible to predation, are poor dispersers or have low reproductive rates (Yates *et al*. 2003). These fire regime specific[36] or sensitive species and communities are typically associated with less flammable parts of the Wheatbelt such as wetlands, granite outcrops and woodlands, and are vulnerable to long term loss of species diversity,

[35] Fire Management Areas group features with similar environmental, land use and fire management features and prescribe a standard approach to the range of fire management activities. The department's proposed *Bushfire Risk Management Framework* will change FMAs to Bushfire Risk Management Zones (which distinguish areas with different characteristic risk profiles) and introduce Fire Management Category (FMC) subdivisions (depending on management intent) and tactical size-based management classes beneath these.

[36] Species that has a specific fire regime, or sequence of fire, for its persistence, which could be a unique combination of fire interval, season and intensity.

vegetation structure and habitat value because of too frequent, intense or extensive fire or inappropriate season of fire. For example, the malleefowl needs long unburnt dense shrub with an abundance of *Acacia* species and leaf and twig litter for nest mound building (Benshemesh 2007), and aging *Acacia* shrublands become less suitable for malleefowl because understorey and litter cover peak 25 to 30 years post-fire and then decline (Parsons and Gosper 2011). It is particularly important to protect threatened species and ecological communities from bushfire, and use planned fire (where appropriate) to maintain habitat quality for threatened animals and regenerate threatened plants

- the traditional use of fire is an important part of Aboriginal culture, and is integral to looking after country and cultural heritage. Aboriginal people may wish to be involved in fire management incorporating traditional and Western approaches
- fire can also interact with a range of external pressures such as weed and feral animal invasion. Management needs to consider these pressures to limit the potential for adverse impacts
- some plants or animals may not be able to re-colonise isolated reserves completely burnt in a single fire
- the loss of biodiversity from reserves due to a combination of pressures has also influenced the frequency and intensity of fire, and how other species recover following fire. For example, the decline of digging marsupials through feral predators has increased litter accumulation and decreased the ability of some plants to disperse and regenerate
- the effects of climate change, particularly where changes to the seasonality and reliability of rainfall coincide with fire, may affect the ability of plants and animals to successfully recover.

Regeneration of poison bush thicket (*Gastrolobium sp.*) four years after a prescribed burn at Tutanning Nature Reserve in the Shire of Pingelly. Photo – Greg Durell/DBCA

Fire management objectives for each reserve need to reflect the principles outlined above. To achieve this, fire management strategies will aim to:

- use fuel modification, fire prevention and bushfire suppression measures as appropriate to reduce the risk of bushfire to life, property and infrastructure
- use fuel modification, bushfire suppression and prescribed fire to reinstate and maintain ecologically appropriate fire regimes
- liaise and engage with relevant stakeholders in the planning and management of fire
- improve our knowledge of and capacity to manage fire through appropriate research, operational experience, stakeholder and community consultation, and applying an adaptive management approach.

Management objective: To conserve biodiversity and key values, while protecting life and property from bushfire.

Key management challenges

- The extreme remoteness of many department-managed lands may affect the management of bushfires and prescribed burning.
- Re-introducing appropriate fire regimes to regenerate and maintain vegetation communities and habitats declining due to prolonged fire exclusion.
- Accounting for the uncertainties surrounding the impact of climate change on fire regimes, suppression and recovery.
- Considering the impact fire may have on visitor safety and experience.
- Involving Aboriginal people in and incorporating traditional knowledge into prescribed burning programs.

Management strategies

1. Manage fire consistent with relevant legislation, policies and guidelines, Appendix 7 and recovery plans using an adaptive management framework.
2. Maintain appropriate fire management capability to implement prescribed burning and bushfire mitigation programs and suppression.
3. Maintain recording and mapping systems for bushfire and prescribed burning operations.
4. Undertake the preparation and review of Regional fire planning documents, including bushfire risk assessment and, where necessary, guidelines for the protection of life and property values on CALM Act lands from the impact of bushfires.
5. Use ecological principles to determine minimum fire interval periods for major vegetation communities.

Management considerations

- The protection of life and property takes precedence when developing fire management programs and prescriptions considering available resources.
- Fire management to achieve biodiversity conservation objectives will consider the life history attributes of the most fire-regime sensitive indicator species.
- Fire management should consider the potential interactions with pressures such as invasive plants and animals, disease and climate change.
- Consideration of fire regimes to conserve biodiversity, with special focus given to threatened species, woodlands and granite outcrops.
- The department's management of fire is regulated by legislation (for example, *Bush Fires Act 1954*, CALM Act and precedents established under common law) and guided by the department's *Corporate Policy Statement No. 19: Fire management*, *Corporate Policy Statement No. 88: Prescribed burning*, other policies, guidelines, plans and operating procedures.
- The *Emergency Management Act 2005* sets out the emergency management arrangements for the State, requiring that hazard-specific plans be maintained. The plan for bushfire is State Hazard Plan – Fire, which sets out the department's role and obligations (along with that of other relevant agencies) in contributing to bushfire prevention and mitigation, preparedness, response and recovery.
- The Commission's *Position Statement: Prescribed burning on vested lands* presents principles for the development and implementation of prescribed burning policies and programs on lands vested in the Commission.

6. Undertake prescribed fire and other fuel management to mitigate bushfire risk.
7. Integrate fire management with the management of other pressures.
8. Establish and maintain a system of fire breaks and access tracks for fire management.
9. Liaise and work with key stakeholders including DFES, agencies, local government, neighbours and local bush fire brigades to encourage cooperative and compatible fire management arrangements.
10. Use adaptive management and identify research opportunities to improve our understanding of the influence of fire regimes on biodiversity conservation.
11. Work with Aboriginal people to incorporate traditional knowledge into prescribed burning programs where it is safe, practical and feasible to do so, where it aligns with the department's fire management objectives, and is consistent with legislative, policy and community responsibilities.
12. Ensure relevant staff and operators are trained in fire management.

Key performance indicators[37]

Fire management outcomes	
Performance measure	Fire management outcomes for vegetation types in Appendix 7
Target	Fire management outcomes are achieved
Reporting	Annually
Bushfire impacts	
Performance measure	The impact of bushfire on human life or community assets
Target	No loss of human life or community assets, or serious injury attributable to the department's fire management
Reporting	Annually

[37] The proposed *Bushfire Risk Management Framework* may replace measures and targets with indicators of acceptable bushfire risk in each Bushfire Risk Management Zone FMC.

3. Connection to country (cultural heritage values)

Strategic objective

To protect and conserve the value of the land to the culture and heritage of Aboriginal people, and conserve and protect other cultural heritage for current and future generations.

The Wheatbelt has a rich human history with Aboriginal people, the traditional owners of the land, inhabiting areas dating back many thousands of years. In more recent historical times, Aboriginal people and colonial settlers have co-inhabited the region and in respect to the colonial settlers undertook dramatic changes to the landscape since the mid-1800s up to the early 1980s during the clearing phase of the wheatbelt.

13. Aboriginal cultural heritage

The main priorities for Aboriginal cultural heritage during the life of the plan will be:

- protecting sites of significance to Aboriginal people occurring on department-managed lands
- supporting Aboriginal people's connection to country, and customary use of department-managed lands
- improving working relationships and partnerships with Aboriginal people.

Aboriginal people have inhabited the Wheatbelt Region for more than 40,000 years and have developed a close association with their *budjar*. Aboriginal heritage and *budjar* are interconnected. It encompasses laws and practices, connection to lands and waterways and traditional ecological and cultural knowledge[38] of *budjar* and its biodiversity. Aboriginal heritage also involves the archaeological records of Aboriginal people, areas of mythological or ceremonial importance, places where traditional and cultural events took place, and the ongoing physical and spiritual involvement of the people with *budjar*. Aboriginal heritage provides an essential emotional, physical and spiritual link to traditions, culture, practices and identity.

Under their traditional laws and customs, Aboriginal people have responsibilities for looking after country, just as country looks after them as their 'classroom' and 'health clinic'. It is recognised that heritage places are still used today and provide a means of maintaining Aboriginal culture and heritage. The protection of Aboriginal heritage is therefore a matter of protecting Aboriginal cultural identity and facilitating access to *budjar* to look after these heritage places and values. This interconnectedness is explained through traditional laws and customs, creation stories, songs, and other cultural practices transferred through generations to explain Aboriginal 'world view' and knowledge of country. Dreaming stories and songs were connected to actual places, and sometimes these places were linked together into a Dreaming Trail. For example, Mulka's Cave, Wave Rock, Jilakin Rock, Dumbleyung Lake and Puntapin Rock are all connected via an ancient Dreaming Trail that Noongar people believe was created by the Wagyl (Spirit or Rainbow Serpent) (CALM 1998).

Aboriginal sites

Ethnographic and archaeological[39] evidence attests to the dynamic and enduring relationship between Aboriginal people, the biota and landscapes of their *budjar*. Aboriginal sites, which link Aboriginal cultural tradition to

[38] Aboriginal traditional and cultural knowledge in this plan is the intellectual property of Aboriginal people and cannot be used outside the context of this management plan without their written consent through the relevant representative body.
[39] Aboriginal sites can be categorised as archaeological and/or ethnographic sites. Ethnographic sites include places for current ritual or ceremony, caches of ceremonial objects, sites with mythological associations, or sources of stone, ochre, plants or animals, which are known or used. Archaeological sites are often ethnographic sites as well, and include the physical remains of Aboriginal culture, before and after colonial settlement. Archaeological sites include shelters, fish traps or weirs, stone or ochre quarries, stone artefact production areas, middens, seed grinding patches, engravings, paintings, marked trees and burial sites.

place, land and people across time, hold great meaning and significance to Aboriginal people. There are 46 registered Aboriginal sites on parks and reserves in the Wheatbelt Region. There are also another 56 sites that are not registered but have been lodged or have insufficient information. Most of the recorded sites are artefacts/scatters, man-made structures and mythological sites, although there are also several historical, burial, ceremonial, painting and quarry sites. Many sites are also water sources and/or camping, hunting or meeting places.

Gnamma hole. Photo – Greg Durell/DBCA

It is likely that registered sites only represent a small proportion of the actual sites within the planning area. Under the *Aboriginal Heritage Act 1972* (Aboriginal Heritage Act), sites are protected whether they are registered or not, and it is an offence to in any way alter an Aboriginal site or object unless permission is granted in accordance with the Aboriginal Heritage Act. As the register is not a comprehensive listing of all sites, the *Register of Aboriginal Sites* should be consulted and assessments may be necessary before any operations where there is potential to inadvertently damage sites. Appropriate approvals under the Aboriginal Heritage Act are needed to proceed with any major public works that may affect Aboriginal heritage values. The department will work with DPLH and Aboriginal people and apply the State Government's *Aboriginal Heritage Due Diligence Guidelines* to guide management actions to ensure Aboriginal heritage sites are not adversely impacted.

Aboriginal people's connection to country

There are two Aboriginal language regions in the Wheatbelt Region[40]: Noongar people cover 72 per cent of the Region and consist of 10 language groups (*Amangu*, *Yued/Yuat*, *Balardong/Ballardong*, *Nyakinyaki*, *Wilman*, *Ganeang*, *Mineng*, *Goreng*, *Wudjari* and *Njunga* groups); and Wongai people cover the rest of the Region and consist of three language groups (*Kelamaia*, *Kalaako* and *Widi* groups). Each language group correlates with different geographic areas with ecological distinctions and is also represented through native title claims.

Aboriginal people have a strong desire to care for country and practise customary activities according to their traditional laws and customs, to be involved in cooperative management of conservation reserves and to strengthen cultural ties to *budjar*. The Commission and the department acknowledge the aspirations of Aboriginal people to have their traditional rights to country recognised, participate in the ongoing planning, decision-making and management of department-managed lands, and conduct customary activities on department-managed lands.

Native title

The *Native Title Act 1993* (Native Title Act) sets out processes for consultation with native title claimants and native title representative bodies when major public works are undertaken, management plans are being prepared, or other work undertaken. There are five registered native title claims and two determinations in the Wheatbelt Region (Table 1, Maps 4, 6–10). The Marlinyu Ghoorlie native title claim in the northeast of the region has been lodged but is not a registered claim at this time.

Table 1. Native Title claims and determinations in the Wheatbelt Region.

Native Title claimant group	National Native Title Tribunal number	Area (km^2) of claim in the Region	Percentage of the Region	Percentage of the claim
Indigenous Land Use Agreements				
Ballardong People	WI2015/004	59,985	46	96
Gnaala Karla Booja	WI2015/005	12,629	10	41
Wagyl Kaip and Southern Noongar	WI2015/007	18,311	14	35

[40] See daa.wa.gov.au/about-the-department/publications/maps/state-maps/ and noongarculture.org.au/noongar/.

Yued	WI2015/009	5,211	4	18
Native Title Determinations				
Ngadju	WCD2014/004	39	0.03	0.04
Badimia People	WCD2015/001	4,232	3	12
Native Title claims				
Widi Mob	WC1997/072	2,535	2	7
Marlinyu Ghoorlie	WC2017/007	39,260	30	40

The National Native Title Tribunal determination outcome for Ngadju (WCD2014/004) was that native title exists in the entire determination area. Frank Hann National Park lies within this determination, although the area of the national park is unclaimed. Parts of Carlyarn and Karroun Hill nature reserves lie within the Badimia People (WCD2015/001) determination, however the outcome of this determination was that native title does not exist. Native title claims for the Kaparn People (WC2013/009) and Kalamaia Kabu(d)n People (WC1997/100) have been dismissed.

The South West Native Title Settlement (SWNTS) is the largest and most comprehensive agreement to settle Aboriginal interests for land in Australia since colonisation, and is being finalised. Involving about 30,000 Noongar people and covering about 200,000km^2, the SWNTS provides an opportunity for the WA Government to work in partnership with the Noongar community to improve their economic, social and cultural development. The SWNTS provides Noongar people with recognition as traditional owners of the south-west of WA, establishes a Noongar Land Estate, implements a standard heritage process, and provides a range of economic and community development outcomes, in exchange for the surrender of native title and resolution of native title claims. All claimant groups within the South West Noongar area have approved Indigenous Land Use Agreements[41] (ILUA) under the SWNTS. Only once the ILUAs are registered by the National Native Title Tribunal and relevant legal processes concluded will native title be fully and finally resolved for the ILUA areas. Until then, the 'future act provisions' of the Native Title Act still apply, where consultation with native title claimants and native title representative bodies is needed when major public works or other work are undertaken, and management plans are prepared.

Native title claimant groups are represented by native title representative bodies, and within the Wheatbelt Region Aboriginal people are generally represented by the South West Aboriginal Land and Sea Council (SWALSC), Yamatji Marlpa Aboriginal Corporation and Goldfields Land and Sea Council Aboriginal Corporation.

The SWNTS comprises several components, including the establishment of regional corporations representing claim areas that will provide services for local Noongar communities. While most components of the SWNTS will start once the ILUAs are registered by the National Native Title Tribunal, the Noongar Standard Heritage Agreement started when the ILUAs were formally signed and sent to the National Native Title Tribunal. The Noongar Standard Heritage Agreement establishes a uniform and efficient Aboriginal heritage survey regime for land clearance and the protection of sites/objects. The ILUAs were formally signed by the State Government on 8 June 2015. The *Noongar (Koorah, Nitja, Boordahwan) (Past, Present, Future) Recognition Act 2016* (which recognises Noongar people as the traditional owners of the south-west of WA) was proclaimed on 6 June 2016.

The Yamatji Nation Southern Region Agreement (previously known as the 'Geraldton Alternative Settlement Agreement') is also being negotiated, which includes part of the Widi Mob native title claim. CALM Act lands and any other department-managed areas will be managed consistently with the Agreement process and outcomes.

Notwithstanding formal recognition of native title, the department will continue to recognise that Aboriginal people have strong and enduring interests in department-managed lands and waters (Maps 6–10) and desire to continue cultural activities in these areas, and will continue to work closely with local Aboriginal people on land management activities.

Involving Aboriginal people in management

Working with Aboriginal people to care for *budjar* is essential for the preservation of natural and cultural heritage, as well as enriching cross-cultural awareness. The involvement of Aboriginal people in cooperative

[41] An ILUA is an agreement under the Native Title Act between a native title group and others, about the use and management of land and waters.

management of department-managed lands and waters also provides cultural, spiritual and economic benefits to Aboriginal people.

The CALM Act has a management objective "*to protect and conserve the value of the lands and waters to the culture and heritage of Aboriginal people*", establishes legal frameworks to enable joint management of lands and waters between the department and other parties, and enables Aboriginal people to undertake customary activities on reserves and other lands. The CALM Act aims to recognise the connections between Aboriginal people and country, and will help to fulfil the longstanding aspirations of Aboriginal people to be involved in the management of *budjar* and to do traditional activities on *budjar*. The SWNTS includes a component relating to joint management. Upon implementation of the SWNTS, Cooperative Management Committees will be established for each Noongar Regional Corporation area. These Cooperative Management Committees will comprise representatives from the Regional Corporations and the department and will provide advice on the management of CALM Act lands within the Regional Corporation area. The Cooperative Management Committees will also identify priority areas within the Regional Corporation area for formal joint management under the CALM Act.

The department has worked closely with native title claimants and local Aboriginal people for many years in the Wheatbelt Region. For example, the department and the Badjaling community are working on establishing a co-operative management agreement for the Badjaling Nature Reserve, which builds on significant cooperative work done on cultural improvement works in this reserve, and Gnaala Karla Booja groups are associated with land management and cultural training and employment development using Dryandra Woodland.

The department recognises that the natural values of many conservation reserves may be insufficient to justify conservation reserve status, and may have their vesting and/or purpose changed during the life of the plan. With appropriate consultation, some of these reserves may be suitable for vesting in and management by local Aboriginal communities. For example, the vesting of the Mooranoppin Nature Reserve near Kellerberrin has been changed to the Kellerberrin Aboriginal Progress Association.

Customary activities

Aboriginal people are also interested in department-managed land as a place to undertake customary activities. Aboriginal people are unevenly distributed across the Wheatbelt Region, with several towns supporting most of the population. These communities often associate themselves with patches of bush where they still undertake customary activities, highlighting the 'ownership' of natural areas by different Aboriginal communities. Aboriginal culture is integrally linked with the land, and activities such as hunting, camping, collecting bush tucker and the passing on of traditional knowledge require access to natural lands. In the Wheatbelt Region this involves the department to a large extent, as more than 10 per cent of the Crown reserves in the agricultural zone are managed by the department.

The CALM Act (and associated regulations), together with the Biodiversity Conservation Act, allow Aboriginal people to access lands and/or waters managed by the department to conduct traditional activities, subject to regulations. Such traditional customary purposes may be for medicinal, artistic, ceremonial or other cultural purposes. The hunting and gathering of food by Aboriginal people is an important part of their culture, enabling them to maintain traditional relationships with the land and water, share knowledge and partake in traditional practices. However, certain customary activities may be inappropriate in places where it is evident there is a real and significant risk to (i) public safety, (ii) the protection of flora and fauna, or (iii) other uses, users or values of department-managed lands. The department will work with native title claimant groups, joint management parties and local Aboriginal communities to develop local area arrangements to support and manage customary activities on department-managed lands and waters, including the taking of traditional food by Aboriginal people. The development of relationships at a local level is vital to the ongoing management of customary activities on department-managed lands and waters.

Working relationships with Aboriginal people

A greater respect for and understanding of Aboriginal culture may help all people in having a greater attachment to *budjar* and to work in partnership to create a positive and sustainable future for all. While the department liaises with several Aboriginal agencies or groups (including DPLH, local Aboriginal corporations, Indigenous Land Corporation, Native Title Tribunal, and Aboriginal and Torres Strait Islander Commission) on different issues at different levels on a regular basis, it will continue to build and strengthen relationships with Aboriginal people, communities and representative bodies through a variety of strategies and projects.

Education

The department promotes a greater awareness of Aboriginal culture (i) because the Australian public generally has a poor understanding of Aboriginal culture (which must be redressed for reconciliation to occur), and (ii) to encourage people to explore Aboriginal culture and its relationship to *budjar*.

The department has been actively promoting greater knowledge of Noongar culture through the *Nearer to Nature* program and through publications such as *Exploring Woodlands with Nyoongars* (CALM 1998), which have been developed in consultation with Noongar people. The department has provided in-service courses for teachers, and opportunities for cultural activities for Noongar students and young people on department-managed lands in partnership with elders. The department has held cultural activity workshops for Aboriginal people in Narrogin and the northern Wheatbelt, which were aimed at training Aboriginal people to lead interpretive activities for education or tourist groups.

Aboriginal language is used extensively across the Wheatbelt Region in names of landscape features such as towns, roads, farms and reserves (Appendix 1), such as Baladjie Lake Nature Reserve (from 'baladj' meaning 'lookout'), Carrolup Nature Reserve (from 'carra' meaning 'place of red-tailed cockatoo'), Karlgarin Nature Reserve (from 'karl' meaning 'fire') and Coyrecup Nature Reserve (from 'kwerakap' meaning 'brush-tailed kangaroo') (Milne 1992). While some of the spellings vary and meanings are not always known or correctly given, the sharing of Aboriginal language and stories deepens the respect for Aboriginal culture and spirituality and creates a greater awareness of the traditional and contemporary history of the area. Some of the ways that the cultural ties between Aboriginal people and *budjar* can be better appreciated, cross-cultural awareness enriched and working relationships strengthened is through (i) Aboriginal naming of reserves, individual recreation sites or reserve features/places, (ii) appropriate signage and cultural interpretation at key sites, and (iii) developing walk trails that tell stories of Aboriginal Dreaming and the significance of key sites (such as the 'dreaming' trail at Boyagin Rock that has been developed by the department, Noongar representatives and the Pingelly Tourism Committee).

Employment

Employment of Aboriginal people is another way of creating greater cross-cultural awareness upon which to build better working relationships between the department and Aboriginal people. It is also an important mechanism for developing expertise among Aboriginal people and providing long-term employment. The department supports job creation and training and community development opportunities for Aboriginal people in the Wheatbelt Region and across regional and remote communities in WA, including the State Government's *Aboriginal Ranger Program*.

To achieve a just and equitable Aboriginal employment outcome on conservation lands and waters, the department runs the *Mentored Aboriginal Training and Employment Scheme*, which is a multi-faceted employment and training program implemented in conjunction with non-government training providers and land management organisations. The department's *Reconciliation Action Plan* identifies an Aboriginal employment target of seven per cent of the workforce. Aboriginal trainees have been, and are, employed within the department's regional workforce, and criteria relating to Aboriginal people are included in staff selection processes. The department has also been working with the Gnaala Karla Boodja Employment Enterprise Development Group on a strategy to increase the employment of Aboriginal people in land management.

There is considerable and growing interest in Aboriginal tourism in WA, and there are opportunities to capitalise on this interest given the closeness of parts of the Wheatbelt to Perth such as Dryandra Woodland, which can deliver tourism and other social and economic benefits to Aboriginal people (Government of Western Australia 2011). The department can facilitate and support opportunities for access to land and tenure for the development of tourism. It is important that Aboriginal culture is told and shared by Aboriginal people, not only as the traditional owners of that culture, but also to ensure an authentic experience for tourists. The assessment of new restricted tourism licences includes a consideration of Aboriginal employment outcomes and culturally appropriate service delivery. The development of walk trails may also provide opportunities for direct employment, and the opportunity to develop enterprises such as guided cultural awareness tours, bush survival skills training and the production and teaching of bush foods and medicines.

Other avenues for employment may include commercial licenses for commercial activities such as firewood collection and wildflower picking, or contracts for services supplied directly to the department such as weed spraying on reserves.

Management objective: To conserve and protect the value of the land to the culture and heritage of Aboriginal people by protecting cultural and natural heritage on department-managed land, supporting Aboriginal people's connection to country and customary use of department-managed land, and improving working relationships and partnerships with Aboriginal people.

Key management challenges

- Communicating with and involving a dispersed Aboriginal community many of which may now not be living 'on country'.
- Loss of traditional knowledge.
- Many different Aboriginal groups spread across a large area with similar and different expectations.
- Individuals and families that are not party to ILUAs and working parties.
- Providing suitable employment for Aboriginal people 'on country'.

Management considerations

- The department's *Corporate Policy Statement No. 87: Aboriginal joint management* provides guidance on involving Aboriginal people in the management of the State's lands and waters.
- The department's *Corporate Policy Statement No. 86: Aboriginal customary activities* and *Guide to Aboriginal customary activities on Parks and Wildlife-managed lands and waters* provide guidance on activities undertaken by Aboriginal people for customary purposes, and in the application of relevant regulations.
- The SWNTS will change the nature, business and interaction between the department and Noongar people.

Management strategies

1. Work with Aboriginal people to assess the value of the land to the culture and heritage of Aboriginal people and ensure that this knowledge informs and guides all management actions. Where consent is given by Aboriginal people to use traditional knowledge, ensure it is appropriately acknowledged.
2. Ensure that liaison with Aboriginal people is directed at the relevant communities by consulting with DPLH, the representative corporate body and traditional owners, and by maintaining a database of local contacts, representatives of the various groups and families, and their areas of knowledge and interest.
3. Maintain and build upon a commitment to pursue cooperative management arrangements with Aboriginal people, consistent with legislation, policy and the SWNTS.
4. Apply the relevant 'future act provisions' under the Native Title Act to department works.
5. Consider information located on all heritage registers and databases, apply the *Aboriginal Heritage Due Diligence Guidelines*, and liaise with DPLH, Aboriginal people, representative corporate bodies and other relevant stakeholders about the appropriate protection, conservation and management of cultural heritage to ensure Aboriginal sites are protected.
6. Consistent with legislation, policy and regulations, help and facilitate the needs and aspirations of Aboriginal people to access and undertake customary activities on department-managed lands, including the carrying out of traditional burning and the development of local area management agreements to support and manage customary activities.
7. Ensure that department staff undertake cross-cultural awareness training, and are appropriately trained in other areas of Aboriginal cultural heritage such as Aboriginal site identification and recording.
8. Ensure that management adapts to and conforms with any legislative or policy changes and native title resolutions during the life of this plan.
9. Encourage training, employment and economic development opportunities through cooperative and joint management arrangements.
10. Providing teacher interest is maintained, retain and if necessary update '*Exploring Woodlands with Nyoongars*' into the digital environment as a current publication and facilitate in-servicing of teachers.

Key performance indicators

Aboriginal cultural heritage sites

Performance measure	Protection of Aboriginal cultural heritage sites on CALM Act managed lands
Target	No disturbance of Aboriginal heritage sites because of department operations without formal approval and consultation
Reporting	Annually

Involvement of Aboriginal people in management	
Performance measure	Involvement of Aboriginal people in management
Target	Relevant commitments to joint and cooperative management through the SWNTS within the planning area are met
Reporting	Every five years

14. Other cultural heritage

Ensign Robert Dale was the first colonial explorer to venture into the region when he discovered the fertile soils of the Avon Valley in 1830, and travelled as far east as Mt Caroline and Mt Stirling, which he named. Surveyor General John Septimus Roe (1835), Stirling and Roe (1835), Harris (1836), Bunbury (1836), and Roe (1836) soon followed. Henry Maxwell Lefroy (1843) explored east of York and then again in 1863 into the eastern goldfields. Lefroy's report on the possibilities of the area '300 miles' east of York paved the way for Charles Cooke Hunt's 1864, 1865 and 1866 expeditions, which perhaps left the most tangible reminders of all these early explorations. Hunt traversed the Wheatbelt from York to Coolgardie, blazing a track that became the main route to the Goldfields until the Eastern Railway was opened to Southern Cross in the late 1890s. Many of the wells that were sunk along Hunt's route to supply water for travellers remain and bear his name today (for example, Totadgin Well No. 7 [Heritage Place 17561] and Weowanie Rock and well No. 15 [Heritage Place 10077]). In 1893 John Holland cut a 538km track (the longest cart road ever made in one stretch in WA) from Broomehill to Coolgardie (providing a short cut for prospectors to the Goldfields from Albany) and, although much of the southern half of the track has disappeared, remnants of the original track can still be found in the eastern parts of the wheatbelt on reserves and UCL.

The first permanent colonial occupation of the western Wheatbelt occurred between 1830 and 1840, when pastoralists expanded out of the recently discovered Avon Valley. First 'Temporary Occupation' leases and 'Licences to Depasture' were issued, then, in 1873, Special Occupation Licences that allowed settlers to select 100-500 acre (40-200ha) lots for three to 10-year periods. The aim of these licences was to encourage settlement by small farmers by converting them to private tenure after surveying. However, farmers tended to buy only the best enclaves of land within their lease areas (for example, permanent water holes and adjacent rich soils) and continued to run stock on the leased remainder. This changed in 1887 when land regulations requiring improvements to alienated lands were introduced ('conditional purchases'). The requirement to 'improve' the land remains in the *Land Act* – section 47 states the land must be improved by fencing, providing an adequate water supply and progressively sowing to pasture or crop a minimum of 50 per cent of the land area.

The advent of conditional purchases, along with two subsequent developments, greatly accelerated agricultural settlement[42]. The building of a railway system during the 1880s/1890s and into the early 20th Century allowed grain to be readily transported. Railways were initially developed to York (1885), Beverley (1886), Northam (1888), Albany (1889), Southern Cross (1894) and Kalgoorlie (1896). Also, the *Agricultural Lands Purchase Act 1909* enabled the resumption of lands previously held under pastoral lease to be released as 'conditional purchase' blocks.

In 1907, Government surveyor M. Terry classified the land into three classes:

- first-class land – "forests carrying salmon gum, gimlet or *ngarrip* (*Eucalyptus salubris*) wood, and morrel, with smaller areas of jams, scrub jams and mallee"
- second-class land – "wandoo, salmon gum and mallee, light loamy soil, and more or less infested with box poison"
- third-class land – "plains and stony rough feeding country, carrying a large amount of scrub".

Generally, the first two classes were taken up as the railway system extended eastwards, reaching the 350mm isohyet by the 1920s. In later years, a vigorous land alienation policy, technical advances with farm machinery and finally the advent of compound fertilisers enabled cropping of the third-class lands and marginal rainfall

[42] A more detailed account of settlement in the central Wheatbelt area is described by York-Main (1993), and while this account is mainly of the shires of Tammin, Kellerberrin and Trayning, much is applicable to the broader Wheatbelt Region.

zones. The last notable flurry of land alienation and clearing activity occurred in the south-eastern Wheatbelt in the late 1970s and 80s.

First class land was selectively cleared because of the better soils in the valley systems. They were also the first to show signs of salinity. Wood (1924) correctly described the relationship between land clearing and the mobilisation of stored salt by rising watertables. Wood identified that salt was deposited by rainfall, and that low rainfall areas were at greater risk from salinity because of accumulated salt in the soil profile. In 1945, the WA Premier stated that salinity was occurring "*...because of the raising of the watertable by the destruction of timber*". Ironically, Hansard reveals the *Soil and Land Conservation Act 1945* made no reference to salinity because the then Department of Agriculture was successfully dealing with it.

The expansion of the rail system also allowed the development of the sandalwood or *wilarak* (*Santalum spicatum*) export industry, which had been previously restricted by the long haulage distances to coastal ports. During the last half of the 1800s, sandalwood was WA's largest export. Its value contributed greatly to the economic survival of many landholders along the Great Southern Railway, who used funds from sales to help them through periods of drought, depressions and market shortages of other farm produce. Sandalwood timber reserve plots were set aside to ensure the long-term survival of the tree because of concerns of unsustainable cutting. Brown mallet harvesting for tannin production played a similar role in the western Wheatbelt, where money to clear and develop farmland often came from brown mallet bark sales (DEC 2011). The remains of railway lines are evident on several reserves in the region.

A lack of permanent water across much of the Wheatbelt resulted in the digging of wells and building of diversion banks on granite outcrops during early settlement. Extensive granite walls were often built on granite outcrops on reserves to catch and divert water into small dams. While no longer functional, many of these engineering features on granite outcrops provide interpretive opportunities. For many years towns relied heavily on these small dams for their water supply. The establishment of a water pipeline from Mundaring to Kalgoorlie through the wheatbelt proved the feasibility of supplying water from forested areas to remote areas of the region. This route and features of the original pipeline are now part of the National Trust's *Golden Pipeline* heritage trail.

Dryandra Woodland Settlement (Heritage Place No. 03856) is a 26ha former department forestry settlement that dates from 1935 and is listed on the WA 'Register of Heritage Places'. The site comprises a manager's house, seven timber workers' cottages, a former school, compound (workshops, garage, slab hut), a row of pine trees, a recreation hall, a pump house, a mill dam, the site of an old mill, three Nissen huts[43], an arboretum, timber garages, house gardens, and archaeological remains. There are numerous other heritage sites on reserves across the Wheatbelt that are listed on LGA Municipal Inventories.

Management objective: To conserve and protect other cultural heritage in consultation with relevant stakeholders.

Key management challenge

- Identifying and conserving other cultural heritage across many conservation reserves.
- Lack of knowledge and understanding of historic site values.
- Potential degradation through weathering, fire, termites and vandalism.

Management considerations

- The department's *Corporate Policy Statement No. 18: Recreation and visitor services* provides guidance on the protection of other cultural heritage.
- The *Heritage Tourism Strategy for WA* aims to increase heritage tourism experiences across WA, to raise awareness of the importance of our heritage, and to encourage the ongoing conservation of WA's heritage places.

Management strategies

1. Protect, maintain, where possible record and monitor known or identifiable other sites of cultural heritage significance consistent with relevant legislative, policy and other requirements.
2. Consider information located on all heritage registers and databases, and liaise with the Heritage Council of WA, WA Museum, LGAs and other relevant organisations about the appropriate protection, conservation and management of other cultural heritage to ensure heritage sites are protected.
3. As resources allow, identify, research, document, map and maintain database records of other cultural heritage across the planning area.
4. Ensure that other cultural heritage values of the planning area inform and guide management actions.

[43] A Nissen hut is a prefabricated steel structure made from a half-cylindrical skin of corrugated steel. Originally designed during World War I by engineer and inventor Major Peter Norman Nissen, it was used extensively during World War II.

4. People on country (recreation, tourism and community values)

Strategic objective

To allow recreation, tourism and community experiences and use for the appreciation of the area's landscape, natural and cultural heritage values.

The department's *Corporate Policy Statement No. 18: Recreation, tourism and visitor services* outlines the principles, operational guidelines, procedures and administrative arrangements in relation to facilitating recreation and tourism in the planning area.

In some cases, historical recreational activities, particularly the use of power boats and other water-based activities are incompatible with the reserves' purpose. It is well understood that these activities often form part of the vibrancy of inland communities, such as when Dumbleyung Lake fills to a depth to allow boating on average every 15-20 years. Also, rock climbing is becoming increasingly popular on several nature reserves in the region, as well as the potential for increasing needs by mountain bike riders, horseriding and off-road vehicles.

The main priorities during the life of the plan will be to work with communities and stakeholders to:

- implement priority actions to maintain and improve recreation facilities
- maintain and improve visitor risk management
- review the land category, designations and facilities of the region's reserves to ensure that historic and future activities are compatible with the reserves' purpose
- develop new initiatives to attract a sustainable increase in visitors to the region's reserves
- work with organisations and communities to better connect visitors with the region's priority reserves.

15. Visitor experience

Regional recreation context

Gnaala Mia campground in Dryandra Woodland. Photo – Paul McCluskey/DBCA

Most recreation across the Wheatbelt Region is relatively low-key, typically involving picnicking with friends or family and usually associated with granite outcrops, lookouts, breakaways, woodlands and lakes. Often small reserves are the only areas of local natural bushland available for recreation, although many conservation reserves do not have any recreation facilities. Although some places attract relatively higher numbers of visitors such as Dryandra Woodland (69,529 annual visits[44]), Kokerbin (11,422 visits), Totadgin (7,000 visits), Dumbleyung Lake (6,658 visits), Buckleys Breakaway (5,440 visits) and Wongan Hills (Mt Matilda) (3,858 visits), most visitation to Wheatbelt reserves is generally low. Most recreational use is by local communities, which often develop a personal attachment to local reserves, and reserves close to country towns across the region are increasingly valued and used by local people and community groups.

[44] Visitation figures are for 2016-17. Some figures may be estimates.

The Wheatbelt Region lies mainly within Australia's Golden Outback tourism region, and tourism activities are focused at Wave Rock near Hyden and Dryandra Woodland (DEC 2011). Other tourism opportunities in the region include wildflower tours, wildlife viewing, nature appreciation and farm stays. Several tourist drive trails are popular with self-drive visitors and link tourism and recreation sites throughout the region (Section 17 *Visitor activities*), such as the *Granite Way*. There is potential for tourism development given the closeness of the region to Perth, particularly involving the themes of granite rocks of the north east and central Wheatbelt (such as Geeraning, Elachbutting, Sandford, Baladjie, Yorkrakine, Kokerbin, Mt Stirling and Mt Caroline), the linking of Hunt's wells along the York-Goldfields Heritage Trail, and other potential tourism opportunities (Central Wheatbelt Visitor Centre Working Group 2009). The department liaises and works collaboratively with several Regional Tourism Groups (such as NEWTravel, RoeTourism, Avon Tourism and Dryandra Tourism) in identifying and developing tourism opportunities on conservation reserves.

Visitor planning

The numbers of visits to established recreation sites is increasing. Planning for visitor use on reserves is necessary to manage visitor risk, environmental impacts caused by human activity, social benefit, equity, public demand and potential economic benefit. Allowing people to recreate on reserves to enjoy the wildlife experience can provide significant social benefits such as better physical and mental health, family bonding and maintaining cultural identity. There is also potential for local and regional economic growth through tourism. However, uncontrolled visitor access and behaviour can have significant long-term detrimental impacts on the values contained on reserves especially those associated with wetlands and granite rocks.

Remote camping in the Great Western Woodlands. Photo – Greg Durell/DBCA

While there is potential, the provision of more sites is limited to the resources available to develop and manage recreation sites and the need to ensure that any development meets legislative requirements such as the reserve's category or classified areas. More than 90 sites across the region on conservation reserves, other Crown reserves and private property have been assessed for their recreation potential (Moncrieff 2000, Appendix 8). Development of the top-ranked sites will not only help take pressure off many lightly used sites, but also provide benefits to regional economies through increased tourism. Sites developed for recreation should generally be hard wearing with minimal maintenance requirements, strategically placed across the region, based on broader historic community use, and developed to address any site environmental degradation. Before the development of recreation sites, more detailed precinct, master and/or site planning and consultation with local communities will be needed. Changes in recreational development criteria may require adjustments to prioritised recreation planning, sites and activities and the way visitor impacts are managed during the life of the plan. Visitor monitoring will aid decision making on recreation and tourism programs.

Most of Lake Magenta Nature Reserve (Government Gazette No. 90 of 29 August 1969, page 2497; Carter *et al*. 1996) as well as Nangeen Hill Nature Reserve (Government Gazette No. 110 of 18 December 1970, page 3818) were classified as 'prohibited areas' under section 12A of the *Fauna Conservation Act 1950*, and these classifications remain in force under section 62 of the CALM Act. Sizable areas in the eastern Wheatbelt that are more remote (such as Karroun Hill, Jilbadji, Dragon Rocks, Dunn Rock, Lake King, Yellowdine and Lake Magenta nature reserves) may be suitable for classifying as 'wilderness', which may provide unique opportunities for solitude, inspiration and self-reliant recreation.

Tourism routes through the region to the goldfields, south coast and pastoral zones potentially have a major impact on an increasing recreational use and associated environmental disturbance, and visitor access needs to be considered when developing recreation and tourism opportunities for the short-stay user.

Visitor safety

Much of the planning area is relatively remote from emergency services, often difficult to access by emergency vehicles and has variable access to communication networks. The department encourages visitors to use appropriate behaviour while undertaking recreation activities that involve risk. Risks to visitors in the Wheatbelt, such as falling tree limbs, slips, trips and falls, bad weather and health conditions, vehicle accidents, becoming

lost and bushfire, are often present. Many visitor risks can be overcome through attention to personal safety (such as the registration of trip details with friends or family), appropriate maintenance of facilities, and appropriate risk warning information and signage. The department works closely with the State Emergency Service, WA Police, St Johns Ambulance, DFES and local volunteer bush fire brigades in managing visitor risk.

The department manages a pre-determined list of important visitor sites across the Region where it undertakes visitor risk assessments and records risk issues. The department does not systematically undertake visitor risk assessments on all lands it manages where people may visit.

Visual landscape management

The planning area has significant visual landscape values in the major rock outcroppings (granite, laterite and dolerite based), distinctive stands of vegetation especially the inland eucalypt woodlands (such as salmon gums and gimlet) and species-rich heath lands on upper slopes, dramatic displays of seasonal colour (such as spring wildflowers), and lakes, rivers, streams and wetlands (such as Dumbleyung Lake). The modified agricultural landscapes also provide visually pleasing views seen from high vantage points across the region, especially during the winter-spring cropping season.

The visually distinctive bronze-coloured stems of gimlet (*Eucalyptus salubris*). Photo – Paul Blechynden/DBCA

Visitor information, interpretation and education

Natural bushland is an important part of our cultural identity and provides us with a sense of place. For some people, there is an increasing attachment to local places and natural/cultural values. Others may hold a different view not recognising the importance of the conservation of biodiversity because of the disconnection of it from their lives and well-being for a range of reasons (Vanclay 2004, Pannell *et al*. 2006). Developing community understanding of the linkages between human and biodiversity values will result in greater support for conservation, and providing consistent and accurate information, interpretation and education about the values and management of Wheatbelt reserves is important in raising community awareness, appreciation and understanding of the values of Wheatbelt reserves and individual plant and animal species.

The department provides information about conservation reserves in the Wheatbelt Region (such as details of facilities, activities, features, access and regulations) through signage, information bays, printed materials (such as *Managing Your Bushland* [Hussey and Wallace 1993], *Voices of the Bush* [CALM 1988] and *Exploring Granite Outcrops* [McMillan 1989]), electronic media (such as the department's *Explore Parks WA* and *ParkStayWA* websites, and *Trails WA*), department offices and staff, and external sources such as the tourism industry[45].

Barna Mia nocturnal wildlife experience and interpretive centre in Dryandra Woodland is the main interpretive site in the Region and plays an important role in promoting and educating people about wildlife conservation. Many other recreation sites in the Wheatbelt Region also have on-site interpretation or passive activities linked to interpreting the environment. The scarcity of remnant native bushland in the Region provides an opportunity to promote the principle that protection of natural biodiversity is essential to sustain everyone's quality of life. Primary interpretive themes that will be used to guide interpretation within reserves and at recreation sites across the Region include:

- *landscapes* – sustainable land use, catchment management, remnant bushland, and impacts from altered hydrology, invasive plants and animals, inappropriate fire, Phytophthora Dieback and climate change
- *ecology* –wheatbelt woodlands and wetlands
- *biodiversity* – maintenance of biodiversity and ecological processes, threatened plants, animals and ecological communities, appreciating and protecting our biodiversity
- *people* – Aboriginal cultural heritage and early explorers
- *recreation* – sites and activities, and minimal impact recreation.

[45] See australiasgoldenoutback.com/ and tourism.wa.gov.au/.

The Dryandra Woodland's eco-education schools program is the focus for the region's wildlife education program and this includes a range of presentations and organised field activities. Dryandra Woodland's *Barna Mia Wildlife Experience* holds night time walks and talks for the public, informing people about the history of land-use and the impact of foxes on WA's wildlife, and showing people some of the native animals that used to occur in the western wheatbelt. Wheatbelt reserves provide a base for a range of opportunities for education programs and activities for schools. Several education packages are relevant to the Wheatbelt Region including '*Western Shield Action Pack*', '*Growing Plants for Education*', '*Exploring Wheatbelt Woodlands*' and '*Exploring Woodlands with Nyoongars*'. The department's *Bush Ranger* program is also active at several schools. Wheatbelt staff will continue to present wildlife messages as part of an 'in-schools' program where schools invite staff to present topics that meet the school's curriculum.

The *Barna Mia* nocturnal wildlife experience and interpretive centre in Dryandra Woodland. Photo – Marc Simojoki

Management objective: To increase the community's awareness, understanding and appreciation of the natural and cultural environment and its management through the planning and provision of a range of safe and minimal-impact nature-based recreation and tourism opportunities.

Key management challenges

- Monitoring, maintaining and refreshing recreation sites with limited resources.
- Managing expectations that facilities will be developed across a range of sites to support local tourism initiatives.
- Enhancing existing experiences and developing new experiences where funding, environmental, cultural, land category and other considerations may be constrained.
- Promoting biodiversity, conservation reserves and visitor experiences, and ensuring available information is up-to-date.
- Incompatible use of reserves, particularly rock climbing, driving off roads and tracks and on rock outcrops, informal camping and campfires, rubbish dumping and power boats. While power boating is generally infrequent, it requires direct management when it occurs.

Management considerations

- Visitor attractions, experiences and facilities are dispersed across the region, and are often quite remote.
- A more mobile four-wheel drive camping community wish to undertake an 'isolation' experience.
- The department's *Corporate Policy Statement No. 53: Visitor risk management* provides guidance on the management of public risk and the provision of safe and rewarding visitor experiences.
- The department's *Corporate Policy Statement No. 62: Identification and management of wilderness and surrounding areas* provides guidance on identifying and managing wilderness on department-managed lands.

Management strategies

1. In conjunction with other stakeholders where appropriate, provide and maintain a range of recreation opportunities (using Appendix 8 as a guide) consistent with CALM Regulations 2002, department policies, guidelines and standards, adequate protection and maintenance of key values, resources available, ROS principles, recreational development criteria, site capability and the rights and enjoyment of other visitors.
2. Undertake visitor risk assessment of recreation sites and activities, and implement appropriate risk mitigation procedures where necessary.
3. Liaise with tourism organisations and LGAs in the cooperative development and management of recreation sites, particularly those identified in Appendix 8.
4. As needed, gazette classified, restricted or designated areas under section 62 of the CALM Act or regulations 5 and 6 of the CALM Regulations.
5. Encourage community involvement and support in managing recreation and tourism activities in reserves listed in Appendix 8.
6. Encourage major tourism infrastructure off-site as far as is practicable, and focus on the provision of opportunities on lands managed by the department that cannot be catered for elsewhere.
7. Liaise with WA Police and other emergency organisations in the planning and coordination of search, rescue or recovery operations.
8. Undertake visitor monitoring at key sites, and where appropriate use visitor data to minimise impacts and improve management.
9. Consider the sensitivity of, and promote information, interpretation and education products and services to visitors, tourism industry, volunteers, educational

• Visitor access can be directly controlled by classifying specific areas (i) under section 62 of the CALM Act, or (ii) under regulation 5 of the CALM Regulations. • The department aims to provide a range of visitor access, facilities and information at selected sites across the region for recreation, nature and wildlife experiences based on the 'Recreation Opportunity Spectrum' (Clark and Stankey 1979), while limiting unintended incremental development, minimising visitor impacts and being sensitive to changing community values and needs (SRQ 2003).	bodies and commercial operators about primary interpretive themes, values and management issues at key sites, and monitor to ensure they meet standards and customer expectations and needs. 10. Investigate, and based on the results classify, suitable remote areas as wilderness. 11. Identify, sensitively manage and minimise degradation of visual landscape values, particularly along access corridors, tourist destinations, lookout points and prominent natural features consistent with department standards.

16. Visitor access

Gravel access road in Dryandra Woodland. Photo – Paul Roberts/DBCA

Public access to and within reserves in the planning area is primarily by motor vehicle, but also by walking, cycling, horseriding and, when lakes and rivers are full, by boats. Most road access on or through department-managed lands in the Wheatbelt are dedicated (or gazetted) public roads[46], which are separate Crown land road reserves managed by either Main Roads WA (such as Great Eastern, Albany and Great Southern highways) or relevant LGAs. However, the department manages more than 3,100km of roads and tracks in the Wheatbelt, most of which are open to public use and not actively maintained. Some roads and tracks provide access to specific features and sites within reserves, but many provide access for management including bushfires. In some cases, tracks on reserves are used by neighbours for access.

Vehicles leaving defined roads and tracks can cause soil compaction, damage vegetation and spread Phytophthora Dieback and other diseases and weeds. Some sensitive areas include granite outcrops and wetlands where vehicle tracks can severely damage ecosystems and the visual impact is usually long lasting. There are some roads managed by local governments that traverse department-managed lands that are not built on established road reserves. In some cases where access to private property is through reserves, there may be a need to develop management agreements between the LGA, department and the affected landowner to ensure ongoing access and maintenance. Many access roads are of a poor standard and resources to maintain them are limited. Some reserves have access roads into a recreation site, although these are often in substandard condition and have not always been sited in the best location, resulting in detrimental environmental impacts. Access roads and parking areas where they exist will be progressively improved, subject to resources, to minimise environment impacts and ensure safe access for visitors. Roads and tracks that are designated as 'management access only' will be signposted and/or physically closed.

Management objective: To provide and maintain access that facilitates visitor enjoyment and appreciation of, and minimises impacts on, key values.

Key management challenges	Management strategies
• Maintaining roads and tracks managed by the department with limited resources. • Limited control of how many tracks on reserves are used and often their use does not comply with legislation. • An expectation that all reserves will contain maintained tracks for bushfire control purposes.	1. Provide, maintain, monitor and promote the responsible and safe use of road and track access for management and public use, subject to resources, in consultation with relevant stakeholders and consistent with department policies, guidelines and standards, protecting key values, minimising environmental impacts, dieback disease hygiene measures and visual landscape management principles.

[46] Dedicated public roads are defined under the *Land Administration Act 1997* as "land dedicated at common law or reserved, declared or otherwise dedicated under an Act as an alley, bridge, court, lane, road, street, thoroughfare or yard for the passage of pedestrians or vehicles or both".

Management considerations

- The department's *Corporate Policy Statement No. 40: Road management* provides guidance on access management on department-managed lands.
- Occasionally management of reserves may require access to be temporarily, permanently or seasonally closed to the public because of public safety, cultural sensitivity, operational or environmental concerns.
- There may be a need to rationalise internal tracks where they are no longer needed or where they are affecting conservation values.
- Unused and/or inappropriately located Crown road reserves may need to be rationalised in consultation with LGAs and other relevant agencies.
- Liaison with Main Roads WA and LGAs will be important to manage impacts that may arise from road upgrades, including those foreshadowed in 'Roads 2030'.

2. Retain all historic vehicle access to private property through reserves, or where applicable discuss alternate arrangements with landowners.
3. Where necessary, temporarily, permanently or seasonally close roads and tracks subject to approval by the regional manager and appropriate signage, provision of information and conditions of usage.
4. Develop access protocols for sensitive areas of conservation interest.
5. Liaise with Main Roads WA, LGAs, the community and other relevant stakeholders to rationalise or improve the department's road network, ensure that Crown road reserves are best located to protect the natural and landscape values and meet public access needs, to cancel unnecessary or unused road reserves, and to manage impacts that may arise from road upgrades.
6. Where sufficient resources allow, maintain the bushfire access network as described in Appendix 7.

17. Visitor activities

Where possible the department will attempt to manage the impact of people on reserves throughout the region. While the overall impact is generally low, localised long lasting damage is occurring at specific sites where the landforms are fragile. Specific areas of concern are granite outcrops, woodlands, wetlands and salt lakes, and breakaways. Many impacts can be eliminated or minimised through careful site selection, facility placement and universal facility design.

Visitor numbers are increasing and combined with the greater affordability of off-road vehicles there is a trend towards more frequent visitation to specific areas and sites that were previously infrequently visited, and access tracks being created.

The *Ochre Trail* in Dryandra Woodland highlights the Aboriginal heritage of the Dryandra area, and is a popular bushwalk. Photo – Greg Durell/DBCA

The department will continue to promote specific sites across the wheatbelt for people to visit. While there will be some sites not promoted, generally the sites that will be promoted are those that the region can actively manage. In addition, where sites have historical recreation use, provided the activity is passive in nature or infrequent (such as waterskiing) and impact and risks to the public can be managed, it will be allowed.

Bushwalking and cycling

Self-guided walks[47] are provided at Dryandra Woodland (Map 5), Totadgin Conservation Park and several nature reserves including Boyagin, Kokerbin, Toolibin, Pallarup, Buckley's Breakaway, Sandford Rocks, Korrelocking, Durokoppin, Yorkrakine Rock, Gathercole, Billyacatting, Lake Cronin, Wongan Hills (Mt Matilda), Frog Rock and part of Parkeyerring (the Wagin Lakes Trail). The *Mt Matilda walk trail* in Wongan Hills Nature Reserve and the *Woylie Walk* in Dryandra Woodland are two of WA's 'top trails'. Opportunities to develop new and upgrade existing short interpretive walks across several reserves include Tutanning, Dingo Rock and Mt Hampton, and for more remote 'wilderness bushwalking' in Lake Magenta, Dragon Rock, Dunn Rock, Jilbadji and Karroun Hill nature reserves.

There are no existing cycle trails on reserves in the region. Most cycling activity on lands managed by the department in the Wheatbelt Region is confined to Dryandra Woodland where it occurs on existing tracks. However, it is likely that demand and use in the Region will grow given that cycling in natural areas, particularly mountain biking, is increasingly popular.

[47] See *Explore Parks WA* and *Trails WA*.

Day-use sites

Park information shelter at the entrance to Dryandra Woodland. Photo – Paul Roberts/DBCA

Day use sites scattered across department-managed lands in the Wheatbelt (Map 5, Appendix 8) provide opportunities for picnicking and barbecuing, as well as a range of other activities such as nature appreciation, lookouts, interpretation and bushwalking. There are also many other informal places that have been used by local communities for many years, and some sites may not be the best place to have facilities because of the environmental sensitivity/impacts or other factors. The development or upgrading of day-use sites across the Wheatbelt will generally focus on sites in Appendix 8, unless issues of visitor risk, environmental impacts, social benefit, equity, public demand or potential economic benefit at specific sites require prioritisation. Due to the remoteness of many sites, the department encourages local communities and visitors to respect day-use sites, facilities and other visitors, report damage and provide feedback on the condition of sites/facilities. Sites will generally only be developed or upgraded with LGA and local community support, including a preparedness to help with the maintenance and management of sites. The department encourages visitors to bring portable gas stoves, and gas barbecues may be considered for installation if they can be serviced by the local community.

Domestic animals

Many visitors enjoy experiencing natural areas with their domestic animals such as dogs and horses (*Equus caballus*). However, domestic animals are not allowed in nature reserves and are not usually allowed in national parks or conservation parks, except guide dogs and dogs needed for emergency search and rescue and management purposes, and where 'designated areas' for dogs or horses may be provided under the CALM Regulations (where environmental and social impacts can be managed and kept to acceptable limits). Several reserves are baited for the control of foxes and feral cats, and dogs are susceptible to taking poisoned fox baits. Opportunities for domestic animals are generally restricted to land managed by other authorities, including horseriding on gazetted public roads that traverse lands managed by the department.

It is recognised that many travellers through the region, especially retirees on drive around holidays, take domestic pets with them, especially dogs. The department will consider this requirement and may allow this activity to occur at specific sites, which may require the vesting of some reserves to be changed.

Nature appreciation

Nature appreciation includes activities such as photography, wildlife-watching, wildflower viewing and picnicking, and in the Wheatbelt Region local people mainly use reserves for these purposes, although there is increasing intrastate, interstate and international visitation. In many instances reserves are the only patches of sizeable bush left in an area, and are important as places where local people can not only learn about the bush but also develop and maintain an emotional and spiritual attachment to the natural landscape. The *Barna Mia* wildlife experience in Dryandra Woodland provides visitors with a wildlife viewing experience in a controlled, semi-natural environment. The wildflower and orchid season from July to December is becoming increasingly popular and usually coincides with local area wildflower displays and other promotions aimed at increasing numbers of tourists into the region. Several wildflower drive trails weave through parts of the Wheatbelt Region including the *Wave Rock Wildflower Trail* and the *Granite Loop Wildflower Trail*.

Scenic driving and motorised recreation

Most visitors to the Wheatbelt Region are self-drive tourists (Central Wheatbelt Visitor Centre Working Group 2009). In the Wheatbelt, drive trails can be (i) a way to get to a particular destination (such as *Pathways to Wave Rock Trail*), (ii) alternative routes to a major highway (such as *Pioneers Pathway*[48] and *Golden Pipeline Heritage Trail*), or (iii) attractions in themselves (such as the *Holland Track*). Drive trails on department-

[48] See trailswa.com.au/trails/pioneers-pathway and australiasgoldenoutback.com/outback-australia-drive-routes/Outback_self-drive_routes/Pioneers_Pathway_Self_Drive_three_days.

managed lands in the Wheatbelt Region are generally limited because of the small size of most reserves, but include the 23km audio drive trail within Dryandra Woodland (DEC 2011) as well as recreation sites that form part of regional drive trails (such as Totadgin Conservation Park on the *Golden Pipeline* drive trail).

Visitor accommodation

Formal opportunities for overnight accommodation and camping in the Wheatbelt Region are generally limited by the small size or remoteness of many reserves, and the occurrence of sensitive environments. However, there are accommodation opportunities within Dryandra Woodland at the Lions Dryandra Woodland Village[49], Congelin campground and the *Gnaala Mia* campground. The development of camping areas, particularly basic camping for remote four-wheel driving on department-managed reserves in eastern parts of the region, may be considered in some areas (Appendix 8), including where unauthorised camping already occurs on reserves.

Camping at Dryandra Woodland's *Gnaala Mia* campground. Photo – Kevin Smith/DBCA

Water-based recreation

Few opportunities exist for water-based recreation because of the lack of permanent water in the Region. However, after significant rainfall, lakes can fill and provide opportunities for boating, waterskiing, canoeing and swimming. Some dams occur on department-managed lands, such as Congelin and Old Mill dams in Dryandra Woodland. Recreational fishing is limited by water quality and reliability.

Waterskiing occurs, or is known to have occurred[50], in several waterbodies in the Region (Appendix 9). Some sites are formally gazetted as boating areas, but many are not. The generally long duration between high rainfall events that leads to extensive catchment flows does limit opportunities. For example, Dumbleyung Lake has experienced a partial or near fill event in 1983, 2006 and 2017. The department understands the value to local communities when lake fill events occur that can lead to water-based recreation. High speed/freestyle boating activity such as jet boats, PWCs and waterskiing is not legally allowed on nature reserves, but does occur. To allow these activities will require 'pre-existing arrangements or agreements', gazettal of the lake under the Navigable Waters Regulations 1958, and the permission of the Commission. Even where recreation is included in the reserve purpose, these activities are inconsistent with the intent or purposes of nature reserves. If waterskiing is to continue on nature reserves, a change to the reserve category may be needed to accommodate active recreation and formal gazettal as a waterskiing area. In areas that are not nature reserves, the CALM Regulations provide powers for the operation, safe navigation, launching, beaching and retrieving of vessels (regulations 61 to 64) and the ability to restrict such activities in certain areas (regulation 5). Those gazetted areas in Appendix 9 on CALM Act lands are approved under this plan for waterskiing.

Waterskiing at Dumbleyung Lake. Photo – Greg Durell/DBCA

In many cases, the lack of sufficient water depth restricts the department's capacity to consider approving areas where historic power boating has occurred.

[49] See dryandravillage.org.au/ and parks.dpaw.wa.gov.au/site/lions-dryandra-woodland-village .

[50] Not all of these waterbodies would be expected to have water suitable for waterskiing at any one time. For some lakes, conditions may be suitable as infrequently as once a decade.

Management objective: To provide a range of sustainable recreation opportunities that minimise environmental impacts while maximising social and economic benefits to local communities.

Key management challenges

- Prioritising the development and maintenance of recreation sites across the region.
- Managing recreation sites that are remote from work centres and major towns.
- The occurrence of boating activities and rock climbing on some nature reserves contrary to current legislation.

Management considerations

- The department's *Corporate Policy Statement No. 18: Recreation, tourism and visitor services* provides guidance on visitor activities in the planning area.
- Boating activities are often infrequent and rely on significant rainfall events.
- The operation and watercraft safety of all boating activities is subject to the *Shipping and Pilotage Act 1967*, and the Navigable Waters Regulations 1958 and the Shipping and Pilotage (Mooring Control Areas) Regulations 1983.
- The Department of Transport (DoT) controls all boating activities and operational safety, and consequently the use of a water body for waterskiing requires the water body to be approved by the DoT as well as the authority managing the water body.
- Recreational fishing is managed in accordance with the *Fish Resources Management Act 1994* and associated regulations.
- Visitor activities, where allowed, need to be mindful of the natural and cultural significance of areas.

Management strategies

1. Provide, maintain and manage a range of safe recreation sites and opportunities that meet people's needs consistent with department policies and guidelines, Appendices 8 and 9, adequate protection of key values, recreational development criteria, site capability, design standards, the rights and enjoyment of other visitors, and in consultation with LGAs, local communities and other key stakeholders.
2. Monitor the impacts of, and demand for, recreational activities, and manage activities in liaison with users where impacts become significant or unacceptable.
3. Consider and where appropriate designate areas under the CALM Regulations through gazettal or by signage, subject to strategy 1 above.
4. Consider changing the land category of reserves on a case-by-case basis to allow for higher-impact recreation activities such as horseriding, waterskiing or camping, subject to strategy 1.
5. Work with the community to find alternative waterskiing areas close to existing nature reserve sites where waterskiing occurs.
6. Not allow waterskiing on water bodies in nature reserves, particularly where disturbance to threatened species or communities is likely or other waterskiing opportunities exist close by. Continue to allow if there is a pre-existing agreement or arrangement in place and the area for waterskiing is gazetted.
7. Establish camp sites using Appendix 8 as a guide.
8. Allow overnight remote camping at designated areas on CALM Act lands consistent with department policy and guidelines and the principles of this management plan.
9. Not allow open fires and campfires (ground fires or fires in containers) on conservation reserves, except where lawful authority is given, customary activity applies or fire rings are provided for public use.
10. Work with LGAs to identify, develop and promote travel routes and drive trails across the region that link sites listed in Appendix 8 with other sites not directly managed by the department.

18. Commercial operations and tourism

Dryandra Woodland is one of the Wheatbelt Region's key tourist attractions, and provides a focus for development and supply of a forest/woodland, wildlife, wildflower and heritage day-trip and overnight tourism product that is central to the Wheatbelt Region and can link in with other tourism attractions such as Wave Rock.

There is one lease in the Wheatbelt Region for recreation or tourism purposes (for Dryandra Woodland Village), and there are 58 operators that are licensed to conduct a range of activities in reserves, although the number of operators that run tours or activities in the area may be much less. There is an increasing desire for Aboriginal people to develop skills and conduct commercially-based cultural tourism on some culturally significant areas throughout the Wheatbelt Region.

Management objective: To support commercial operations that help to advance the community's understanding of, and commitment to, biodiversity conservation while minimising environmental impacts.

Key management challenge

- Increasing wildlife and Aboriginal cultural tourism opportunities that are environmentally, culturally and commercially appropriate and sustainable.

Management considerations

- Commercial concessions can help meet the rising demand for high quality recreation and tourism opportunities, facilities and services, while ensuring that financial contributions help meet the costs of managing the resource.
- The department's *Commercial Operator Handbook* provides guidance on approval of and conditions for commercial operations.
- The department's *Corporate Policy Statement No. 8: Negotiating commercial development and activities* provides guidance on negotiating commercial development and activities on department-managed lands and when to apply a competitive selection process.
- The department's *Corporate Policy Statement No. 55: Commercial filming* provides guidance on commercial filming.
- The department's *Corporate Policy Statement No. 68: Management of events and organised group activities on CALM land* provides guidance on managing commercial and non-commercial activities, events and functions involving organised groups on CALM Act lands.
- Commercial operations need to be consistent with the purpose of the reserve on which they are carried out.

Management strategies

1. Evaluate, grant proposals for, and manage licences, commercial tourism leases and events consistent with department policy and guidelines, the purpose of parks or reserves, and the protection of values.
2. Ensure all commercial operations operate under a lease, licence or permit agreement with appropriate conditions.
3. Investigate opportunities for partnerships with commercial operators to provide built accommodation and camping within the planning area as required.
4. Liaise with commercial operators to provide new information, encourage 'feedback', advise on management and visitor controls, and share knowledge of safety and rescue procedures.
5. Monitor the level and impact of operator use to ensure it is sustainable, including compliance with licence and lease conditions.
6. Review licence and lease conditions to include requirements, where deemed necessary, to provide information to enable impact assessment of the tourism activity and monitor compliance with general conditions.
7. Seek sources of potential income (commercial opportunities, sponsorship, merchandising and product development, and concessions).
8. Foster and develop commercial and non-commercial Aboriginal cultural tours with Gnaala Karla Boodja at Dryandra Woodland and where appropriate other potential sites with other Aboriginal groups.
9. Work with the Western Australian Indigenous Tourism Operators Council to foster future Aboriginal culturally-based tourism activities.
10. Encourage the establishment of regional-based or local tourism industries that provide visitor experiences based on wildlife appreciation.

19. Involving the community

Strategic objective

To consider the needs and values of others, particularly the many neighbours that adjoin Wheatbelt reserves.

Community involvement and partnerships are an integral part of the department's operations, and help promote community awareness, appreciation and support for the protection and conservation of the State's biodiversity and natural and cultural values.

Public participation and involvement opportunities

Ongoing community involvement and support from neighbours, Aboriginal people, visitors, volunteers, tour operators and other community stakeholders is essential for the successful implementation of this management plan. The department encourages public participation through volunteer activities and the formation of community groups. The CALM Act provides for public participation in the preparation of area management plans (sections 57-59) and proposals for compatible operations (section 33A[3]).

Volunteer activities increase the department's work capabilities and skills base, as well as fostering communication links and understanding within the community. People, through their work, gain a better sense of appreciating nature and are likely to value it more. Many volunteers contribute to a wide range of management activities, and play a particularly crucial role in the recovery of threatened species, building or maintaining infrastructure, and looking after visitors. Local people are increasingly interested in using and being involved in management of reserves close to country towns, such as the Wongan Hills Tourist Promotion Association interest in upgrading facilities at Mount Matilda.

Establishing community groups brings together people that share a common interest, and wish to learn more about the natural environment and contribute actively to its management. While there are no formal 'Friends of' groups, smaller informal interest groups occur in the region. The small population size and the scattered nature of people across the region means that it is often difficult to organise people into formal groups. Notwithstanding this, there is potential and good efficiency incentives to develop community support groups that can help with managing, maintaining or monitoring reserves and recreational facilities, promoting the values of reserves through education, and helping fauna and flora conservation programs.

Off-reserve management and partnerships

Off-reserve management

The management of landscape-scale pressures is a critical issue for conserving the State's biodiversity and natural assets. The pressures caused by clearing such as altered hydrology and the inability of plants and animals to move and exchange genes due to habitat fragmentation has resulted and will continue to result in declining ecosystems and species, and some species may face extinction.

A catchment approach to managing key biodiverse areas has been adopted by the Wheatbelt Region where it is appropriate to do so. This aims to limit the impacts of landscape-scale pressures where there is a high level of valued assets. Off-reserve conservation and work on other lands not directly managed by the department is and will continue to be a key strategy in specified areas where catchment-scale biodiversity management is undertaken or planned into the future. Therefore, working cooperatively with other land owners is essential.

The long-held concern about salinity and land degradation in the Wheatbelt has generated interest in and support for the management and protection of remnant vegetation, revegetation and other landcare activities (Wallace 1995, Moore and Renton 2002, Smith 2008, Macgregor and Janicke 2011). However, degradation of private and Crown land is still occurring. While altered hydrology at a landscape scale may have reached equilibrium in specific landscapes (Raper *et al*. 2014), at a finer scale the impacts of rising saline water tables, increased inundation and subsequent erosion is still occurring. The trend by land managers is to attempt to bring new technologies into agricultural practices that aims towards sustainability. Inclusive of this aim is often a desire by landowners to protect and conserve the little remaining remnant bushland that exists on farms.

Many remnant ecosystems and populations that may not be adequately conserved in the conservation reserve system may occur on private land, and maintaining these landscapes and their biodiversity can complement the reserve system and be particularly important (Steffen *et al*. 2009). Many remaining freshwater wetlands are on private lands and most private remnants in good condition are of high conservation value, which are important components of biodiversity conservation in the Wheatbelt (Keighery 2006).

While many landholders have been independently and actively involved in NRM activities (Smith 2008), some have sought help in the protection of remnant vegetation using covenants (Macgregor and Janicke 2011), particularly as one of the major barriers to protecting remnant vegetation is the economic cost associated with conservation management (Lockwood *et al*. 2000). A range of biodiversity incentive programs help people conserve biodiversity or undertake conservation work on other lands. Many properties in the Wheatbelt Region are covered by covenant and voluntary management schemes (Table 2), including programs that are managed by the department such as *Land for Wildlife* and *Nature Conservation Covenants*.

Table 2. The extent of biodiversity incentive programs in the Wheatbelt Region.

	Land for Wildlife (department)	*Nature Conservation Covenants* (department)	*Soil and Land Conservation Act Covenant* (DPIRD)	*Covenanting Program* (National Trust WA)
No. of sites	1,510	125	603	80
Area (ha)	150,528	7,824	295,925	n/a

Many landholders have also established vegetated buffers around remnants and corridors connecting remnants that provide a range of environmental, economic and social benefits. The department has been working with farmers in selected priority landscapes for more than 20 years in Wongan Hills, Tarin Rock and the Toolibin Lake and Lake Bryde catchments. While the end objective may be different in individual areas, the aim is to increase the quality and quantity of native vegetation, to improve sustainability and reduce threatening processes.

Liaison and partnerships

Close working relations and partnerships provide important mutual benefits to the department and those that the department partners with, and help achieve land management and biodiversity objectives. The department liaises on a regular basis with many stakeholders within and external to the Wheatbelt Region, including the relevant Australian department administering the EPBC Act concerning matters of national environmental significance, State Government agencies that have specific responsibilities such as declared invasive species (DPIRD), bushfire (DFES), mining (DMIRS) and water resources (DWER), and local governments. Liaison with LGAs is particularly important given:

- LGAs broadly represent the views of local communities within their constituencies
- LGAs can encourage planning and land management practices that complement management of the reserves through a range of planning instruments
- the department maintains working arrangements with LGAs, local bush fire brigades and volunteers to provide cooperative and coordinated firefighting that can deal successfully with the full range of fire emergencies on or near department-managed lands and can achieve complementary fire management on nearby lands
- LGAs share responsibilities in the provision and maintenance of the public road network, and often Crown lands are the source of gravel deposits.

The department also liaises and partners with five NRM catchment councils (Section 8 *Hydrology*) and more than 100 conservation landcare groups, Aboriginal groups, community organisations, universities, volunteers, visitors and reserve neighbours. Department officers also regularly provide advice on a range of extension topics and issues such as revegetation practices.

Management of cross-boundary issues

Management objectives for this plan cannot be achieved in isolation as various land tenures (for example, private property, reserves vested with LGAs, UCL and other Crown reserves) adjoin department-managed lands. Key management issues such as invasive plants and animals, water quality and quantity, threatened species and bushfire need to be approached from the broader integrated land management perspective to achieve management objectives. Neighbours are encouraged to manage adjacent land in a way that is sympathetic with, and complementary to, management of reserves such as low grazing pressures, native pastures, leaving dead trees and fallen timber, reduced pesticide and fertiliser use, maintenance of paddock trees, and preservation of creeks and wetlands. Ongoing liaison with neighbours, local communities, conservation organisations and agencies will aim to facilitate the effective, coordinated management of cross-boundary issues and minimise adverse impacts on key values. Principles for effective neighbour relations, outlined in the department's *Corporate Policy Statement No. 65: Good neighbour policy*, are important for and will be fostered through the development of partnerships with the community.

The department may enter into a memorandum of understanding or partnerships with other agencies, LGAs, industry groups, or resource users, which expands the department's possible sphere of influence onto lands otherwise not under its control.

Liaison with neighbours and organisations will be important in implementing recovery actions for some threatened species (such as malleefowl and cockatoos) that are mobile and can travel across tenures in search of suitable habitat, particularly in increasing awareness about their conservation status and to provide information on actions that landholders can undertake to help in recovery.

The department will continue to build upon its existing broadscale biodiversity conservation management framework, called '*Stepping Stones*', in consultation with interested groups. This framework aims to increase at a landscape scale the combined coordinated effort for wildlife conservation, sustainable developments, including tourism and cultural protection across the wheatbelt landscape using pre-determined wildlife conservation assets.

Management objective: To facilitate and promote ongoing and effective involvement and support of, and liaison and partnership with, communities and stakeholders in the management of reserves to increase peoples' understanding of the natural environment and its connection to their own lives.	
Key management challenges	**Management strategies**

- Communicating with the community, and fostering and attracting community involvement to help the department in managing reserves.
- Maintaining good relationships and networks, which is essential for effective reserve management.
- Countering perceptions in the community that salinity is now a non-issue and everything has been done for landcare.
- Establishing a volunteer network throughout a vast and generally underpopulated region.

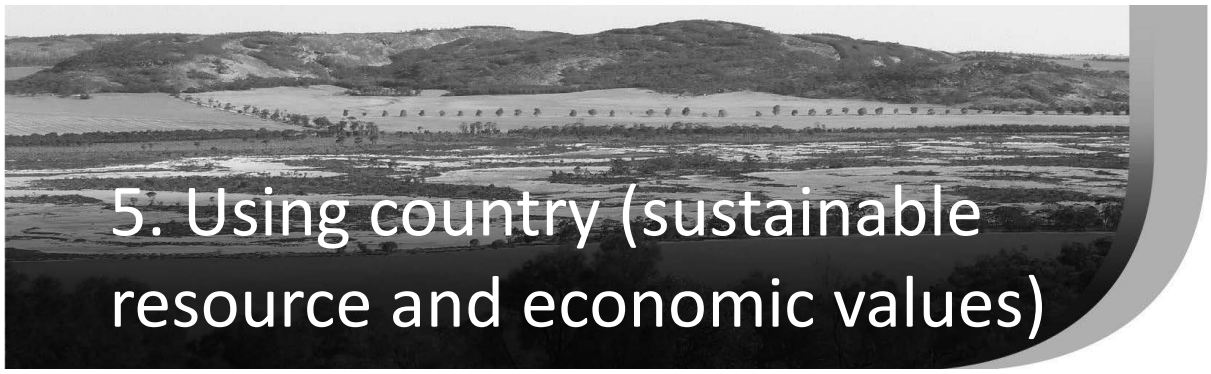
Management considerations

- Volunteers need to have meaningful work and be recognised and rewarded to ensure continued motivation.
- Volunteer groups are small and scattered across a large area. The general reduction of people from wheatbelt communities is diminishing opportunities to establish volunteer networks to help in conservation works.
- The department's *Corporate Policy Statement No. 15: Volunteers and community involvement* provides guidance on encouraging and facilitating voluntary activity.
- The department's *Corporate Policy Statement: Public participation and stakeholder engagement* provides guidance on undertaking and providing opportunities for public participation and stakeholder engagement.
- The department's *Corporate Policy Statement No. 65: Good neighbour policy* provides guidance on building and maintaining good relations with neighbours, and the way in which the department addresses common cross-boundary issues.

1. Support, promote and provide opportunities for public participation and community involvement in reserve and other management within the planning area, particularly in flora and fauna recovery, and helping with visitor services at key recreation sites.
2. Maintain records of the number of registered volunteers and the amount of volunteer hours contributed.
3. Liaise with, encourage and engage neighbours, LGAs, agencies, organisations, industry and other stakeholders to reduce pressures on natural values by facilitating off-reserve conservation and the effective, coordinated management of cross-boundary issues consistent with department policy.
4. Maximise the efficiency and effectiveness of communication and liaison with the public, including appropriate monitoring and staff training, modifying different communication techniques where necessary.
5. Facilitate community involvement through advisory and 'Friends of' groups, and support for volunteer involvement in department programs.
6. Increase the area of land under protection by encouraging landowners to fence off remnant vegetation on their properties.
7. Increase the effective size of reserves by helping landowners to re-establish vegetation next to reserves, including plantings of commercially prospective species and for biodiversity conservation.
8. Identify and promote the use of camp hosts.

Key performance indicator

Recovery and voluntary management programs	
Performance measure	Catchment-scale management teams led by the region comprise community representatives including private landowners and volunteers
Target	Private landowner and volunteer community representation
Reporting	Every five years



5. Using country (sustainable resource and economic values)

Strategic objective

To allow for sustainable resource use.

20. Mineral and petroleum exploration and development

The Wheatbelt Region has known mineral deposits and widespread potential for a range of minerals such as gold, iron ore, gypsum and clays, nickel, tin/tantalum/lithium, copper/lead/zinc and uranium, and has been (and continues to be) subject to mineral exploration and development. Most mining tenements (mostly exploration tenements, but also mining leases, prospecting and other tenements) are located on the western and eastern fringes of the Region, and while there are 149 live and 148 pending tenements, the number and the status of these tenements will change with time[51]. Gold mining and exploration activity is focused in the Shire of Yilgarn in areas associated with the greenstone belt, which extends north and south of Southern Cross, although almost all gold mining in the Region is restricted to UCL.

Gypsum mining has the potential for significant impact on department-managed lands in the Region. Gypsum deposits throughout the Wheatbelt are associated with salt lakes within paleo-drainage channels. Even though gypsum is a relatively low dollar-value mineral, it has several important industrial and agricultural uses (Jones 1995). In the Wheatbelt gypsum is deposited in several forms including crystal gypsum (found in lake beds) and gypsite and seed gypsum (which can occur on the surface of dry lakes and in adjacent dunes). The mining of dunes is of most concern because dune systems act as refuges for flora and fauna, and provide for exchange of genetic material between isolated populations. The flora also exhibits a high level of endemism within individual paleo-drainage channels. This, and the linear nature of many department-managed reserves, may place some species at risk from mining operations.

Most requirements for basic raw materials (BRM), such as gravel and sand, in the planning area are from LGAs, Main Roads WA or the department for use on roads, recreation sites and other purposes. BRM should be preferentially sourced from outside conservation reserves. When this is not feasible, BRM can be sourced from within the planning area for use within the boundary of the reserve (or adjacent conservation reserve) the material is extracted from.

There are 22 sites on department-managed lands in the Wheatbelt Region that have been listed as contaminated sites under the *Contaminated Sites Act 2003*, subject to Contaminated Sites Regulations 2006. These include 13 sites that are awaiting classification, eight sites that are possibly contaminated (which need more investigation) and one site that has been found to be not contaminated.

Management objective: To minimise the impact of mineral and petroleum exploration and development, including BRM extraction, on key values.	
Key management challenges	**Management strategies**
• Ensuring that mineral exploration and developments are assessed and managed in recognition of wildlife, land and other key values. • Limited ability to respond to multiple exploration licenses during 'boom' times. • Lack of resources to plan and implement contaminated site restoration.	1. Manage mineral exploration and development activities and proposals consistent with government, department and Commission policies and guidelines. 2. Review and provide advice on the effect of exploration or development proposals on the conservation values of reserves, and seek to avoid or minimise these impacts.

[51] See DMIRS's GeoVIEW.WA online database.

Management considerations	
• Much of the management of mineral and petroleum exploration and development in the region is undertaken by department specialist branches with the help of regional staff. • Legislation provides a process for industry to apply for access to undertake mining and petroleum exploration and development in reserves. Access to reserves should not be assumed, and all applications for access and development proposals will be considered on a case-by-case basis. • BRM should be sourced from outside conservation reserves. • The department's *Corporate Policy Statement No. 4: Environmental offsets* provides guidance on contributing to the development and implementation of environmental offsets. • The Commission's *Position Statement No. 3: Mining in lands vested in the Conservation Commission of Western Australia* and *Position Statement No. 12: Basic Raw Materials: State Government and local government access to lands vested in the Conservation Commission under the CALM Act* provide guidance on mining activities and access to BRM.	3. Refer or recommend referral of exploration or development proposals with the potential to impact significantly on the values of reserves to DWER for consideration of assessment under the Environmental Protection Act. 4. Advise exploration or development proponents of their legal obligation to refer proposals that could have a significant impact on conservation values that are matters of national significance to the Australian Government Minister for the Environment for assessment under the EPBC Act. 5. Liaise with DMIRS in their monitoring of existing exploration and/or development activities within and next to the planning area, and request they take any necessary action where conditions are breached. 6. Provide advice to industry and decision-makers aimed at ensuring that resource development proponents and operators in the planning area are required to appropriately identify the impacts of their proposals on the conservation values of the planning area and suitably address, mitigate and offset the impacts of approved developments and activities during project implementation as appropriate. 7. Seek to ensure that all mineral exploration and development activities adhere to department weed and disease hygiene practices. 8. Monitor rehabilitation agreements according to conditions of approval, and department rehabilitation standards and guidelines. 9. Identify, assess, rehabilitate and monitor contaminated sites, subject to available resources.

21. Use of plants and animals

Forest products

Although the responsibility for harvesting and sale of forest products and establishing and managing commercial tree crops rests with the Forest Products Commission (FPC), the department has forest management responsibilities and for specific purposes in selected zones promotes the establishment of woody perennial plant crops on a broadscale for biodiversity conservation benefits in combating the impacts of land degradation including altered hydrology, fragmentation and wind erosion. The native timber industry in the Wheatbelt is small scale producing minor forest produce such as firewood from the Dryandra Woodland brown mallet plantations and private property. There is good potential for future uses of brown mallet if a small sawlog industry could be based on the brown mallet timber resource at Dryandra.

Brown mallet plantations

During the 20th century, brown mallet harvested from Dryandra Woodland (State forests 51, 52 and 53) supported the brown mallet bark industry and several other local industries, including a tool handle manufacturer who produced about 100,000 handles each year, a small industry for the treatment and supply of treated fencing materials and licensed operators who cut firewood and fencing materials (Paton 1988). Naturally occurring brown mallet was heavily exploited, and in Dryandra plantations of brown mallet were established between 1926 and 1962, which now cover 8,316ha (about 30 per cent of Dryandra). Of this area, 3,430ha contains good quality brown mallet stands, 2,812ha are more open brown mallet stands with a limited range of understorey species, and brown mallet establishment failed for the remaining 2,074ha. The failed areas now carry mixed vegetation including areas of wandoo, powderbark wandoo (*Eucalyptus accedens*), rock sheoak, heath and communities associated with rock outcrops.

Brown mallet plantation in Dryandra Woodland. Photo – Paul Roberts/DBCA

Supply of brown mallet timber has been in decline for at least five years. The FPC is investigating the 'mood' of the market for brown mallet products up to 2,000 tonnes per year, including sawn product, tool handles and firewood.

The aims for brown mallet production are to continue to allow for industry to take up any sustainable opportunity to use the resource and, in time, progressively regenerate good quality stands back to brown mallet and return poorer areas of brown mallet to natural vegetation communities (Table 3). If new markets for brown mallet are established, the intent is to complement the existing brown mallet resource with the development of plantations on private land.

This management plan provides for the harvesting of plantation brown mallet from Dryandra Woodland. All brown mallet plantations are proposed to be retained as State forest.

Under the *Forest Products Act 2000* (Forest Products Act), the FPC is responsible for establishing and maintaining plantations of forest products on public land. Section 58A of the Forest Products Act provides that plantation product contracts can only be entered into by the FPC when the quantities and kinds of plantation products and the location of the plantation products proposed to be managed, harvested or sold under the plantation product contract are in accordance with the provisions of the relevant management plan. An FPC plantation product contract cannot be entered into for a term exceeding 10 years or renewed or extended beyond 10 years from the date of commencement of the original term, except with the concurrence of the CALM Act Minister (Minister for Environment). Consequently, once this management plan has been gazetted, FPC may be able to issue plantation product contracts for 10 or more years, or renew or extend these contracts, under the Forest Products Act for the commercial harvesting of plantation brown mallet for the life of the plan. Plantation product contracts are required to be in accordance with the provisions of the management plan as if the management plan were of effect for all of the term of the plantation product contract, or the renewed or extended term.

This management plan complements the *Forest Management Plan 2014-2023* (FMP) (Conservation Commission 2013) where it relates to Dryandra. Should there be a conflict between this plan and the FMP, this management plan will take priority.

Table 3. Mallet plantation management in Dryandra Woodland.

First rotation	Second rotation	Third rotation*
'Poor quality' brown mallet (about 3,500ha)		
Harvest stands for brown mallet products, then convert to natural vegetation (2,100ha). If regeneration consists of dense brown mallet stands, commercially thin or use prescribed fire to determine community composition. Re-establish 1,400ha of 'poor quality' brown mallet for second rotation.	Harvest stands for brown mallet products, then convert to natural vegetation, or third rotation if second rotation re-establishment was successful (1,400ha).	
'Good quality' brown mallet (about 4,800ha)		
Commercially harvest 'good quality' brown mallet and re-establish plantations. Research during first rotation: • silvicultural requirements of brown mallet to maximise yields • properties and uses of brown mallet • techniques for commercial brown mallet (and other species) establishment and silviculture on private property.	Commercially harvest and convert about 1,300ha to natural vegetation. If regeneration consists of dense brown mallet stands, commercially thin or use prescribed fire to determine forest composition.	
	Commercially harvest 2,000ha and re-establish brown mallet for third rotation.	Commercially harvest 2,000ha and review the need to regenerate to natural vegetation. If regeneration consists of dense brown mallet, commercially thin.
	Commercially harvest and re-establish a 200ha brown mallet plantation to demonstrate silvicultural management necessary to produce range of products and benefits.	Maintain demonstration plantation.
	Help with broadscale establishment of brown mallet or other species on private land.	Increasing proportion of brown mallet on private land.

* = the need for third or more rotations is to be determined on the success or otherwise of the proposed rotations stated above.

Firewood collection

In the Wheatbelt Region, approved public firewood collection is only allowed from Dryandra Woodland's brown mallet plantations under the conditions of a fee payable permit issued by the department, although other firewood collection areas may occur in nearby parts of the Perth Hills and South West. Commercial firewood operations are managed through contracts administered by the FPC. Firewood collection is not permitted on conservation reserves, except for Customary Activities purposes. However, unlawful removal of firewood from department-managed lands does occur, particularly on reserves close to or within town sites, and this can lead to damage or loss of vegetation cover and habitat integrity, soil compaction, and the spreading of plant diseases. The lack of available firewood resources near Wheatbelt towns is an ongoing issue. The department will continue to monitor and manage firewood collection impacts on department-managed lands, and will focus on education and encouraging communities to develop or provide alternative supply or energy alternatives where firewood is mostly depleted.

Woody perennial plants

Several minor timber species in Dryandra and across the Wheatbelt are likely to have been cut in the past, including wandoo, powderbark wandoo, sandalwood, rock sheoak, jarrah (*Eucalyptus marginata*), marri (*Corymbia calophylla*), flooded gum (*E. rudis*), York gum and jam or *mangart* (*Acacia acuminata*), and commercial interest remains in some of these species. The department pioneered, through the *Salinity Action*

Plan, the development of potential commercial woody perennial native plants in combating altered hydrology. Since 1931, research and demonstration sites and seed orchards have been established throughout the Wheatbelt (particularly in Dryandra and the Toolibin Lake and Lake Bryde catchments) as demonstration areas for possible future development and investigations into commercial tree crops including sandalwood (Appendix 1). Woody perennial plants can provide additional economic options to farmers in markets such as native foods, floriculture, pharmaceutical products, wattle species for specialised pulp and tannin production, eucalyptus oil, wood for solid and liquid fuel and specialty timbers, as well as commercial tree crops of blue gums in high rainfall areas, maritime pine (*Pinus pinaster*) in medium rainfall areas, and sandalwood, brown mallet, rock sheoak and oil mallees[52] in low rainfall areas. Significant work has been done on researching profitable and productive ways of incorporating woody perennial plants into farms in the low rainfall zone of southern Australia.

Oil mallees, which have been widely planted across the Wheatbelt, not only have multiple environmental benefits such as reduction of water-logging and groundwater recharge, shelter and protection for crops, livestock and soils, and protection for biodiversity and infrastructure, but also potentially multiple economic co-benefits[53] such as eucalyptus oil production, biomass production and bioenergy, charcoal and activated carbon, composite wood products and carbon sequestration. Oil mallees were promoted as an alternative farming option in the Wheatbelt by several agencies and organisations including the FPC and the Oil Mallee Association.

While natural stands of sandalwood were once common in the Wheatbelt before agricultural clearing, harvesting is now mainly confined to the rangelands, although the illegal taking of sandalwood still occurs on some reserves in the region. The highly valued sandalwood is the most planted commercial tree crop on agricultural land in the Wheatbelt, where more than 15,000ha of plantations will reduce the harvesting pressure on natural stands and increase the resource base and long-term viability of the industry. The department is working with the FPC to address the recommendations of the 2014 Parliamentary inquiry into the sandalwood industry in WA and implement the *Native Sandalwood Industry Strategy*.

Sandalwood (*Santalum spicatum*) still occurs on many reserves throughout the region. Photo – Greg Durell/DBCA

Forest produce

Forest produce may be taken in accordance with licences issued under section 99A(1) of the CALM Act for (i) use for therapeutic, scientific or horticultural purposes, (ii) essential works, and (iii) the taking or removal of exotic trees, honey, beeswax or pollen (by apiary site permit). Under section 33(1)(cb) of the CALM Act, forest produce[54] obtained through the carrying out of necessary or compatible operations[55] can be used for the purpose of making improvements to the land, where it is consistent with the reserve purpose. Forest produce obtained in this manner may be used by the department for management purposes.

Wildflowers and other native plants

Commercial picking of native plants is not permitted in conservation reserves, and the cut flower trade in the Wheatbelt Region is minimal because of the limited floral resource available. However, there is potential for increased production in the commercial wildflower trade by establishing flower resources on private property

[52] Oil mallee is a collective term to describe native mallee eucalyptus tree species with high leaf oil content. *Eucalyptus loxophleba* subsp. *lissophloia*, *E. kochii* subsp. *plenissima* and *E. kochii* subsp. *borealis* make up 80 per cent of established plantings in the Wheatbelt.

[53] See oilmallee.org.au/industry-development.htm.

[54] Forest produce includes trees, parts of trees, timber, sawdust, chips, firewood, charcoal, gum, kino, resin, sap, honey, seed, bees-wax, rocks, stone and soil as per section 3 of the CALM Act.

[55] Section 33(3)(b) of the CALM Act provides for management of lands where there is no statutory management plan according to necessary operations (for nature reserves) or compatible operations (for national parks and conservation parks).

(which the department encourages) that could reduce pressure on the existing native flora resource, contribute to the management of altered hydrology, and increase biodiversity conservation values. Although not directly related to the wildflower industry, the establishment of species suitable for brushwood fencing is a good example. The collection of native seed is the main flora harvesting activity in the Wheatbelt Region, where community groups, farmers, mining companies and nurseries use native seed for revegetation, rehabilitation and propagation projects.

There are some sites in the Wheatbelt Region where didgeridoo harvesting has been undertaken illegally and unsustainably. The department manages the didgeridoo industry in WA through licensing requirements for the harvesting of didgeridoos from private property and Crown land.

Native animals

Under the Biodiversity Conservation Act, the department is responsible for the regulation of commercial gain associated with protected fauna in WA on all private property and Crown lands. The department administers the taking, farming, killing, processing, transport and sale of fauna, including the commercial harvesting of kangaroos and emus, and the keeping and breeding of birds (aviculture), reptiles and amphibians as a hobby, in accordance with appropriate licences. These licences allow for the taking of all but Declared Rare Fauna for which a special permit is needed. In some cases, 'open season' areas apply across parts of the Region, particularly in relation to the control of western grey kangaroos and other animals.

Beekeeping

There are more than 570 apiary sites in the Wheatbelt Region, mostly on UCL, pastoral leases and unvested reserves in the north and eastern parts of the region. Of these, 116 sites are on department-managed lands, including 55 sites in Dryandra Woodland where brown mallet is a major source of honey.

Management objective: To facilitate the sustainable use of native plants and animals, provide a brown mallet timber resource, and promote the value and widespread adoption of local native species in sustainable farming.

Key management challenges

- Managing the sustainable use of authorised resources in the Wheatbelt.
- Ensuring that any use of native plants and animals does not adversely affect key values.
- Continuing to provide information on and promote perennial crops for biodiversity.
- There is a need for research into the conversion from brown mallet back to natural vegetation stands.

Management considerations

- This plan provides the broad framework for the timber industry at Dryandra. However, operational and technical details will be developed if new products and markets are established.
- The department's *Corporate Policy Statement No. 11: Regulation of the forest products industry* provides guidance on the regulation of the establishment, growing and harvesting of forest products from native forests and plantations on State forest and timber reserves, and Crown freehold (department interest) lands in the Wheatbelt region.
- The use of brown mallet plantations by native vertebrate animals is influenced by the age of the plantation, the amount of regrowth other than brown mallet and the inclusion of natural vegetation isolates or rocky outcrops (Ninox 1991). Older brown mallet stands with regrowth wandoo and powderbark wandoo, support a greater diversity than young, uniform stands.
- The department's *Corporate Policy Statement No. 37: Management of wildlife utilisation* provides guidance

Management strategies

1. Manage the taking and public or commercial use of plants and animals in accordance with relevant legislation, policies and guidelines, and licensing systems.
2. Support FPC to enter into plantation product contracts for terms exceeding 10 years, or extending or renewing plantation product contracts, for the harvesting and supply of up to 2,000 tonnes per year of brown mallet from the plantations within Dryandra Woodland, subject to Minister for Environment concurrence, the life of the plan and in accordance with section 58A of the Forest Products Act.
3. Produce a harvesting and regeneration plan for the brown mallet plantations at Dryandra Woodland for production, regeneration of mallet or conversion back to natural vegetation.
4. Support research with the aims of increasing the timber yield and quality of brown mallet, and determining the properties and uses of brown mallet.
5. Liaise with FPC for the development of other timber products.
6. Ensure that timber harvesting operations are conducted in accordance with the department's Visual Landscape Management guidelines to reduce aesthetic impacts.
7. Allow the taking or removal of forest produce, with conditions if necessary, in accordance with a licence issued by the Director General for (i) removal of exotic plants, (ii) removal for therapeutic, scientific or horticultural purposes, (iii) essential works, and (iv)

on the management of all harvesting, commercial exploitation and other significant human exploitation or interference of fauna and flora managed by the department under the Biodiversity Conservation Act and the CALM Act (excluding the harvesting of timber under a production contract issued in accordance with the Forest Products Act). This includes flora harvesting, kangaroo harvesting, keeping pet reptiles, amphibians and birds, and use of flora and fauna for scientific purposes. • The taking of native flora is subject to provisions under the Biodiversity Conservation Act, and the department is responsible for administering the taking and sale of flora in accordance with (i) Commercial Purposes Licence, (ii) Commercial Producers (and nurseryman) Licence, or (iii) Scientific or Other Prescribed Purposes Licence. • The FPC is responsible for the commercial harvesting, regeneration, marketing and development of the sandalwood industry, both in plantations and natural resource areas throughout the State. • Firewood collection on Crown land is only allowed under a *Commercial Purposes Licence* (under the Biodiversity Conservation Act) with the manager's permission, or from gazetted 'public firewood areas' in State forest and timber reserves. • The department's *Corporate Policy Statement No. 41: Beekeeping on Crown land* provides guidance on the management of beekeeping on Crown land including conservation reserves. All apiary sites on Crown land in WA require a permit from the department.	salvage from areas used for exploration or mining activities. 8. Manage apiary sites and beekeeping on department-managed lands in accordance with department policy and guidelines, including undertaking an apiary site assessment (Appendix 10). 9. Prevent harvesting of wildflowers on conservation reserves. 10. Encourage and promote the use of private property for beekeeping, the propagation of native flora for wildflower picking, and the planting of potentially commercial tree crop species such as oil mallees, brown mallet, sandalwood and maritime pine. 11. Provide support and advice on the use and integration of tree crops on farmland in key focal areas. 12. Liaise with key stakeholders and relevant community groups in key focal areas to ensure the most efficient use of resources/sites and minimal impact upon department-managed lands and other land users. 13. Monitor operations to ensure compliance with licensing conditions, and where necessary make recommendations on management according to impact on natural values.

22. Other resource use

Water resources

The Kent and Warren river water reserves are the only public drinking water source areas (PDWSAs) that cover lands (or parts of lands) managed by the department within the Wheatbelt Region (Map 3), and none of these PDWSAs have Drinking Water Source Protection Reports (which establish the level of protection needed within PDWSAs). DWER and Water Corporation may need access to PDWSAs to conduct investigations into alternate water supplies, for surveillance and enforcement, asset maintenance and water monitoring.

Proponents seeking to extract water from the planning area need a licence from DWER. To be licensed, the proponent would need approval from the land manager to access the land for extracting water. The department may, after consultation with the Commission and with approval from the Minister for Environment, issue a permit for this to occur. Where infrastructure is needed, a lease may also be issued.

There are several department-managed reserves in the region that have some historical use and infrastructure for the local supply of water. Water collection, storage and extraction still occurs on many reserves throughout the Wheatbelt Region, particularly those areas that are considered strategic for drought proofing and are considered by the community to be important public assets. Many water sources are strategically used in bushfire suppression, such as Congelin Dam and Old Mill Dam in Dryandra Woodland.

Other public utilities and services

Public utilities provide essential community needs but can have serious visual impacts and cause permanent loss of natural values. Utilities and services potentially impacting lands and waters managed by the department include powerlines, roads, radio and telecommunication cables and towers, buildings, water infrastructure, borefields and drainage systems. There are four organisations including WA Police and DFES that have telecommunication leases for facilities located on department-managed lands in the Wheatbelt Region.

Some areas in the Wheatbelt Region have been used for training by various organisations including some sections of the defence forces, and while natural areas are sought-after for group training and school groups, the department needs to consider other factors such as dieback disease and over-use.

Management objective: To minimise the impact of other resource use on the natural environment, and appropriately rehabilitate and/or restore disturbances from resource use.

Key management challenge

- Ensuring that any existing and proposed utilities, services and other proposed resource use do not adversely affect key values.

Management considerations

- Proposals for utilities and services should be subject to physical, biological, social and visual considerations, and wherever possible should be located outside existing or proposed conservation reserves.
- The responsibility for the regulation, protection and management of water resources on reserves rests with DWER, Water Corporation and the department.
- Drinking water sources and their catchments are protected by proclaiming areas under the *Country Areas Water Supply Act 1947*[56], and these PDWSAs may have constraints placed on land use, development, public access and land/water-based activities.
- Extraction of water will be in accordance with relevant legislative provisions.
- The Commission's *Position Statement No. 11: The protection of surface and groundwater biodiversity values of lands vested in the Conservation Commission of Western Australia* provides guidance on proposals to take water.
- The department's *Corporate Policy Statement No. 54: Defence force training activities* provides guidance on training by defence forces and the conditions they may operate under.

Management strategies

1. Manage resource use sustainably and to minimise impact on department-managed lands in accordance with relevant legislation, policies and guidelines.
2. Assess the potential impact from new or upgrading of existing resource use proposals, provide conditional approval, and refer proposals to DWER where appropriate.
3. Minimise the impact of utilities, infrastructure or services by:
   - reviewing existing services, and where no serious problems occur, allowing them to remain
   - amending utility corridors to fit actual alignment of utilities
   - avoiding the placement of new and relocated facilities and services within reserves
   - where necessary, relocating facilities, rescheduling of operations to existing utility corridors or sites with minimal impact, or encouraging alternative low-impact methods of providing services
   - allowing sharing of sites and facilities only with approved Government agencies, LGAs and essential emergency services, and where the reliability and effectiveness of the department's communication will not be impeded, ensuring that all users share the costs of joint facilities on an equitable basis
   - accommodating requests for the placement of temporary radio masts, subject to Strategy 2
   - removing infrastructure (except if the department considers it to have other value) and rehabilitating the site if utilities and services are no longer required
   - where there is no other viable alternative, excise land containing utility and service infrastructure, and either reserve these areas as CALM Act section 5(1)(h) reserves or vest in another appropriate authority.
4. Issue and administer leases and permits for utilities and services in accordance with the CALM Act, and ensure permits for the extraction of water are consistent with the objectives of this plan.
5. Liaise with resource users, agencies and other relevant stakeholders and monitor activities to ensure that the operation and maintenance of services comply with conditions of approval and minimise impacts on key values including the responsible management of fire, weeds, introduced animals and disease.
6. Maintain water sources for bushfire suppression and domestic water supply at priority sites as resources allow.
7. Develop and implement rehabilitation programs for degraded areas where work is yet to be undertaken.

[56] Water resources management legislation in WA is under review and may change during the life of this plan.

7. Understanding country (research, monitoring and performance assessment)

Strategic objective

To increase understanding of the values and management issues of Wheatbelt reserves, and gain knowledge to guide, adapt and improve management.

Progress towards achieving the objectives and targets is demonstrated by periodic monitoring[57] and performance assessment[58] to investigate the effectiveness of management strategies and identify opportunities for improvement. Adaptive management is the subsequent revision of management strategies based on the monitoring information and its evaluation.

23. Research and monitoring

Research and monitoring are essential components of management, which can lead to a better understanding of values, aid in performance assessment against the objectives of the management plan and provide a scientific basis for improving and adapting future management to achieve best practices. Pure wildlife and social science will be led by department specialist branches, and operational investigations may be undertaken by the Region in an adaptive management framework.

Monitoring vegetation within Tutanning Nature Reserve. Photo – Deanna Rasmussen/DBCA

The planning area is, and will continue to be, an important focus for ecological research given (i) the presence of many threatened plants, animals and ecological communities, (ii) the *Return To Dryandra* program and wildlife enclosures at Dryandra Woodland, (iii) many key reserves, landscapes and catchments that provide habitat and refuge such as Dryandra Woodland, Tutanning, Boyagin, Batalling, Dongolocking, Mt Caroline, Dragon Rocks and Lake Magenta nature reserves, and (iv) the extent and impact of pressures. Direction for research and monitoring in the planning area is provided by the department's *Science and conservation strategic plan* and *research activity reports*, recovery plans, wildlife management plans and recovery teams. Major projects that will continue during the life of this plan include:

- biodiversity and climate change – granite outcrops as refuges for flora, and climate-resilient vegetation of multi-use landscapes (Boyagin Nature Reserve is a Terrestrial Ecosystem Research Network site)
- fauna recovery and introduced predator control at Dryandra Woodland and other sites as part of *Western Shield*
- threatened flora conservation
- *SWWMP*, and advancing the hydrological understanding of key Wheatbelt catchments and wetlands
- fire management – fire, fragmentation, senescence, weeds and the conservation of plant diversity in Wheatbelt reserves, and fire regimes and impacts in transitional woodlands and shrublands

[57] Monitoring refers to ongoing and systematic collection and analysis of routine quantitative data and qualitative information used by management to determine progress on the implementation of activities, achievement of objectives and use of resources, and allows for adjustments and improvements to be made.

[58] Performance assessment refers to the evaluation and reporting of management practices and outcomes to systematically investigate the effectiveness of management activities.

- sociological research – to determine community attitudes towards conservation, identify methods for managing human usage, identify ways of communicating the importance and value of biodiversity, and monitoring visitor use, expectations, perceptions and preferences to determine the effectiveness of the plan's implementation, including the appropriateness of programs, site improvements and other activities.

24. Performance assessment

The Commission and other joint responsible bodies have responsibility for assessing the implementation and success of this plan in accordance with section 19(1)(g)(iii) of the CALM Act. A set of key performance indicators (KPIs), or other mechanisms as appropriate, will be used to assess this plan. KPIs have been identified for selected values and management issues throughout the plan, are linked to objectives and strategies, and reflect the highest conservation and management priorities of the Commission and the department. Any sustained change (such as a continuous decrease or increase) or breach of set limits will trigger the need for investigation to determine the cause of that change and therefore the requirement for, and type of, management intervention. The department will provide information to enable an assessment of the plan's implementation, and a portfolio of evidence (such as quantitative data, imagery that shows whether spatial and temporal changes have occurred, surveys, investigation records or other written documents) will be maintained showing those areas where the plan is being successful and those where changes are needed.

Management objective: To increase knowledge and understanding of the Wheatbelt Region's key values and pressures to inform and improve management and allow assessment of the management plan's KPIs.

Key management challenges

- Addressing knowledge gaps and improving baseline information on natural values and the human-induced pressures on them.
- Ensuring research findings contribute to improved management outcomes.
- Integrating traditional ecological knowledge and contemporary scientific knowledge and research methods, and ensuring research is carried out in a culturally appropriate manner.
- Increasing need to undertake research in a resource deficient environment.

Management considerations

- Partnerships and collaborations with others are important to help address resource constraints and knowledge gaps.
- The department's *Corporate Policy Statement No. 28: Science* provides guidance on all scientific research, monitoring and communication undertaken within or on behalf of the department.
- The Commission's *Position Statement No. 9: Criteria for developing key performance indicators for management plans prepared under the CALM Act* and *Position Statement No. 10: Monitoring strategy for assessing the implementation of management plans prepared under the CALM Act* provide guidance on setting performance criteria and monitoring the implementation of management plans.
- Proposals involving the care and use of animals for scientific purposes must be referred to the Animal Ethics Committee for endorsement under the *Animal Welfare Act 2002*, and be consistent with the *Australian code for the care and use of animals for scientific purposes* and the department's standard field operating procedures.

Management strategies

1. Support, encourage, record and where necessary undertake survey, research and monitoring, consistent with department policies, guidelines, resources, priorities and the protection of values, that facilitates management, establishes baseline information, and contributes directly to department objectives or the implementation and assessment of this management plan, and adapt future management where appropriate.
2. Apply a permit system for research proposals from outside the department that specify conditions under which work may be carried out, that adverse impacts on key values are minimised, and that results are to be disseminated.
3. Continue monitoring the recovery of the Toolibin Lake Ramsar wetland system's ecological character, and other wetlands where appropriate.
4. Undertake social research and monitoring where appropriate, consistent with the department's social research program.

References

Many of the following references are either available on the internet or are publicly available (or can be requested) through the department's Library at Kensington. Policies of the department and position statements of the Commission, particularly those referenced in this management plan, are available on the respective websites at dpaw.wa.gov.au/about-us/36-policies-and-legislation and conservation.wa.gov.au/publications/position-statement.

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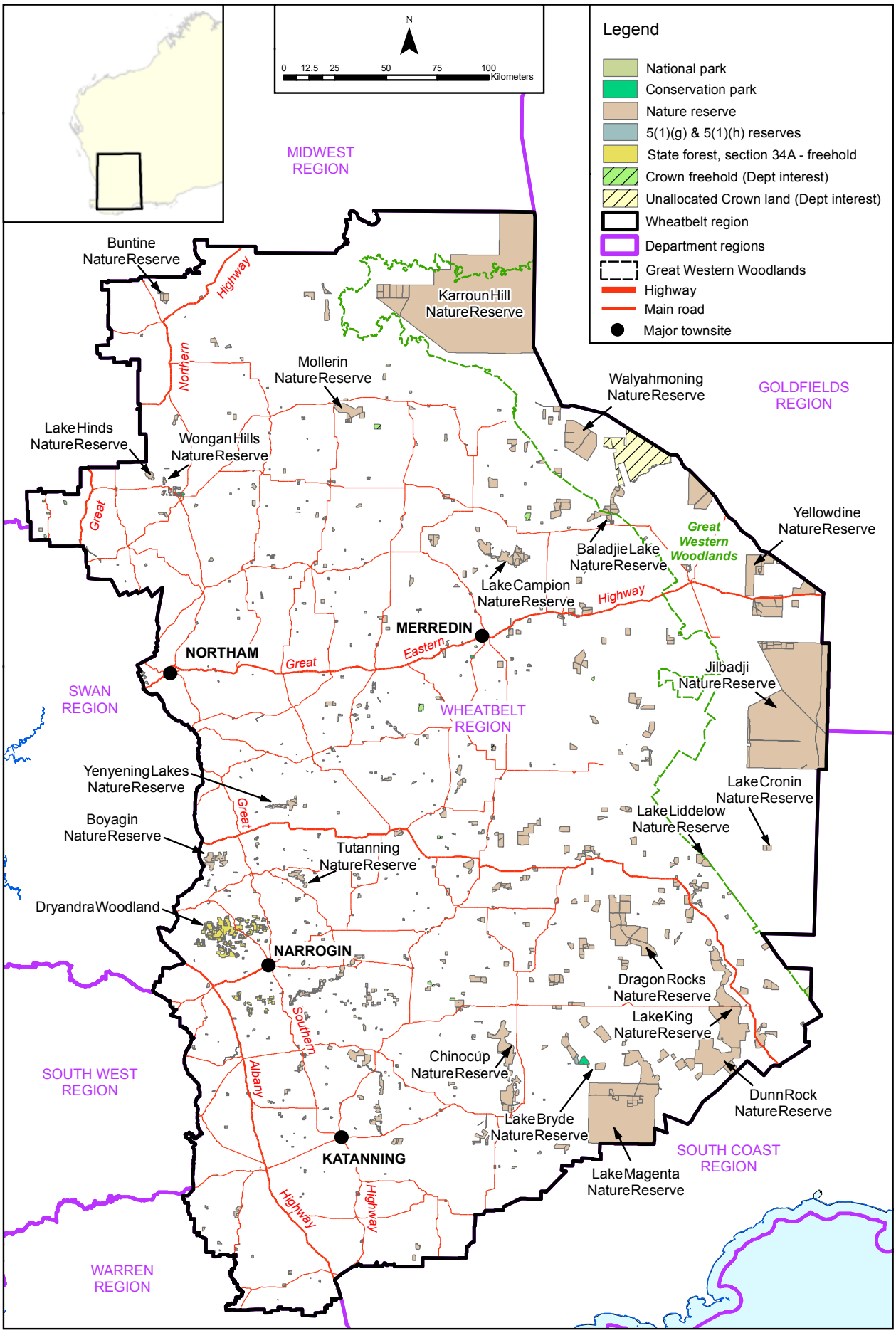
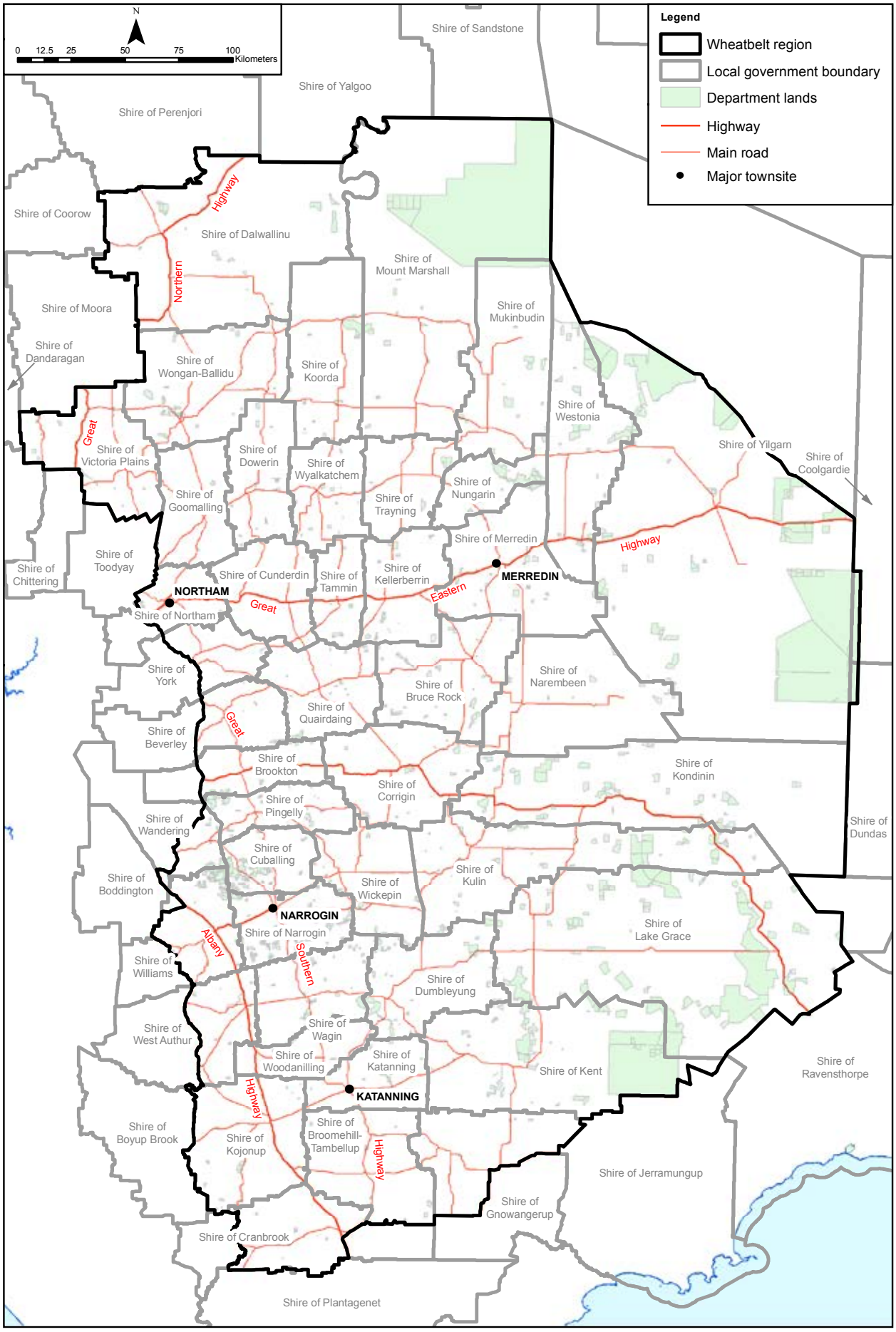
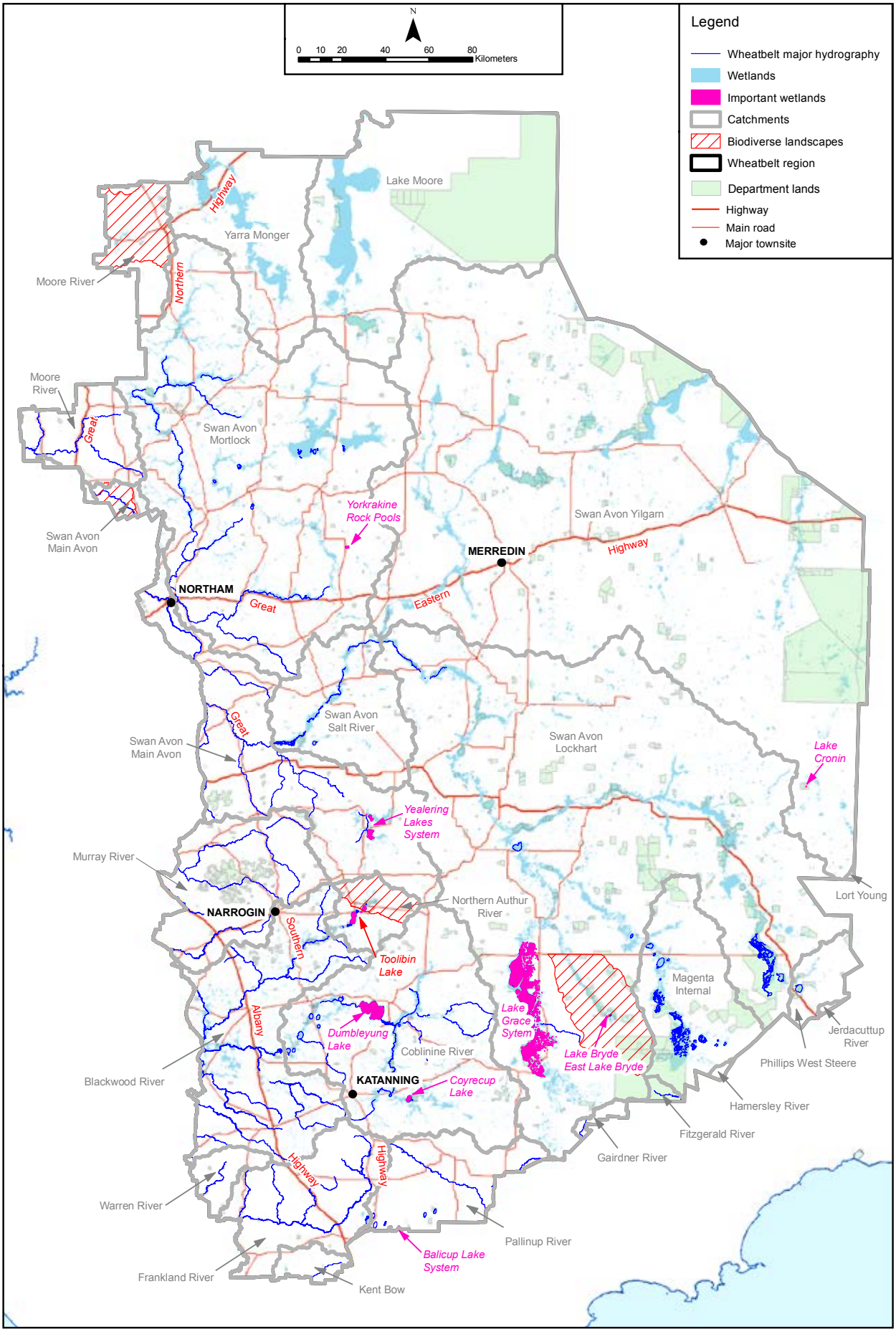
Map 1. The Wheatbelt Region – location and tenure



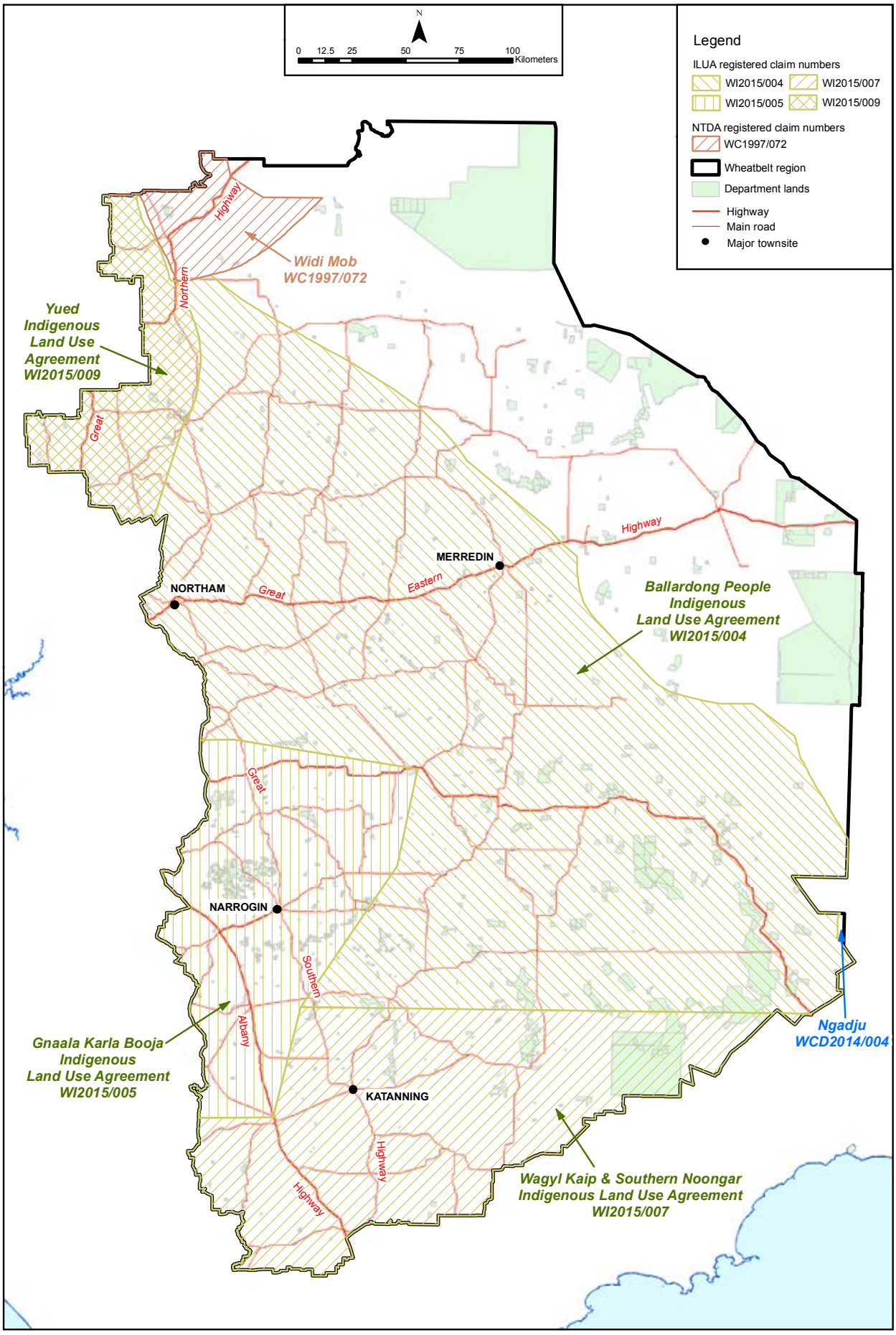
Map 2. Local government authorities



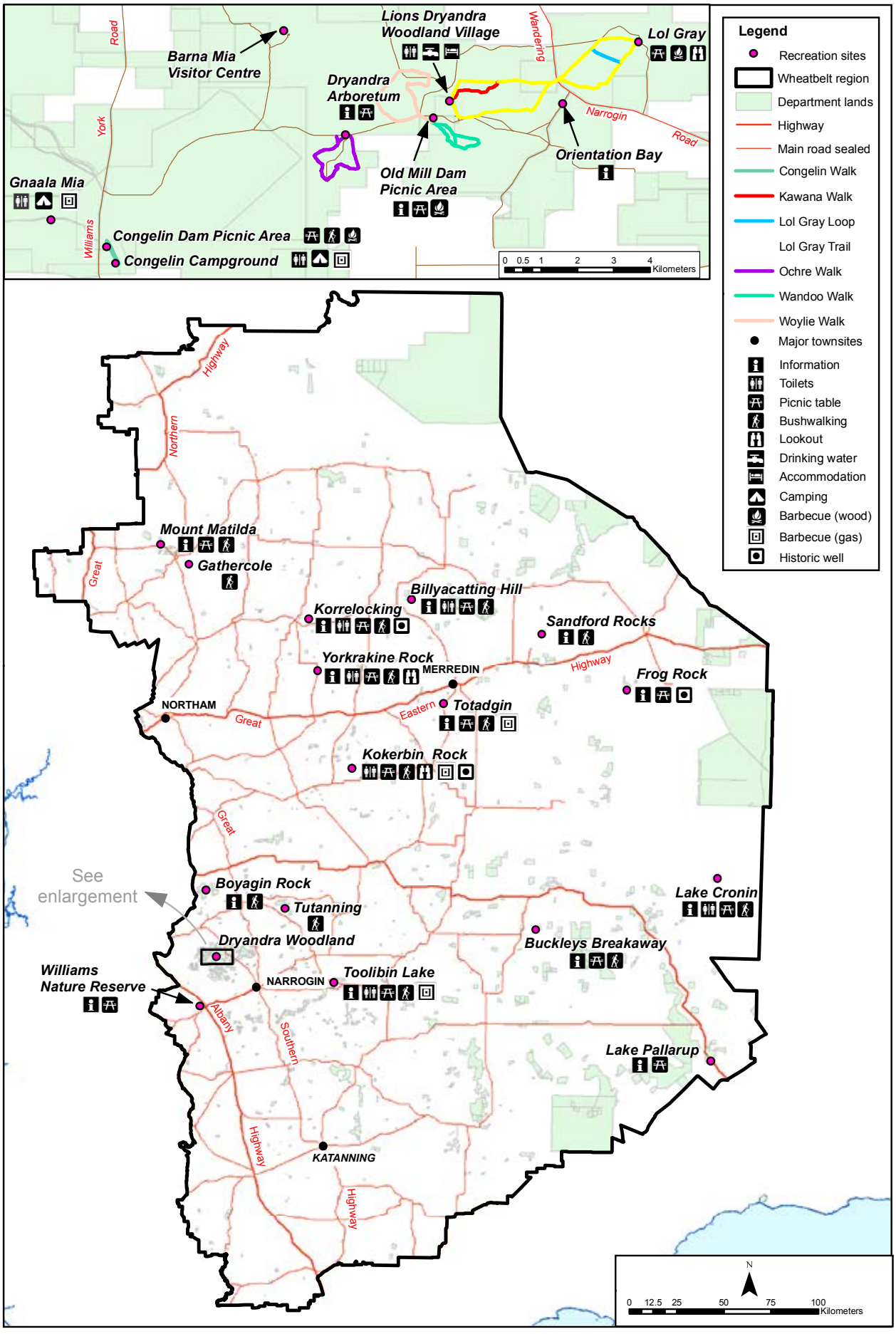
Map 3. Hydrological features



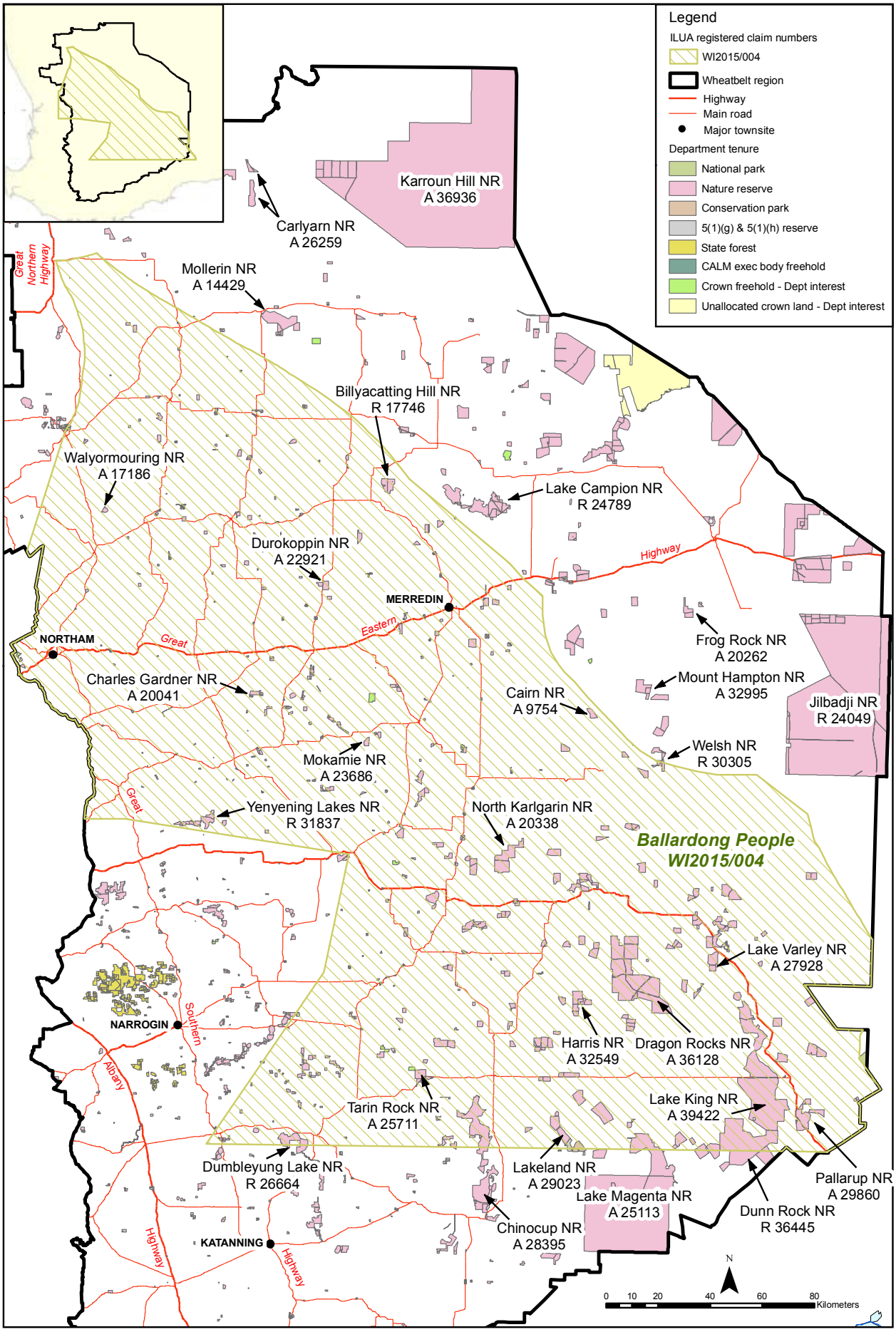
Map 4. Native title claims in the Wheatbelt Region



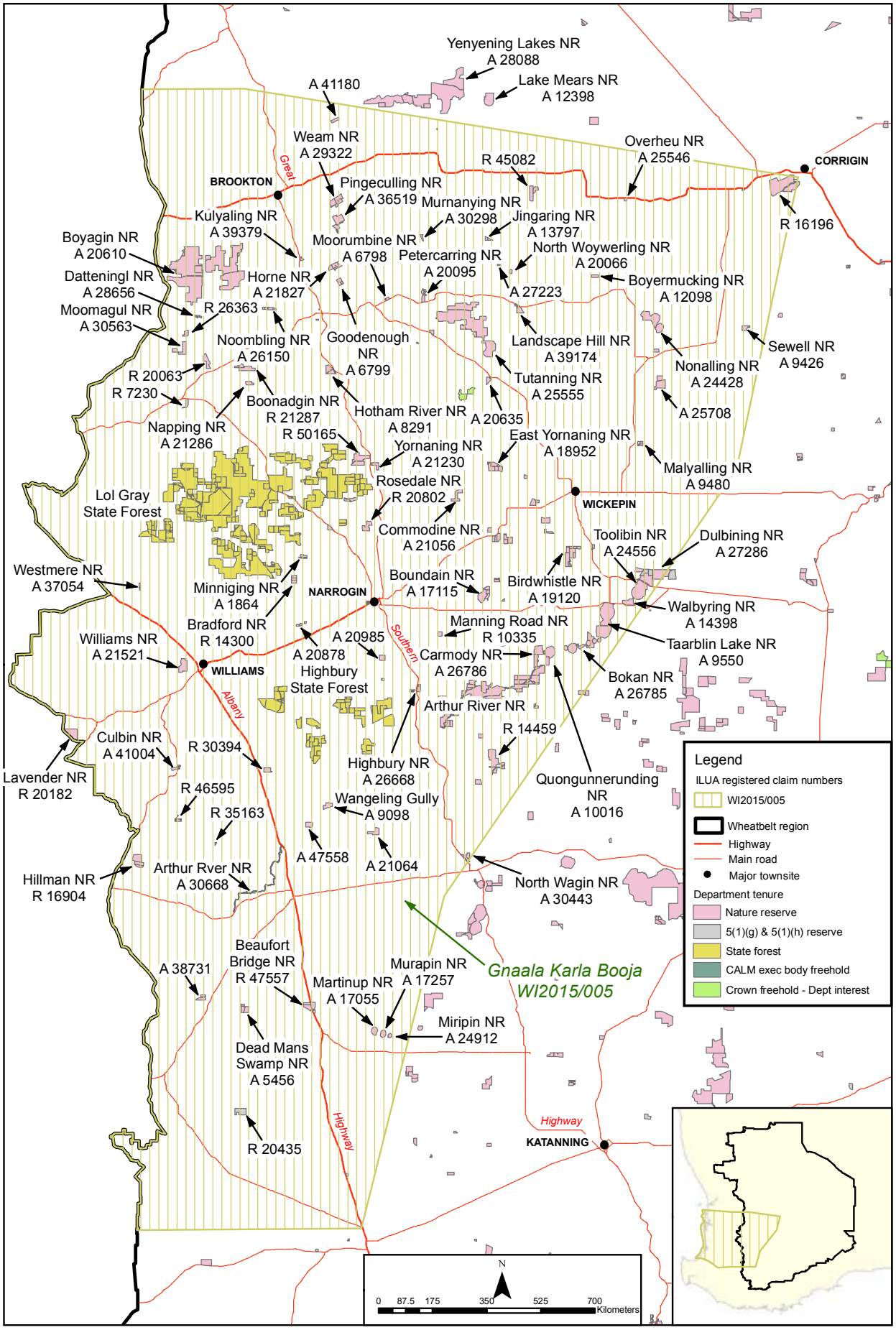
Map 5. Recreation sites on Wheatbelt reserves



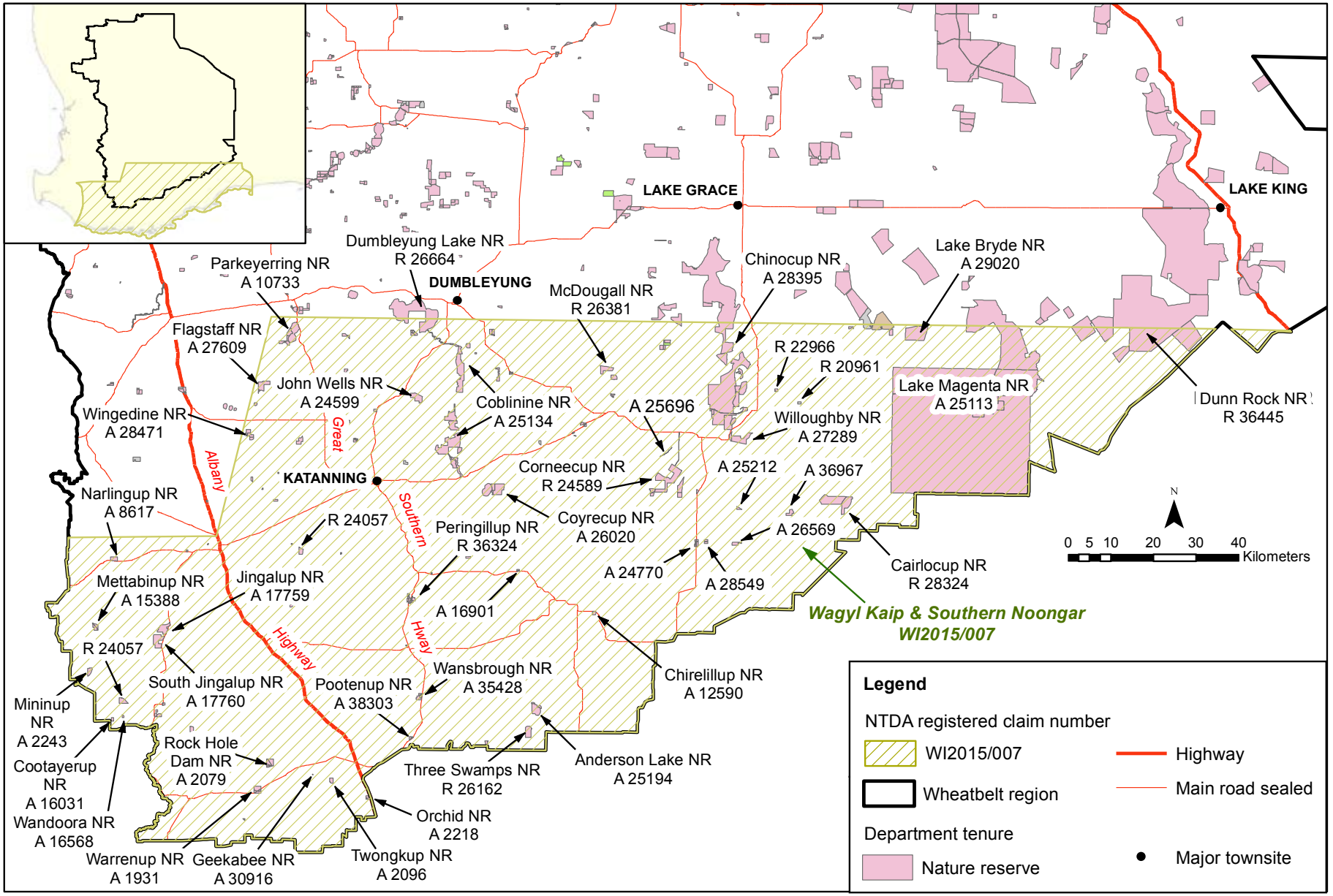
Map 6. Ballardong native title claim



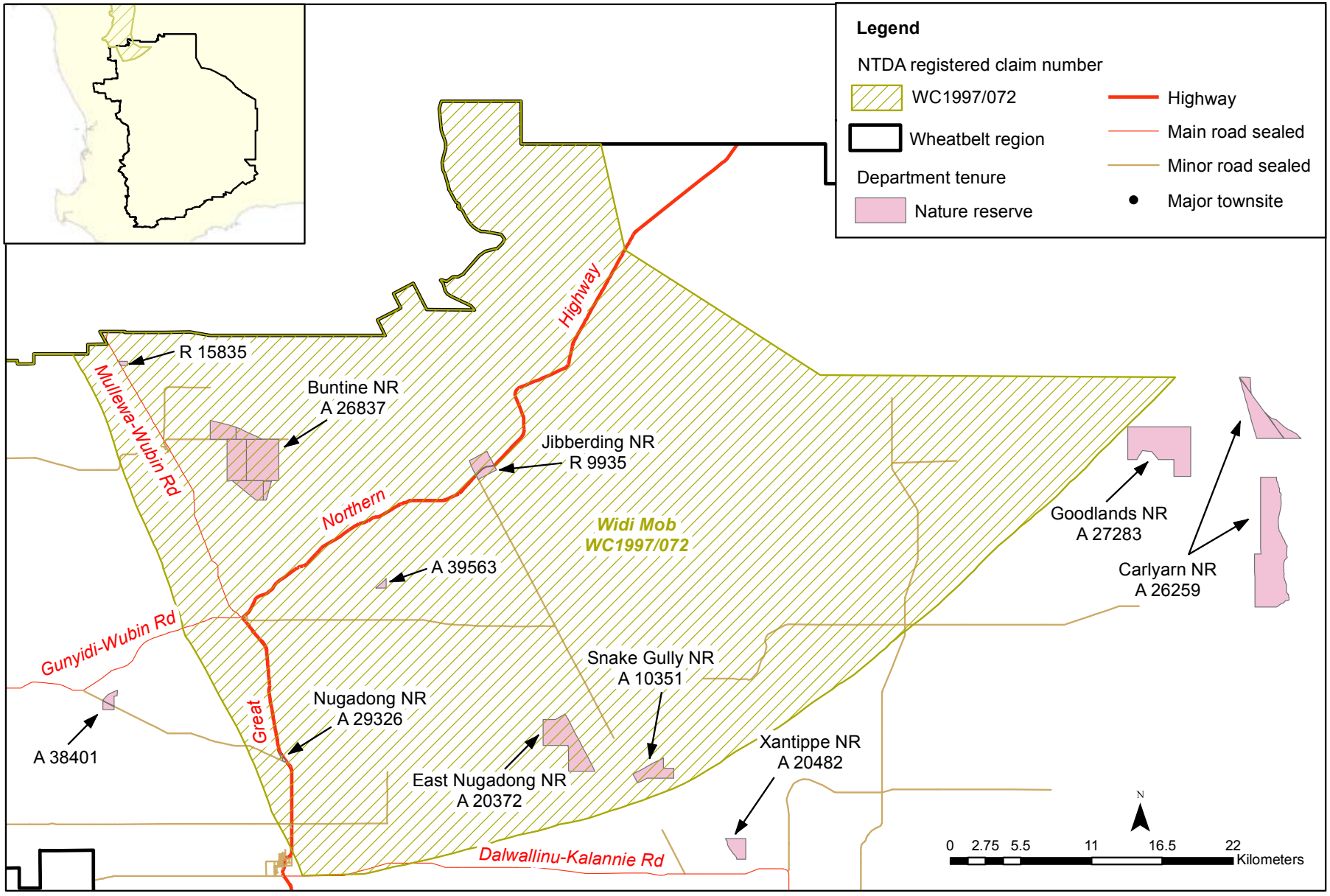
Map 7. Gnaala Karla Booja native title claim



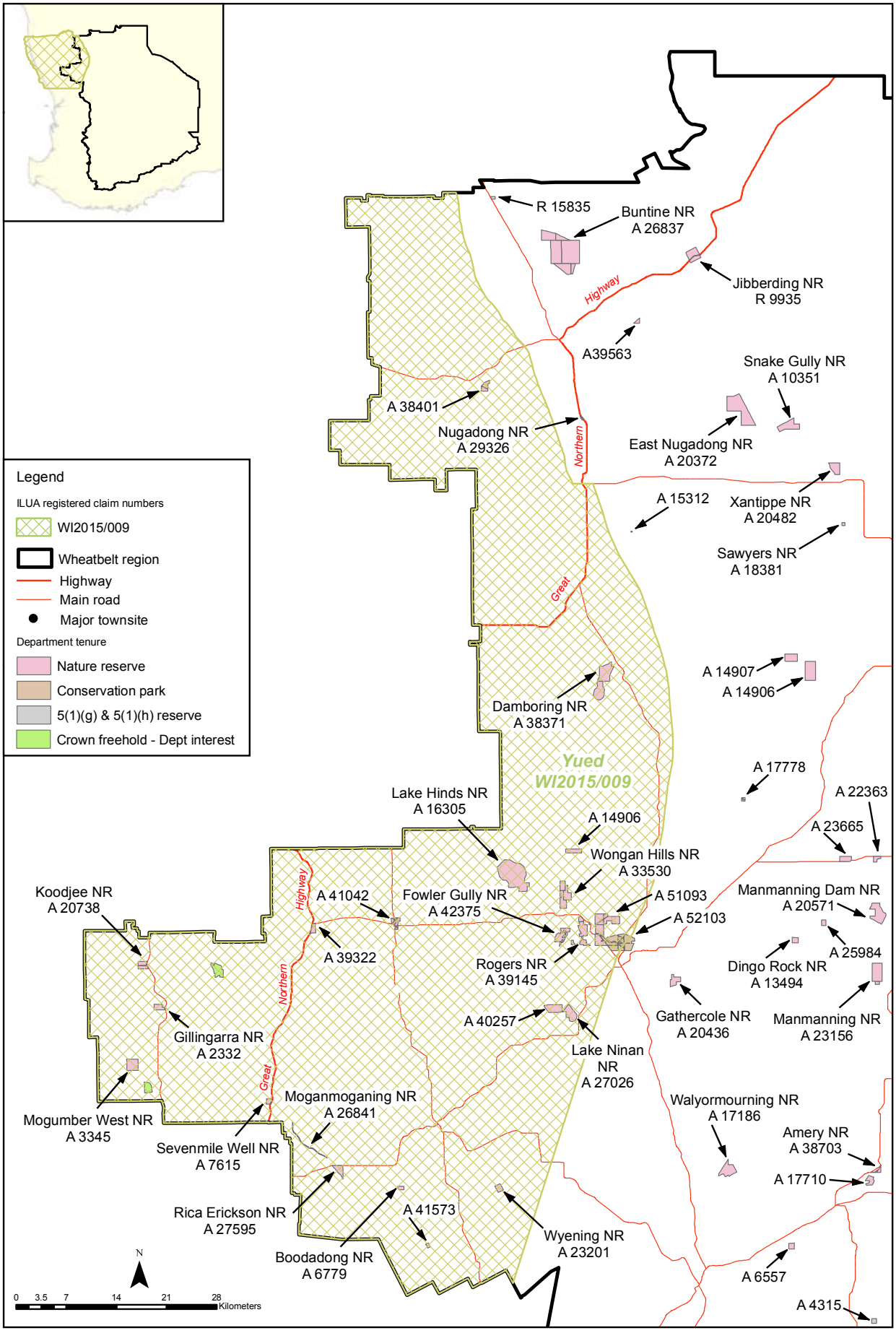
Map 8. Southern Noongar and Wagyl Kaip native title claim



Map 9. Widi Mob native title claim



Map 10. Yued native title claim



Appendices

Appendix 1. Existing reserves and other lands managed by the department

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Shire of Beverley				
Unnamed 5(1)(h) reserve	C3218	5	Timber and seed collection	1, 7
Yandinilling Nature Reserve	A16412	65	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C16584	141	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A26897	16	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C27230	19	Timber	1, 7
Yenyening Lakes Nature Reserve[D]	**A28088**	**2,417**	**Conservation of flora and fauna**	**1, 7**
Yenyening Lakes Nature Reserve	C31837	681	Recreation and conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**A41180**	**50**	**Conservation of flora and fauna**	**1, 8**
Unnamed nature reserve	A46074	26	Conservation of flora and fauna	1, 7
Shire of Brookton				
Unnamed nature reserve	A12397	4	Conservation of flora and fauna and water	1, 8
Lake Mears Nature Reserve	A12398	255	Conservation of flora and fauna	1, 7
Boyagin Nature Reserve[D]	**A20610**	**4,845**	**Conservation of flora and fauna**	**1, 8**
Yenyening Lakes Nature Reserve[D]	**A28088**	**2,417**	**Conservation of flora and fauna**	**1, 7**
Weam Nature Reserve	A29322	226	Conservation of flora and fauna	1, 8
Pingeculling Nature Reserve	A36519	243	Conservation of flora and fauna	1, 8
Kulyaling Nature Reserve	A39379	17	Conservation of flora and fauna	1, 8
Unnamed nature reserve[D]	**A41180**	**50**	**Conservation of flora and fauna**	**1, 8**
Unnamed nature reserve[D]	**C45082**	**175**	**Conservation of flora and fauna**	**1, 8**
Shire of Broomehill–Tambellup				
Unnamed 5(1)(h) reserve	C1703	8	Timber	1, 10
Broomehill Nature Reserve	C4569	6	Conservation of flora and fauna	1, 10
Ngopitchup Nature Reserve	A7128	40	Water and conservation of flora and fauna	1, 10
Unnamed nature reserve	C10914	7	Conservation of flora	1, 10
Broomehill Nature Reserve	C17111	4	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A19068	44	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A24707	11	Conservation of flora and fauna	1, 10
Anderson Lake Nature Reserve	A25194	479	Conservation of flora and fauna	1, 10
Three Swamps Nature Reserve	C26162	357	Conservation of flora and fauna	1, 10
Beejenup Nature Reserve	C30526	50	Conservation of flora and fauna	1, 10
Wansbrough Nature Reserve	A35428	126	Conservation of flora and fauna	1, 10
Peringillup Nature Reserve	C36324	218	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A39399	139	Conservation of flora and fauna	1, 10
Shire of Bruce Rock				
Pikaring Nature Reserve	A976	106	Conservation of flora and fauna	1, 7
Wulyaling Nature Reserve	A978	40	Conservation of flora and fauna	1, 7
Kwolyin Nature Reserve	A11038	61	Conservation of flora and fauna	1, 7
Kokerbin Nature Reserve	A11043	91	Conservation of flora and fauna	1, 7
Bruce Rock Nature Reserve	A12277	40	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C13057	140	Conservation of flora and fauna and water	1, 7
Wialkutting Nature Reserve	A14194	65	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C15199	2	Conservation of flora	1, 7
Sorensens Nature Reserve	A16104	108	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C16134	5	Vegetation trials and seed orchard	1, 7
Red Lake Nature Reserve	A16493	54	Conservation of flora and fauna	1, 7
Unnamed 5(1)(g) reserve	C18444	26	Sandalwood establishment	1, 7
Unnamed nature reserve	C22116	10	Conservation of flora and fauna	1, 7
Boolanelling Nature Reserve	A22792	669	Conservation of flora and fauna	1, 7
Nangeen Hill Nature Reserve	A23187	178	Conservation of flora and fauna	1, 7
Mokamie Nature Reserve	A23686	481	Flora and fauna	1, 7
Shackleton Nature Reserve	A24505	447	Conservation of flora and fauna	1, 7

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Seagroatt Nature Reserve	A25062	1149	Conservation of flora and fauna	1, 7
Wandjagill Nature Reserve	C25884	764	Conservation of flora and fauna	1, 7
Yarding Nature Reserve	A27108	232	Conservation of flora and fauna	1, 7
Jura Nature Reserve	A27452	39	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C30431	601	Conservation of flora and fauna	1, 7
Kwolyin Nature Reserve	A30969	283	Conservation of flora and fauna	1, 7
Yilgerin Nature Reserve	C35002	49	Conservation of flora	1, 7
Unnamed nature reserve	C35598	86	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A38395	70	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A38522	69	Conservation of flora and fauna	1, 7
Shire of Coolgardie				
Jilbadji Nature Reserve[D]	**C24049**	**208,866**	**Conservation of flora and fauna**	**1**
Shire of Corrigin				
2226/995 - Crown Freehold (Dept Interest)	P026016 29559	267		7
Wedgengully Nature Reserve	C246	22	Conservation of flora and fauna	1, 7
Sewell Nature Reserve	A9426	73	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C10125	33	Conservation of flora and fauna	1, 7
Paperbark Nature Reserve	C12899	59	Conservation of flora and fauna	1, 7
Paperbark Nature Reserve	C12900	61	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C14014	53	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C15057	91	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C16196	884	Conservation of flora and fauna	1, 7, 8
Gorge Rock Nature Reserve	A16714	28	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A21424	154	Conservation of flora and fauna	1, 7
Nonalling Nature Reserve	A24428	506	Conservation of flora and fauna	1, 8
Overheu Nature Reserve	A25546	19	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A30324	890	Conservation of flora and fauna	1, 7
Wogerlin Nature Reserve	C34000	95	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A38567	64	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**C45082**	**175**	**Conservation of flora and fauna**	**1, 8**
Unnamed 5(1)(h) reserve	C45645	8	Timber sandalwood	3, 8
Shire of Cranbrook				
Warrenup Nature Reserve	A1931	251	Conservation of flora and fauna	1, 10
Rock Hole Dam Nature Reserve	A2079	257	Conservation of flora and fauna	1, 10
Twongkup Nature Reserve	A2096	81	Conservation of flora and fauna	1, 10
Orchid Nature Reserve	A2218	56	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A15214	101	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A21543	11	Conservation of flora and fauna	1, 10
Geekabee Hill Nature Reserve	A30916	4	Conservation of flora and fauna	1, 10
Pootenup Nature Reserve	A38303	47	Conservation of flora and fauna	1, 10
Shire of Cuballing				
Lol Gray State Forest[D]	**F 51**	**20,144**	**State Forest**	**1**
Montague State Forest	F 53	4,083	State Forest	1
2726/60 - Crown Freehold (Dept Interest)	P064332 10	85		8
2814/398 - Crown Freehold (Dept Interest)	P075785 13	122		8
Minniging Nature Reserve	A1864	52	Conservation of flora and fauna	1, 8
Hotham River Nature Reserve	A8291	148	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C15925	88	Conservation of flora and fauna	1, 8
East Yornaning Nature Reserve[D]	**A18952**	**248**	**Conservation of flora and fauna**	**1, 8**
Unnamed nature reserve	A20635	54	Conservation of flora and fauna	1, 8
Rosedale Nature Reserve	C20802	134	Conservation of flora and fauna	1, 8
Commodine Nature Reserve	A21056	145	Conservation of flora and fauna	1, 8
Yornaning Nature Reserve	A21230	69	Conservation of flora and fauna	1, 8
Fourteen Mile Brook Nature Reserve	A21830	45	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A29589	40	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C50165	330	Conservation of flora and fauna	1, 8
Shire of Cunderdin				
Flowery Patch Nature Reserve	A564	20	Conservation of flora and fauna	1, 7
Bulgin Nature Reserve	A8830	24	Conservation of flora and fauna	1, 7
Shire of Dalwallinu				
Jibberding Nature Reserve	C9935	248	Conservation of flora and fauna	1, 11
Snake Gully Nature Reserve	A10351	300	Conservation of flora and fauna	1, 11
Unnamed nature reserve	A15312	2	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C15835	21	Conservation of flora and fauna	1, 11
Sawyers Nature Reserve	A18381	16	Conservation of flora and fauna	1
Old Store Nature Reserve	A19650	62	Conservation of flora and fauna	1
East Nugadong Nature Reserve	A20372	781	Conservation of flora and fauna	1, 11

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Xantippe Nature Reserve	A20482	189	Conservation of flora and fauna	1
Carlyarn Nature Reserve	A26259	2,723	Conservation of flora and fauna	1
Buntine Nature Reserve	A26837	1,919	Conservation of flora and fauna	1, 11
Goodlands Nature Reserve	A27283	1,349	Conservation of flora and fauna	1
Nugadong Nature Reserve	A29326	10	Conservation of flora and fauna	1, 11
Unnamed nature reserve	A38401	107	Conservation of flora and fauna	1, 12
Unnamed nature reserve	A39563	29	Conservation of flora and fauna	1, 11
Unnamed nature reserve	A52583	0.65	Conservation of flora and fauna	1
Shire of Dowerin				
Namelcatchem Nature Reserve	A687	259	Conservation of flora and fauna	1, 7
Eaton Nature Reserve	A4313	44	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C4315	40	Timber	1, 7
Unnamed nature reserve	C6557	63	Conservation of flora and fauna	1, 7
Moonijin Nature Reserve	A9228	57	Conservation of flora and fauna	1, 7
Minnivale Nature Reserve	A14114	218	Conservation of flora and fauna	1, 7
Hindmarsh Nature Reserve	A14510	160	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C15461	10	Timber	1, 7
Unnamed nature reserve	A17710	107	Conservation of flora and fauna	1, 7
Manmanning Dam Nature Reserve	A20571	378	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C21475	26	Conservation of flora and fauna	1, 7
Manmanning Nature Reserve	A23156	367	Conservation of flora and fauna	1, 7
Amery Nature Reserve	A38703	36	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A47960	107	Conservation of flora and fauna	1, 7
Shire of Dumbleyung				
3013/657 - Crown Freehold (Dept Interest)	P060132 111	324		
Coblinine Nature Reserve	A5322	134	Conservation of flora and fauna	1, 10
Dumbleyung Lake Nature Reserve	C5999	114	Flora and fauna	1, 10
Unnamed nature reserve	C9847	36	Conservation of flora	1, 7
Coomelberrup Nature Reserve	A10472	92	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A10930	40	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C12645	40	Conservation of flora and fauna	1, 10
Unnamed nature reserve	C13438	176	Conservation of flora and fauna	1, 7
Mount Pleasant Nature Reserve	A15197	57	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**C19075**	**136**	**Conservation of flora and fauna**	**1, 10**
Dongolocking Nature Reserve[D]	**A19082**	**720**	**Conservation of flora and fauna**	**1, 7**
Dongolocking Nature Reserve[D]	**A19083**	**198**	**Conservation of flora and fauna**	**1, 7**
Mallee Plain Nature Reserve[D]	**A19084**	**316**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve[D]	**A19085**	**275**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	A19086	18	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve[D]	**A19089**	**465**	**Conservation of flora and fauna**	**1, 7**
Dongolocking Nature Reserve	A19091	139	Conservation of flora and fauna	1, 7
Cronin Nature Reserve	C19098	263	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve	C20069	199	Conservation of flora and fauna	1, 7
Hurdle Creek Nature Reserve	A20070	275	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve[D]	**A20836**	**113**	**Conservation of flora and fauna**	**1, 7**
Coblinine Nature Reserve	A25133	164	Conservation of flora and fauna	1, 10
Coblinine Nature Reserve[D]	**A25134**	**1,178**	**Conservation of flora and fauna**	**1, 10**
Tarin Rock Nature Reserve	A25711	2,011	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A26005	81	Conservation of flora and fauna	1, 7
Dumbleyung Lake Nature Reserve[D]	**C26664**	**4,094**	**Conservation of flora and fauna**	**1, 7, 10**
North Tarin Rock Nature Reserve[D]	**A29857**	**2,142**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	C31043	6	Conservation of flora	1, 7
Unnamed nature reserve	C38379	186	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A40035	10	Conservation of flora and fauna	1, 10
Unnamed nature reserve	C43286	64	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A43464	144	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A46260	457	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C46838	271	Conservation of flora and fauna	1, 7
Shire of Dundas				
Jilbadji Nature Reserve[D]	**C24049**	**208,866**	**Conservation of flora and fauna**	**1**
Shire of Gnowangerup				
Chirelillup Nature Reserve	A12590	64	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A16901	27	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A24770	105	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A26569	128	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A28549	63	Conservation of flora and fauna	1, 10
Shire of Goomalling				
Cartamulligan Well Nature Reserve	A737	18	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A1563	99	Conservation of flora and fauna	1, 7

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Walyormouring Nature Reserve	A17186	294	Conservation of flora and fauna	1, 7
Shire of Jerramungup				
Lake Magenta Nature Reserve[D]	**A25113**	**107,812**	**Conservation of flora and fauna**	**1, 7, 10**
Shire of Katanning				
1225/499 - Crown Freehold (Dept Interest)	P222683 325	0.12		10
Carrolup Nature Reserve	A7535	30	Conservation of flora and fauna	1, 10
Unnamed nature reserve[D]	**C19075**	**136**	**Conservation of flora and fauna**	**1, 10**
Unnamed 5(1)(g) reserve	C20987	59	Timber (mallet)	1, 10
Woorgabup Nature Reserve	C24072	49	Conservation of flora and fauna	1, 10
Unnamed nature reserve	C24282	309	Conservation of flora and fauna	1, 10
Johns Well Nature Reserve	A24599	385	Conservation of flora and fauna	1, 10
Coblinine Nature Reserve[D]	**A25134**	**1,178**	**Conservation of flora and fauna**	**1, 10**
Coblinine Nature Reserve	A25135	846	Conservation of flora and fauna	1, 10
Coblinine Nature Reserve	A25136	1,845	Conservation of flora and fauna	1, 10
Coyrecup Nature Reserve	A26020	676	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A27481	107	Conservation of flora and fauna	1, 10
Coyrecup Nature Reserve	A28552	471	Flora fauna and recreation	1, 10
Moojebing Nature Reserve	A32204	44	Conservation of flora and fauna	1, 10
Shire of Kellerberrin				
2882/297 - Crown Freehold (Dept Interest)	P403567 800	720		
Burges Spring Nature Reserve	A563	94	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A10719	12	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A11024	22	Conservation of flora and fauna	1, 7
Mount Caroline Nature Reserve	A11047	352	Conservation of flora and fauna	1, 7
North Baandee Nature Reserve	A12329	147	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C21196	2	Conservation of flora	1, 7
Durokoppin Nature Reserve	A22921	1,030	Conservation of flora and fauna	1, 7
East Yorkrakine Nature Reserve	A23085	78	Conservation of flora and fauna	1, 7
Kodj Kodjin Nature Reserve	A23138	204	Conservation of flora and fauna	1, 7
Mournucking Nature Reserve	A24897	697	Conservation of flora and fauna	1, 7
Glenluce Nature Reserve	A25112	96	Conservation of flora and fauna	1, 7
Glenluce Nature Reserve	A26266	148	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A26809	116	Conservation of flora and fauna	1, 7
Craig Nature Reserve	A30903	11	Conservation of flora and fauna	1, 7
Shire of Kent				
2210/891 - Crown Freehold (Dept Interest)	P024592 12	100		10
Ballast Pit Nature Reserve	A16226	12	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A19080	80	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A19081	134	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A20046	391	Conservation of flora and fauna	1, 7, 10
Unnamed 5(1)(h) reserve	C20961	40	Timber	1, 10
Unnamed nature reserve	C22966	39	Conservation of flora	1, 10
Unnamed nature reserve	C23218	125	Conservation of flora	1, 10
Corneecup Nature Reserve	C24589	1,952	Conservation of flora and fauna	1, 10
Unnamed nature reserve	C24827	49	Conservation of flora and fauna	1, 10
Lake Magenta Nature Reserve[D]	**A25113**	**107,812**	**Conservation of flora and fauna**	**1, 7, 10**
Unnamed nature reserve	A25212	44	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A25696	7	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A25697	16	Conservation of flora and fauna	1, 10
McDougall Nature Reserve	C26381	336	Conservation of flora and fauna	1, 10
Willoughby Nature Reserve	A27289	600	Conservation of flora and fauna	1, 10
Cairlocup Nature Reserve	C28324	1,577	Conservation of flora and fauna	1, 10
Chinocup Nature Reserve[D]	**A28395**	**19,825**	**Conservation of flora and fauna**	**1, 7, 10**
Lake Bryde Nature Reserve	A29020	1,528	Conservation of flora and fauna	1, 10
Lake Bryde Nature Reserve	A29021	107	Conservation of flora and fauna	1, 10
Holland Rocks Nature Reserve	A29022	50	Conservation of flora and fauna	1, 10
Lakeland Nature Reserve	A29023	1,529	Conservation of flora and fauna	1, 7
Lake Janet Nature Reserve	A29026	32	Conservation of flora and fauna	1, 10
Willoughby Nature Reserve	C31603	93	Conservation of fauna	1, 10
Unnamed nature reserve	C32663	322	Conservation of flora and fauna	1, 7, 10
Hobart Road Nature Reserve	A34571	6	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A36967	146	Conservation of flora and fauna	1, 10
Moornaming Nature Reserve	A38553	78	Conservation of flora and fauna	1, 10
Unnamed 5(1)(g) reserve	C41826	44	Timber	1, 10
Unnamed 5(1)(h) reserve	C47384	725	Rehabilitation, trials and demonstrations, agriculture, flow management and conservation	1, 7, 10
Unnamed conservation park	C48436	1,302	Conservation park	1, 7, 10

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Unnamed nature reserve	A49706	145	Conservation of flora and fauna	1, 10
Shire of Kojonup				
Unnamed nature reserve	C2184	40	Conservation of flora and fauna	1, 10
Mininup Nature Reserve	A2243	154	Flora and fauna	1, 10
Unnamed nature reserve	C5796	41	Conservation of flora and fauna	1, 10
Narlingup Nature Reserve	A8617	145	Conservation of flora and fauna	1, 10
Cherry Tree Pool Nature Reserve	C9091	6	Conservation of flora and fauna	1, 10
Mongelup Nature Reserve	A9307	39	Conservation of flora and fauna	1, 10
Yetterup Nature Reserve	A9308	40	Conservation of flora and fauna	1, 10
Maragoonda Nature Reserve	A9920	13	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A13102	16	Conservation of flora and fauna	1, 10
Unnamed nature reserve	A15061	16	Conservation of flora and fauna	1, 8
Mettabinup Nature Reserve	A15388	164	Conservation of flora and fauna	1, 10
Cootayerup Nature Reserve	A16031	40	Conservation of flora and fauna	1, 10
Wandoora Nature Reserve	A16568	22	Conservation of flora and fauna	1, 10
Jingalup Nature Reserve	A17759	427	Conservation of flora and fauna	1, 10
South Jingalup Nature Reserve	A17760	551	Conservation of flora and fauna	1, 10
Unnamed nature reserve	C24057	192	Conservation of flora and fauna	1, 10
Yetterup Nature Reserve	A24677	75	Conservation of flora and fauna	1, 10
Unnamed nature reserve	C26158	5	Conservation of flora and fauna	1, 10
Birdwood Nature Reserve	A27769	46	Conservation of flora and fauna	1, 10
Unnamed nature reserve	C36827	19	Conservation of flora and fauna	1, 10
Shire of Kondinin				
Karlgarin Nature Reserve	C10716	232	Conservation of flora and fauna	1, 7
Scriveners Nature Reserve	A17662	903	Conservation of flora and fauna and water	1, 7
Unnamed nature reserve	C19832	100	Conservation of flora and fauna	1, 7
North Karlgarin Nature Reserve[D]	**A20338**	**5,822**	**Conservation of flora and fauna**	**1, 7**
Roe Nature Reserve	C20339	1,246	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**C20341**	**539**	**Conservation of flora and fauna**	**1, 7**
Marble Rocks Nature Reserve	C20528	117	Conservation of flora and fauna and water	1, 7
Lake Gounter Nature Reserve	A21253	3,327	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C21705	155	Conservation of flora and fauna	1, 7
Kondinin Lake Nature Reserve	A22519	1,688	Recreation and conservation of flora and fauna	5, 7
Unnamed nature reserve	C23366	937	Conservation of flora and fauna	1, 7
Karlgarin Nature Reserve	C23704	239	Conservation of flora and fauna	1, 7
Lake Hurlstone Nature Reserve	A24417	460	Conservation of flora and fauna	1, 7
Bendering Nature Reserve	A25681	1,895	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A26661	347	Conservation of flora and fauna	1, 7
Biglin Nature Reserve	A27202	6	Conservation of flora and fauna	1, 7
Lake Hurlstone Nature Reserve	A27837	2,154	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A28047	2,533	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A28715	434	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**A29027**	**1,252**	**Conservation of flora and fauna**	**1, 7**
Bushfire Rock Nature Reserve	C29535	115	Conservation of flora and fauna	1, 7
Lake Liddelow Nature Reserve	A29810	1,133	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A34295	929	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A36003	1,113	Conservation of flora and fauna	1, 7
Lake Cronin Nature Reserve	A36526	1,016	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A46116	524	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**C48742**	**495**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	C51602	399	Conservation of flora and fauna	1, 7
Shire of Koorda				
Noorajin Soak Nature Reserve	A10262	202	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C12135	40	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A12154	61	Conservation of flora and fauna	1, 7
Mollerin Nature Reserve[D]	**A14429**	**6,637**	**Conservation of flora and fauna**	**1**
Warramuggan Nature Reserve	A16040	249	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A16245	270	Conservation of flora and fauna	1, 7
Dukin Nature Reserve	C16867	333	Conservation of flora and fauna	1, 7
Unnamed 5(1)(g) reserve	C22176	4	Conservation and site for re-establishing native plant species	1, 7
Unnamed nature reserve	A23008	65	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A23029	162	Conservation of flora and fauna	1
Walk Walkin Nature Reserve	C24838	241	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A30270	6	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A39038	185	Conservation of flora and fauna	1
Unnamed nature reserve	C49071	76	Conservation of flora and fauna	1
Shire of Kulin				
2892/380 - Crown Freehold (Dept Interest)	P401311 41	375		

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Unnamed nature reserve	C9927	261	Water and conservation of flora and fauna	1, 7
Stretton Road Nature Reserve	C10772	60	Conservation of flora and fauna	1, 7
Sparks Road Nature Reserve	A13232	20	Conservation of flora and fauna	1, 7
Harrismith Nature Reserve	C13258	40	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C13603	26	Conservation of flora and fauna	1, 7
Kulin Road Nature Reserve	C14001	489	Flora and fauna	1, 7
Jitarning Nature Reserve	C15342	23	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C16068	52	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C16281	32	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A16479	73	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C16560	46	Conservation of flora and fauna	1, 7
Koolberin Nature Reserve	C16763	17	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C16942	14	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C17911	11	Conservation and seed orchard	1, 7
Unnamed nature reserve	C18311	30	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A18698	150	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**C20341**	**539**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	A20342	955	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C21745	48	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C22247	19	Conservation of flora and fauna	1, 7
Pingaring Nature Reserve	C23993	68	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C25248	29	Conservation of flora and fauna	1, 7
Kondinin Salt Marsh Nature Reserve	C26692	1,915	Conservation of flora and fauna	1, 7
Kondinin Salt Marsh Nature Reserve	C26905	293	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A27485	480	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A27486	777	Conservation of flora and fauna	1, 7
Flat Rock Nature Reserve	C27487	1,468	Conservation of flora	1, 7
Lake Hurlstone Nature Reserve	A27927	2,388	Conservation of flora and fauna	1, 7
Lake Varley Nature Reserve	A27928	2,096	Conservation of flora and fauna	1, 7
North Jitarning Nature Reserve	A27979	45	Conservation of flora and fauna	1, 7
Lake Varley Nature Reserve	A28014	101	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C28547	506	Conservation of flora	1, 7
Unnamed nature reserve[D]	**A29027**	**1,252**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	C29451	213	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C29580	65	Conservation of flora and fauna	1, 7
Maublarling Nature Reserve	C29835	52	Conservation of flora and fauna	1, 7
Jitarning Nature Reserve	A29988	20	Conservation of flora and fauna	1, 7
Pederah Nature Reserve	C30267	403	Conservation of flora and fauna	1, 7
Morton Nature Reserve	A31360	114	Conservation of flora and fauna	1, 7
Tapper Road Nature Reserve	C33713	117	Conservation of flora and fauna	1, 7
Rose Road Nature Reserve	C34136	50	Conservation of flora and fauna	1, 7
South Kulin Nature Reserve	C34833	13	Conservation of flora and fauna	1, 7
Hopkins Nature Reserve	C35134	579	Conservation of flora	1, 7
Dragon Rocks Nature Reserve[D]	**A36128**	**32,204**	**Conservation of flora and fauna**	**1, 7**
Plain Hills Nature Reserve	C36558	217	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A43282	473	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A46566	297	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A48024	97	Conservation of flora and fauna	1, 7
Shire of Lake Grace				
Unnamed nature reserve	C13063	42	Conservation of flora and fauna	1, 7
Lake Biddy Nature Reserve	C17617	51	Conservation of fauna	1, 7
McGlinn Nature Reserve	C18730	292	Conservation of flora and fauna	1, 7
Kathleen Nature Reserve	C20218	1,191	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C20349	1,770	Conservation of flora and fauna	1, 7, 10
Unnamed nature reserve	C20350	1,949	Conservation of flora and fauna	1, 7
Damnosa Nature Reserve	A24435	47	Conservation of flora and fauna	1, 7
Lake Magenta Nature Reserve[D]	**A25113**	**107,812**	**Conservation of flora and fauna**	**1, 7, 10**
Heathland Nature Reserve	A26762	669	Conservation of flora and fauna	1, 7
South Buniche Nature Reserve	A26763	1,298	Conservation of flora and fauna	1, 7
Frank Hann National Park[E]	**A27023**	**67,539**	**National park**	**1, 7, 9**
Mordetta Nature Reserve	C27887	374	Conservation of flora	1, 7
South Kuender Nature Reserve	C27902	356	Conservation of flora	1, 7
Unnamed nature reserve	C28173	331	Conservation of flora	1, 7
Chinocup Nature Reserve[D]	**A28395**	**19,825**	**Conservation of flora and fauna**	**1, 7, 10**
Lockhart Nature Reserve	A28759	397	Conservation of flora and fauna	1, 7
Silver Wattle Hill Nature Reserve	A29018	1,660	Conservation of flora and fauna	1, 7
Breakaway Ridge Nature Reserve	A29019	3,323	Conservation of flora and fauna	1, 7
Lakeland Nature Reserve	C29024	1,579	Conservation of flora and fauna	1, 7
Lakeland Nature Reserve	A29025	207	Conservation of flora and fauna	1, 7
Kuender Nature Reserve	C29287	383	Conservation of flora and fauna	1, 7

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Unnamed nature reserve	C29574	858	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A29576	512	Conservation of flora and fauna	1, 7
Rock View Nature Reserve	C29617	1,733	Conservation of flora and fauna	1, 7
North Tarin Rock Nature Reserve[D]	**A29857**	**2,142**	**Conservation of flora and fauna**	**1, 7**
Pallarup Nature Reserve	A29860	4,185	Conservation of flora and fauna	1, 7
One Mile Rocks Nature Reserve	A29864	865	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C31094	162	Conservation of flora	1, 7
Unnamed nature reserve	A31111	2,946	Conservation of flora and fauna	1, 7
Crooks Nature Reserve	A32046	585	Conservation of flora and fauna	1, 7
Harris Nature Reserve	A32549	3,605	Conservation of flora and fauna	1, 7
Lake Ace Nature Reserve	A34522	2,392	Conservation of flora and fauna	1, 7
Jackson Nature Reserve	A34523	910	Conservation of flora and fauna	1, 7
Dragon Rocks Nature Reserve[D]	**A36128**	**32,204**	**Conservation of flora and fauna**	**1, 7**
Dunn Rock Nature Reserve	C36445	27,349	Conservation of flora and fauna	1, 7, 10
Unnamed nature reserve	A38450	1,009	Conservation of flora and fauna	1, 7
Lake King Nature Reserve	A39422	40,096	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A42117	474	Conservation of flora and fauna	1, 7
Unnamed conservation park	C47100	2,542	Conservation park	1, 7
Unnamed nature reserve	C49999	136	Conservation of flora and fauna	1, 7
Shire of Merredin				
2607/803 - Crown Freehold (Dept Interest)	P047761 21	0.29	Executive Director Department Of CALM	7
Totadgin Conservation Park	A1313	257	Conservation park	1, 7
Lake Campion Nature Reserve	A11211	88	Conservation of flora and fauna	1
Unnamed nature reserve	A13594	41	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A16293	22	Conservation of flora and fauna	1, 7
Burracoppin Nature Reserve[D]	**C18198**	**202**	**Conservation of flora and fauna**	**1, 7**
Merredin Nature Reserve	A19476	91	Conservation of flora and fauna	1, 7
Norpa Nature Reserve	C20504	203	Conservation of flora and fauna	1, 7
Hines Hill Nature Reserve	C23795	203	Conservation of flora and fauna	1, 7
Maughan Nature Reserve	C24367	816	Conservation of flora and fauna	1, 7
Nangeenan Nature Reserve	A24532	61	Conservation of flora and fauna	1, 7
Lake Campion Nature Reserve[D]	**C24789**	**10,752**	**Conservation of flora and fauna**	**1**
Ulva Nature Reserve	A24835	59	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A25872	414	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C27584	75	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A28403	74	Conservation of flora and fauna	1, 7
Nukarni Nature Reserve	C28406	95	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**A28940**	**4,377**	**Conservation of flora and fauna**	**1**
Booraan Nature Reserve	C29738	480	Conservation of flora and fauna	1, 7
Tank Hill Nature Reserve	C30428	702	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C30429	121	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A30516	106	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A38296	144	Conservation of flora and fauna	1, 7
Korbel Nature Reserve	C41099	70	Conservation of flora and fauna	1, 7
Shire of Mount Marshall				
2666/403 - Crown Freehold (Dept Interest)	P055419 500	658		
Mollerin Nature Reserve[D]	**A14429**	**6,637**	**Conservation of flora and fauna**	**1**
Gabbin Nature Reserve	A16683	83	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A17771	105	Conservation of flora and fauna	1, 7
Mungarri Nature Reserve	C17923	438	Conservation of flora and fauna	1
Unnamed nature reserve	A18950	4	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A19036	9	Conservation of flora and fauna	1, 7
Marindo Nature Reserve	A20986	71	Conservation of flora and fauna	1
North Beacon Nature Reserve	A22457	105	Conservation of flora and fauna	1
Unnamed nature reserve	A24534	307	Conservation of flora and fauna	1
Herndermuning Nature Reserve	C24539	162	Conservation of flora	1
North Wallambin Nature Reserve	A26687	303	Conservation of flora and fauna	1, 7
Beebeegnying Nature Reserve	A26911	143	Conservation of flora and fauna	1
Unnamed nature reserve	A27913	34	Conservation of flora and fauna	1
Danjinning Nature Reserve	A35679	405	Conservation of flora and fauna	1
Karroun Hill Nature Reserve[D]	**A36936**	**309,678**	**Conservation of flora and fauna**	**1**
Unnamed nature reserve	A38574	92	Conservation of flora and fauna	1
Unnamed nature reserve	A39703	8	Conservation of flora and fauna	1
Shire of Mukinbudin				
Unnamed nature reserve	C9474	255	Conservation of flora and fauna	1
Calcaling Nature Reserve	A13051	170	Conservation of flora and fauna	1
Wundowlin Nature Reserve	A22262	729	Conservation of flora and fauna	1
Karloning Nature Reserve	A23835	64	Conservation of flora and fauna	1

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Unnamed nature reserve	A23991	723	Conservation of flora and fauna	1
North Bonnie Rock Nature Reserve	A29303	194	Conservation of flora and fauna	1
South Wilgoyne Nature Reserve	A30705	118	Conservation of flora and fauna	1
Unnamed nature reserve	A31195	24	Conservation of flora and fauna	1
Cookinbin Nature Reserve	C31629	377	Conservation of flora and fauna	1
Barbalin Nature Reserve	A31715	176	Conservation of flora and fauna	1
Unnamed nature reserve	A32993	44	Conservation of flora and fauna	1
Karroun Hill Nature Reserve[D]	**A36936**	**309,678**	**Conservation of flora and fauna**	**1**
Jouerdine Nature Reserve	C37034	1,816	Conservation of flora and fauna	1
Weira Nature Reserve	C42501	86	Conservation of flora and fauna	1
Unnamed nature reserve	C46401	1,785	Conservation of flora and fauna	1
Shire of Narembeen				
2788/977 - Crown Freehold (Dept Interest)	P073422 4	136		7
2788/981 - Crown Freehold (Dept Interest)	P073423 2	120		7
Cairn Nature Reserve	A9754	720	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C13534	44	Timber	1, 7
Sloss Nature Reserve	C13565	366	Conservation of flora and fauna	1, 7
North Karlgarin Nature Reserve[D]	**A20338**	**5,822**	**Conservation of flora and fauna**	**1, 7**
Billericay Nature Reserve	A24554	4	Conservation of flora and fauna	1, 7
Emu Hill Nature Reserve	A25039	76	Conservation of flora and fauna	1, 7
Roach Nature Reserve	A29885	258	Conservation of flora and fauna	1, 7
Welsh Nature Reserve[D]	**C30305**	**1,717**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	C31091	40	Conservation of flora	1, 7
Billericay Nature Reserve	C36101	85	Water supply and conservation of flora and fauna	1, 7
Billericay Nature Reserve	C36102	150	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C37289	768	Conservation of flora and fauna	1, 7
South Kumminin Nature Reserve	A38578	95	Conservation of flora and fauna	1, 7
Ski Lake Nature Reserve	A42115	93	Conservation of flora and fauna	1, 7
Unnamed nature reserve[D]	**C48742**	**495**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	C50864	763	Conservation of flora and fauna	1, 7
Shire of Narrogin				
Lol Gray State Forest[D]	**F 51**	**20,144**	**State Forest**	**1, 8**
Highbury State Forest[D]	**F 52**	**4,124**	**State Forest**	**1, 8**
387/1A - Crown Freehold (Dept Interest)	P009267 23	0.08	Conservator of forests	8
387/2A - Crown Freehold (Dept Interest)	P009267 24	0.08	Conservator of forests	8
387/3A - Crown Freehold (Dept Interest)	P009267 25	0.08	Conservator of forests	8
387/4A - Crown Freehold (Dept Interest)	P009267 26	0.08	Conservator of forests	8
387/6A - Crown Freehold (Dept Interest)	P009267 27	0.09	Conservator of forests	8
Arthur River Nature Reserve	A9508	782	Conservation of flora and fauna	1, 8
Taarblin Lake Nature Reserve[D]	**A9550**	**1,013**	**Conservation of flora and fauna**	**1, 8**
Bokan Nature Reserve	A9551	49	Conservation of flora and fauna	1, 8
Bokan Nature Reserve	A9552	35	Conservation of flora and fauna	1, 8
Bokan Nature Reserve	C9628	36	Conservation of flora and fauna	1, 8
Ibis Lake Nature Reserve	A9629	27	Conservation of flora and fauna	1, 8
Quongunnerunding Nature Reserve	A10016	57	Conservation of flora and fauna	1, 8
Unnamed 5(1)(h) reserve	C10335	19	Timber	1, 8
Bokan Nature Reserve	A10631	170	Conservation of flora and fauna	1, 8
Manning Road Nature Reserve	C14199	42	Conservation of flora and fauna	1, 8
Bradford Nature Reserve	C14300	95	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A15855	40	Conservation of flora and fauna	1, 8
Boundain Nature Reserve	A17115	183	Conservation of flora and fauna	1, 8
Bokan Nature Reserve	A17339	53	Conservation of flora and fauna	1, 8
Birdwhistle Nature Reserve[D]	**A19120**	**396**	**Conservation of flora and fauna**	**1, 8**
Ockley Nature Reserve	A19122	145	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C20877	11	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A20878	25	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A20985	64	Conservation of flora and fauna	1, 8
Boundain Nature Reserve	A21067	106	Conservation of flora and fauna	1, 8
North Yilliminning Nature Reserve	A21229	114	Conservation of flora and fauna	1, 8
Quongunnerunding Nature Reserve	A21284	217	Conservation of flora and fauna	1, 8
Highbury Nature Reserve	A26668	17	Conservation of flora and fauna	1, 8
Highbury Nature Reserve	A26669	54	Conservation of flora and fauna	1, 8
Bokan Nature Reserve	A26785	177	Conservation of flora and fauna	1, 8

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Carmody Nature Reserve	A26786	287	Conservation of flora and fauna	1, 8
Yackrikine Nature Reserve	A26787	105	Conservation of flora and fauna	1, 7, 8
Arthur River Nature Reserve	A26788	966	Conservation of flora and fauna	1, 8
Arthur River Nature Reserve	A26789	1,069	Conservation of flora and fauna	1, 8
Arthur River Nature Reserve	A26790	347	Conservation of flora and fauna	1, 8
Whin Bin Rock Nature Reserve	A27644	34	Conservation of flora	1, 8
Unnamed 5(1)(g) reserve	C27865	6	Office site, depot and nursery	1, 8
Unnamed nature reserve	A29906	8	Conservation of flora and fauna	1, 8
Unnamed 5(1)(g) reserve	C31732	13	Parklands	1, 8
Unnamed 5(1)(h) reserve	C31733	0.1	Radio mast	4, 8
Yilliminning Nature Reserve	A39718	40	Conservation of flora and fauna	1, 8
Sandalwood Block Timber Reserve	C41974	16	Sandalwood regeneration	1, 8
Shire of Northam				
2818/691 - Crown Freehold (Dept Interest)	P075994 322	177		
Mortlock Nature Reserve	A5644	41	Conservation of flora and fauna	1, 7
Throssell Nature Reserve	A7220	18	Conservation of flora and fauna	1, 7
Meenaar Nature Reserve	A29977	94	Conservation of flora and fauna	1, 7
Bobakine Nature Reserve	C42432	161	Conservation of flora and fauna	1, 7
Bobakine Nature Reserve	C43077	111	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C49599	0.1	Depot	2, 7
Unnamed 5(1)(h) reserve	C50273	0.2	Depot and administration	2, 7
Shire of Nungarin				
2745/584 - Crown Freehold (Dept Interest)	P065468 21	859		
Unnamed nature reserve	C11522	227	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A16932	542	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C17798	65	Conservation of flora and fauna	1, 7
Lake Campion Nature Reserve[D]	**C24789**	**10,752**	**Conservation of flora and fauna**	**1**
Unnamed nature reserve	A46004	401	Conservation of flora and fauna	1, 7
Shire of Pingelly				
Mockerdungulling Nature Reserve	A2023	33	Conservation of flora and fauna	1, 8
Moorumbine Nature Reserve	A6798	19	Conservation of flora and fauna	1, 8
Goodenough Nature Reserve	A6799	71	Conservation of flora and fauna	1, 8
Woyerling Nature Reserve	A9714	7	Conservation of flora and fauna	1, 8
Woyerling Nature Reserve	A10142	8	Conservation of flora and fauna	1, 8
Boyagin Nature Reserve	A11144	121	Recreation and conservation of flora and fauna	1, 8
Noonebin Nature Reserve	A11320	4	Conservation of flora and fauna	1, 8
Boyermucking Nature Reserve	A12098	36	Conservation of flora and fauna	1, 8
Jingaring Nature Reserve	A13797	36	Conservation of flora and fauna	1, 8
North Woyerling Nature Reserve	A20066	24	Conservation of flora and fauna	1, 8
Petercarring Nature Reserve	A20095	100	Conservation of flora and fauna	1, 8
Boyagin Nature Reserve[D]	**A20610**	**4,845**	**Conservation of flora and fauna**	**1, 8**
Napping Nature Reserve	A21286	61	Conservation of flora and fauna	1, 8
Boonadgin Nature Reserve	C21287	202	Conservation of flora and fauna	1, 8
Horne Nature Reserve	A21827	167	Conservation of flora and fauna	1, 8
Tutanning Nature Reserve	A25555	2,381	Conservation of flora and fauna	1, 8
Noombling Nature Reserve	A26150	71	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A27223	7	Conservation of flora and fauna	1, 8
Dattening Nature Reserve[D]	**A28656**	**23**	**Conservation of flora and fauna**	**1, 8**
Pingelly Nature Reserve	A29182	5	Conservation of flora and fauna	1, 8
Unnamed 5(1)(h) reserve	C29413	2	Conservation and recreation	1, 8
Murnanying Nature Reserve	A30298	22	Conservation of flora and fauna	1, 8
Tutanning Nature Reserve	A31163	39	Research and conservation of flora and fauna	3, 8
Unnamed 5(1)(h) reserve	C35858	0.2	Depot site Department of CALM	3, 8
Landscape Hill Nature Reserve	A39174	80	Conservation of flora and fauna	1, 8
Shire of Quairading				
Badjaling North Nature Reserve	A10121	58	Conservation of flora and fauna	1, 7
Dulbelling Nature Reserve	A10584	21	Conservation of flora and fauna	1, 7
Gundaring Nature Reserve	A11039	127	Conservation of flora and fauna	1, 7
Mount Stirling Nature Reserve	A11048	225	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C11153	20	Conservation of flora and fauna	1, 7
Quairading Spring Nature Reserve	A11372	29	Conservation of flora and fauna	1, 7
Mooraning Nature Reserve	A11776	44	Water and conservation of flora and fauna	1, 7
Unnamed nature reserve	A12333	40	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A13217	24	Conservation of flora and fauna	1, 7
Wamenusking Nature Reserve	A16346	47	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C18155	7	Native flora re-establishment	3, 7
Pantapin Nature Reserve	A18342	0	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C18798	8	Timber	1, 7

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Dangin Nature Reserve	A19570	4	Conservation of flora and fauna	1, 7
Pikaring West Nature Reserve	A23141	61	Conservation of flora and fauna	1, 7
Badjaling Nature Reserve	A23758	241	Conservation of flora and fauna	1, 7
Yenyening Lakes Nature Reserve[D]	**A28088**	**2,417**	**Conservation of flora and fauna**	**1, 7**
Bugin Nature Reserve	A28317	26	Conservation of flora and fauna	1, 7
Badjaling West Nature Reserve	A28318	56	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A28319	40	Conservation of flora and fauna	1, 7
Dulbelling Nature Reserve	A30132	32	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A30299	171	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A30427	33	Conservation of flora and fauna	1, 7
Shire of Sandstone				
Karroun Hill Nature Reserve[D]	**A36936**	**309,678**	**Conservation of flora and fauna**	**1**
Shire of Tammin				
North Tammin Nature Reserve	A4667	30	Conservation of flora and fauna	1, 7
Noonying Nature Reserve	A10313	49	Water and conservation of flora and fauna	1, 7
North Bungulla Nature Reserve	A17732	93	Conservation of flora and fauna	1, 7
Charles Gardner Reserve	A20041	799	Conservation of flora and fauna	1, 7
Tammin Railway Dam Nature Reserve	A23566	256	Conservation of flora and fauna	1, 7
Yorkrakine Rock Nature Reserve	A23586	157	Conservation of flora and fauna	1, 7
Wyola Nature Reserve	A24831	36	Conservation of flora and fauna	1, 7
Moulien Nature Reserve	A28289	153	Conservation of flora and fauna	1, 7
Bungulla Nature Reserve	A33990	24	Conservation of flora and fauna	1, 7
Shire of Trayning				
Unnamed nature reserve	C10539	53	Conservation of flora and fauna	1, 7
Yelbeni Nature Reserve	A15386	82	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A15564	17	Conservation of flora and fauna	1, 7
East Wallambin Nature Reserve	A15570	40	Conservation of flora and fauna	1, 7
Billyacatting Hill Nature Reserve	C17746	2,063	Conservation of flora and fauna	1, 7
Walcancobbing Nature Reserve	A35413	592	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A47311	194	Conservation of flora and fauna	1, 7
Unnamed 5(1)(h) reserve	C51122	3	Conservation	1, 7
Shire of Victoria Plains				
2688/841 - Crown Freehold (Dept Interest)	P05903055	221		12
2874/202 - Crown Freehold (Dept Interest)	P403566800	136		
Gillingarra Nature Reserve	C2332	105	Conservation of flora and fauna	1, 12
Mogumber West Nature Reserve	A3345	259	Conservation of flora and fauna	1, 12
Boodadong Nature Reserve	A6779	40	Conservation of flora and fauna	1, 12
Sevenmile Well Nature Reserve	A7615	52	Conservation of flora and fauna	1, 12
Koodjee Nature Reserve	A20738	127	Conservation of flora and fauna	1, 12
Wyening Nature Reserve	A23201	81	Conservation of flora and fauna	1, 12
Moganmoganing Nature Reserve	C26841	53	Conservation of flora and fauna	1, 12
Rica Erickson Nature Reserve	A27595	124	Conservation of flora and fauna	1, 12
Unnamed nature reserve	C39322	75	Conservation of flora and fauna	1, 12
Unnamed nature reserve	C41042	99	Conservation of flora and fauna	1, 12
Unnamed nature reserve	A41573	25	Conservation of flora and fauna	1, 12
Shire of Wagin				
Casuarina Nature Reserve	A2085	59	Conservation of flora and fauna	1, 7
Casuarina Nature Reserve	A2086	60	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A2087	63	Conservation of flora and fauna	1, 7
Casuarina Nature Reserve	A2088	78	Conservation of flora and fauna	1, 7
Nallian Nature Reserve	A4458	97	Conservation of flora and fauna	1, 7
Wangeling Gully Nature Reserve	A9098	85	Conservation of flora and fauna	1, 8
Gnarkaryelling Nature Reserve	A9620	17	Conservation of flora and fauna	1, 7
Bockaring Nature Reserve	A9648	91	Conservation of flora and fauna	1, 10
Parkeyerring Nature Reserve	A10733	684	Recreation and conservation of flora and fauna	1, 10
Wagin Lake Nature Reserve	C13279	116	Conservation of fauna	1, 7
Unnamed nature reserve	C14459	440	Conservation of flora and fauna	1, 8
Dongolocking Nature Reserve[D]	**A19082**	**720**	**Conservation of flora and fauna**	**1, 7**
Dongolocking Nature Reserve[D]	**A19083**	**198**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve[D]	**A19085**	**275**	**Conservation of flora and fauna**	**1, 7**
Dongolocking Nature Reserve	A19092	52	Conservation of flora and fauna	1, 7
Concaring Nature Reserve	A19093	85	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve	A19094	31	Conservation of flora and fauna	1, 7
Vagg Nature Reserve	A19095	108	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve[D]	**A19096**	**339**	**Conservation of flora and fauna**	**1, 7**
Buchanan Nature Reserve	A19116	129	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A20479	65	Conservation of flora and fauna	1, 8

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Jaloran Nature Reserve	A20834	63	Conservation of flora and fauna	1, 7
East Collanilling Nature Reserve	A20835	158	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve[D]	**A20836**	**113**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	A21064	111	Conservation of flora and fauna	1, 8
Gundaring Lake Nature Reserve	A24373	316	Protection of fauna	1, 7
Parkeyerring Nature Reserve	A24792	307	Recreation and conservation of flora and fauna	1, 10
Dumbleyung Lake Nature Reserve[D]	**C26664**	**4,094**	**Conservation of flora and fauna**	**1, 7, 10**
North Wagin Nature Reserve	A30443	62	Conservation of flora and fauna	1, 7, 8
Shire of Wandering				
Lol Gray State Forest[B]	**F 51**	**20,144**	**State Forest**	**1**
Unnamed nature reserve	C7230	53	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C20063	124	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C26363	56	Conservation of flora and fauna	1, 8
Dattening Nature Reserve[D]	**A28656**	**23**	**Conservation of flora and fauna**	**1, 8**
Moomagul Nature Reserve	A30563	180	Conservation of flora and fauna	1, 8
Shire of West Arthur				
Beaufort Bridge Nature Reserve[D]	**A1736**	**148**	**Conservation of flora and fauna**	**1, 8**
Dead Man's Swamp Nature Reserve	A5456	125	Conservation of flora and fauna	1, 8
Hillman Nature Reserve	C16904	248	Water and conservation of flora and fauna	1, 8
Unnamed 5(1)(g) reserve	C20435	163	Timber	1, 8
Arthur River Nature Reserve	A30668	83	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C35163	6	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A38731	72	Conservation of flora and fauna	1, 8
Unnamed 5(1)(h) reserve	C47557	40	Timber	1, 8
Unnamed nature reserve	A47558	80	Conservation of flora and fauna	1, 8
Shire of Westonia				
Sandford Rocks Nature Reserve	A1432	807	Conservation of flora and fauna and water	1
Carrabin Nature Reserve	A16235	760	Conservation of flora and fauna	1
Burracoppin Nature Reserve[D]	**C18198**	**202**	**Conservation of flora and fauna**	**1, 7**
Unnamed nature reserve	C18199	174	Conservation of flora and fauna	1
Unnamed nature reserve	C18583	1,059	Conservation of flora and fauna	1
Unnamed nature reserve	A19209	115	Conservation of flora and fauna	1
Chiddarcooping Nature Reserve	A19210	5,262	Conservation of flora and fauna and water	1
Geeraning Nature Reserve	A23338	677	Water and conservation of flora and fauna	1
Yanneymooning Nature Reserve	A24465	532	Water and conservation of flora and fauna	1
Unnamed nature reserve	A26403	113	Conservation of flora and fauna	1
Unnamed nature reserve	A27146	116	Conservation of flora and fauna	1
Unnamed nature reserve	A30430	120	Conservation of flora and fauna	1
Unnamed nature reserve	A32864	1,437	Conservation of flora and fauna	1
Unnamed nature reserve	A32865	579	Conservation of flora and fauna	1
Walyahmoning Nature Reserve[D]	**A35752**	**20,925**	**Conservation of flora and fauna**	**1**
Unnamed nature reserve	A38800	66	Conservation of flora and fauna	1
Baladjie Lake Nature Reserve[D]	**C42720**	**8,916**	**Conservation of flora and fauna**	**1**
Unnamed nature reserve	C44446	986	Conservation of flora and fauna	1
Shire of Wickepin				
Mungerungcutting Nature Reserve	A2175	21	Conservation of flora and fauna	1, 8
Brooks Nature Reserve	A4723	22	Conservation of flora and fauna	1, 8
Malyalling Nature Reserve	A9480	48	Conservation of flora and fauna	1, 8
Taarblin Lake Nature Reserve[D]	**A9550**	**1,013**	**Conservation of flora and fauna**	**1, 8**
Dulbining Nature Reserve	A9617	245	Conservation of flora and fauna	1, 8
Claypit Nature Reserve	C14307	91	Conservation of flora and fauna	1, 8
Walbyring Nature Reserve	A14398	144	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A14694	41	Conservation of flora and fauna	1, 8
Dingerlin Nature Reserve	A15266	63	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C15787	2	Protection of Indigenous flora	1, 7
Unnamed nature reserve	C15788	2	Protection of Indigenous flora	1, 7
East Yornaning Nature Reserve[D]	**A18952**	**248**	**Conservation of flora and fauna**	**1, 8**
Mallee Plain Nature Reserve[D]	**A19084**	**316**	**Conservation of flora and fauna**	**1, 7**
Dongolocking Nature Reserve	A19087	130	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve[D]	**A19089**	**465**	**Conservation of flora and fauna**	**1, 7**
Dongolocking Nature Reserve	A19090	150	Conservation of flora and fauna	1, 7
Dongolocking Nature Reserve[D]	**A19096**	**339**	**Conservation of flora and fauna**	**1, 7**
Yarling Nature Reserve	A19118	103	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A19119	40	Conservation of flora and fauna	1, 8
Birdwhistle Nature Reserve[D]	**A19120**	**396**	**Conservation of flora and fauna**	**1, 8**
Unnamed nature reserve	C19412	55	Conservation of flora and fauna	1, 7
Toolibin Nature Reserve	A24556	497	Conservation of flora and fauna	1, 8
Unnamed nature reserve	A25708	239	Conservation of flora and fauna	1, 8
Dulbining Nature Reserve	A27286	343	Conservation of flora and fauna	1, 7, 8
Unnamed nature reserve	A46128	232	Conservation of flora and fauna	1, 7

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Unnamed 5(1)(h) reserve	C46407	137	Conservation	1, 8
Unnamed 5(1)(h) reserve	C52018	151	Conservation and revegetation	1, 7
Shire of Williams				
Lol Gray State Forest[D]	**F 51**	**20,144**	**State Forest**	**1**
Highbury State Forest[D]	**F 52**	**4,124**	**State Forest**	**1**
Lavender Nature Reserve	C20182	282	Conservation of flora and fauna	1, 8
Williams Nature Reserve	A21521	206	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C30394	75	Conservation of flora and fauna	1, 8
Westmere Nature Reserve	A37054	16	Conservation of flora and fauna	1, 8
Culbin Nature Reserve	A41004	45	Conservation of flora and fauna	1, 8
Unnamed nature reserve	C46595	40	Conservation of flora and fauna	1, 8
Shire of Wongan-Ballidu				
Unnamed nature reserve	A13306	17	Conservation of flora and fauna	1
Dingo Rock Nature Reserve	A13494	63	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C14906	385	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A14907	175	Water and conservation of flora and fauna	1, 7
Lake Hinds Nature Reserve	A16305	1,235	Conservation of flora and fauna	1, 12
Unnamed nature reserve	C16319	5	Conservation of flora and fauna	1, 12
Unnamed nature reserve	A17778	23	Conservation of flora and fauna	1, 7
Gathercole Nature Reserve	A20436	142	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C22363	55	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A23313	116	Conservation of flora and fauna	1, 12
Unnamed nature reserve	A23665	112	Conservation of flora and fauna	1, 7
Unnamed nature reserve	A24060	36	Conservation of flora and fauna	1, 7
Elphin Nature Reserve	A25808	198	Conservation of flora and fauna	1, 12
Unnamed nature reserve	A25984	47	Conservation of flora and fauna	1, 7
Lake Ninan Nature Reserve	A27026	259	Conservation of flora and fauna	1, 12
Wongan Hills Nature Reserve	A33530	417	Protection of flora and fauna	1, 12
Unnamed nature reserve	A33854	20	Conservation of flora and fauna	1, 7
Kirwan Nature Reserve	A35217	70	Conservation of flora and fauna	1, 7
Damboring Nature Reserve	A38371	667	Conservation of flora and fauna	1, 12
Rogers Nature Reserve	A39145	341	Conservation of flora and fauna	1, 12
Unnamed nature reserve	C40257	232	Conservation of flora and fauna	1, 12
Fowler Gully Nature Reserve	A42375	230	Conservation of flora and fauna	1, 12
Unnamed nature reserve	C51093	559	Conservation of flora and fauna	1, 12
Unnamed conservation park	C52103	695	Conservation park	1, 7, 12
Shire of Woodanilling				
Beaufort Bridge Nature Reserve[D]	**A1736**	**148**	**Conservation of flora and fauna**	**1, 8**
Unnamed nature reserve	A5339	40	Conservation of flora and fauna	1, 10
King Rock Nature Reserve	A9377	52	Conservation of flora and fauna	1, 10
Woodanilling Nature Reserve	A13145	134	Conservation of flora and fauna	1, 10
Martinup Nature Reserve	A17055	91	Conservation of flora and fauna	1, 8
Murapin Nature Reserve	A17257	74	Conservation of flora and fauna	1, 8
Wardering Lake Nature Reserve	A17258	43	Conservation of flora and fauna	1, 10
Miripin Nature Reserve	A24912	28	Conservation of flora and fauna	1, 8
Flagstaff Nature Reserve	A27609	424	Conservation of flora and fauna	1, 10
Wingedine Nature Reserve	A28471	254	Conservation of flora and fauna	1, 10
Strathmore Hill Nature Reserve	A40933	171	Conservation of flora and fauna	1, 10
Shire of Wyalkatchem				
Korrelocking Nature Reserve	C689	259	Conservation of flora and fauna	6, 7
Nembudding South Nature Reserve	C4670	11	Conservation of flora and fauna	6, 7
Carribin Rock Nature Reserve	C10991	23	Conservation of flora and fauna	6, 7
Elashgin Nature Reserve	C10992	259	Conservation of flora and fauna	6, 7
Unnamed nature reserve	C12913	70	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C12914	7	Conservation of flora and fauna	6, 7
Gabwotting Nature Reserve	C13242	16	Conservation of flora and fauna	6, 7
Unnamed nature reserve	C14083	12	Conservation of flora and fauna	6, 7
Unnamed nature reserve	A14569	38	Conservation of flora and fauna	6, 7
Dingo Well Nature Reserve	A14920	131	Conservation of flora and fauna	6, 7
Folly Nature Reserve	C15895	8	Conservation of flora and fauna	6, 7
Elliot Nature Reserve	C16913	45	Conservation of flora and fauna	6, 7
Wallambin Nature Reserve	C21719	122	Conservation of flora and fauna	6, 7
Wyalkatchem Nature Reserve	C23877	256	Conservation of flora and fauna	6, 7
Nembudding Nature Reserve	A34385	38	Conservation of flora and fauna	6, 7
Derdibin Rock Nature Reserve	C34527	133	Conservation of flora and fauna	6, 7
Shire of Yilgarn				
2213/904 - Crown Freehold (Dept Interest)	D094681 10	182		
Duladgin Nature Reserve	C2179	1,305	Conservation of flora and fauna	1
Duladgin Nature Reserve	C3112	255	Conservation of flora and fauna	1

Reserve name/category	Reserve number[A]	Area (ha)[B]	Purpose	Notes[C]
Unnamed nature reserve	C16000	1,713	Conservation of flora and fauna	1
Unnamed nature reserve	C18584	577	Conservation of flora and fauna	1
Frog Rock Nature Reserve	A20262	1,438	Conservation of flora and fauna	1
Mount Hampton Nature Reserve	C20526	594	Water and conservation of flora and fauna	1
Unnamed nature reserve	C21980	2	Conservation of flora and fauna	1, 7
Jilbadji Nature Reserve[D]	**C24049**	**208,866**	**Conservation of flora and fauna**	**1**
Unnamed nature reserve	C25801	741	Conservation of flora and fauna	1
Unnamed nature reserve	A28323	1,180	Conservation of flora and fauna	1
Unnamed nature reserve	C28562	161	Conservation of flora and fauna	1
Unnamed nature reserve[D]	**A28940**	**4,377**	**Conservation of flora and fauna**	**1**
Wockallarry Nature Reserve	A29537	208	Conservation of flora and fauna	1
Condarnin Rock Nature Reserve	C29823	259	Conservation of flora and fauna	1
Biljahnie Rock Nature Reserve	C29920	1,036	Conservation of flora and fauna	1
Welsh Nature Reserve[D]	**C30305**	**1,717**	**Conservation of flora and fauna**	**1, 7**
Mount Hampton Nature Reserve	A32995	1,886	Conservation of flora and fauna	1
Unnamed nature reserve	A34197	637	Conservation of flora and fauna	1
Neendojer Rock Nature Reserve	C34776	2,249	Conservation of flora and fauna	1
Walyahmoning Nature Reserve[D]	**A35752**	**20,925**	**Conservation of flora and fauna**	**1**
Unnamed nature reserve	A36918	13,750	Conservation of flora and fauna	1
Unnamed nature reserve	C40460	767	Conservation of flora and fauna	1
Yellowdine Nature Reserve[E]	C41936	32,870	Conservation of flora and fauna	1
Baladjie Lake Nature Reserve[D]	**C42720**	**8,916**	**Conservation of flora and fauna**	**1**
Unnamed nature reserve	A43219	194	Conservation of flora and fauna	1
Shire of York				
Balkuling Nature Reserve	C24179	12	Conservation of flora and fauna	1, 7
Wallaby Hills Nature Reserve	A39149	59	Conservation of flora and fauna	1, 7
Unnamed nature reserve	C40642	16	Conservation of flora and fauna	1, 7

[A] = 'A' refers to reserves classified as class 'A' reserves, and 'C' refers to class 'C' or unclassified reserves.

[B] = Figures are rounded to the nearest hectare.

[C] 1 = vested in the Commission
2 = vested in the CALM Executive Body
3 = vested in the Executive Director Department of CALM
4 = vested in the Executive Director Department of CALM WPL
5 = vested in the Commission and Shire of Kondinin
6 = vested in the Commission and Shire of Wyalkatchem
7 = located within the Ballardong People Native Title claim
8 = located within the Gnaala Karla Booja Native Title claim
9 = located within the Ngadju Native Title claim
10 = located within the Southern Noongar and Wagyl Kaip Native Title claim
11 = located within the Widi Mob Native Title claim
12 = located within the Yued Native Title claim.

[D] = These bolded reserves overlap LGA boundaries and are replicated in this reserve list under different LGAs.

[E] = Part of these reserves lie within/outside the Wheatbelt Region.

Appendix 2. Criteria for listing the Toolibin Lake Ramsar site

The Toolibin Lake Ramsar wetland was listed under the Ramsar Convention in June 1990 on the basis that it meets the following four criteria:

- Criterion 1: **A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.** Toolibin Lake is the last, large, swamp sheoak (*Casuarina obesa*) dominated wetland, with mostly living trees, in the inland agricultural area of south-west Western Australia (Avon Wheatbelt Bioregion). The swamp sheoak dominated vegetation community has been reduced in area and number of occurrences by at least 90 per cent. Toolibin Lake is the only natural wetland in the bioregion that has not become saline due to rising saline groundwater. The lake's resilience is likely to be a result of the perched nature of the wetland, which has delayed the effect of rising saline groundwater compared with other wetlands in the bioregion.

- Criterion 2: **A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.** The ecological community of the site 'Perched wetlands of the Wheatbelt region with extensive stands of living sheoak and paperbark across the lake floor (Toolibin Lake)' is identified as endangered under the EPBC Act.

- Criterion 3: **A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.** As the last substantial remnant of a formerly common wetland type, Toolibin Lake is vital to maintaining the genetic and ecological diversity of the inland agricultural area of south-west WA (Avon Wheatbelt Bioregion). The site supports plants including swamp sheoak, *Melaleuca strobophylla*, York gum, jam, rock sheoak (*Allocasuarina huegeliana*) and acorn banksia (*Banksia prionotes*). When filled, the site supports waterbirds including freckled duck, Pacific heron (*Ardea pacifica*), white-faced heron (*A. novaehollandiae*), great egret (*Egretta alba*), nankeen night heron (*Nycticorax caledonicus*), yellow-billed spoonbill (*Platalea flavipes*), great cormorant or *kart-kart* (*Phalacrocorax carbo*), little black cormorant or *koordjikit* (*P. sulcirostris*), little pied cormorant (*P. melanoleucos*) and blue-billed duck (*Oxyura australis*), as well as a suite of macroinvertebrate species that provide a major food source for waterbirds.

- Criterion 4: **A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.** When full or near full, Toolibin Lake supports more breeding waterbird species than all other inland wetlands in south-west WA. These include the freckled duck, which has a very small breeding population in south-west Western Australia (estimated population 500-1,000, Wetlands International 2012). The lake also supports small breeding colonies of cormorants, egrets, night herons and spoonbills, which are otherwise scarce or absent in the inland agricultural area of south-west WA.

Appendix 3. Vegetation in conservation reserves in the Wheatbelt Region[1].

Vegetation remaining and protected in conservation reserves for IBRA regions and subregions in the Wheatbelt Region

IBRA regions and subregions	Total area (ha)	Area in the Wheatbelt Region (ha)	Percentage of IBRA in Wheatbelt Region	Percentage of Wheatbelt Region	Pre-1750 extent of vegetation (ha)	Current extent of vegetation (ha)	Percentage of pre-1750 extent remaining	Pre-1750 extent in reserves (ha)	Pre-1750 extent in reserves as percentage of pre-1750 extent	Current extent in reserves (ha)	Current extent in reserves as percentage of pre-1750 extent	Current extent in reserves as percentage of current extent
Avon Wheatbelt	**9,517,110**	**7,609,442**	**80**	**56**	**9,517,110**	**1,763,071**	**18.53**	**174,282**	**1.83**	**128,279**	**1.35**	**7.28**
Merredin	6,524,181	4,957,222	76	36	6,524,181	1,366,586	20.95	123,617	1.89	90,610	1.39	6.63
Katanning	2,992,929	2,652,220	89	20	2,992,929	396,485	13.25	50,665	1.69	37,668	1.26	9.50
Coolgardie	**12,912,204**	**1,570,970**	**12**	**11.6**	**12,912,204**	**12,648,491**	**97.96**	**1,404,590**	**10.88**	**1,403,513**	**10.87**	**11.10**
Southern Cross	6,010,833	1,570,970	26	11.6	6,010,833	5,773,838	96.06	975,502	16.23	974,436	16.21	16.88
Esperance Plains	**2,921,330**	**36,298**	**1**	**0.3**	**2,899,941**	**1,495,046**	**51.55**	**824,869**	**28.44**	**812,095**	**28.00**	**54.32**
Fitzgerald	1,577,940	36,298	2	0.3	1,570,678	866,322	55.16	435,094	27.70	431,466	27.47	49.80
Geraldton Sandplains	**3,142,150**	**17,864**	**0.6**	**0.1**	**3,136,038**	**1,404,373**	**44.78**	**484,347**	**15.44**	**481,742**	**15.36**	**34.30**
Lesueur Sandplain	1,172,152	17,864	2	0.1	1,171,775	502,918	42.92	209,685	17.89	208,077	17.76	41.37
Jarrah Forest	**4,509,075**	**888,972**	**20**	**6.5**	**4,506,660**	**2,416,018**	**53.61**	**634,024**	**14.07**	**616,486**	**13.68**	**25.52**
Southern Jarrah Forest	2,610,295	385,676	15	2,8	2,607,880	1,306,449	50.10	442,797	16.98	428,303	16.42	32.78
Northern Jarrah Forest	1,898,781	503,295	26	3.7	1,898,781	1,109,569	58.44	191,227	10.07	188,182	9.91	16.96
Mallee	**7,397,556**	**3,203,959**	**43**	**23.5**	**7,395,894**	**4,181,003**	**56.53**	**1,330,385**	**17.99**	**1,286,843**	**17.40**	**30.78**
Western Mallee	3,981,718	3,203,959	80	23.5	3,981,718	1,471,113	36.95	397,152	9.97	362,888	9.11	24.67
Swan Coastal Plain	**1,525,797**	**17,102**	**1**	**0.1**	**1,501,222**	**578,432**	**38.53**	**163,572**	**10.90**	**153,052**	**10.20**	**26.46**
Dandaragan Plateau	383,465	17,102	4	0.1	383,465	113,576	29.62	28,170	7.35	27,878	7.27	24.55
Yalgoo	**5,087,577**	**255,112**	**5**	**1.9**	**5,057,326**	**4,923,840**	**97.36**	**549,959**	**10.87**	**543,663**	**10.75**	**11.04**
Tallering	3,498,944	255,112	7	1.9	3,498,944	3,387,093	96.80	74,840	2.14	74,776	2.14	2.21

Numbers of vegetation associations in IBRA subregions

IBRA subregion	Total no. of vegetation associations	No. of vegetation associations unreserved (IUCN I-IV, Pre-1750 extent)	No. of vegetation associations less than 10% reserved (IUCN I-IV, Pre-1750 extent)	Total no. of vegetation associations under-represented in reserves	Percentage of vegetation associations under-represented in reserves
Merredin	105	41	56	97	92
Katanning	89	36	44	80	90
Southern Cross	67	29	8	37	55
Fitzgerald	52	9	9	18	35
Lesueur Sandplain	51	8	15	23	45
Southern Jarrah Forest	74	14	23	37	50
Northern Jarrah Forest	44	16	12	28	64
Western Mallee	72	25	25	50	69
Dandaragan Plateau	33	17	11	28	85
Tallering	70	56	8	64	91

[1] = Data sourced from DBCA 2017 Statewide Vegetation Statistics.

Vegetation associations

Beard's vegetation associations (Number and description)[1]		Significance criteria[2]	A. Pre-1750 extent (ha)	B. Current extent (ha)	C. % of pre-1750 extent	D. Pre-1750 extent in conservation reserves (ha)	E. % pre-1750 extent protected as proportion of pre-1750 extent	F. Current extent in conservation reserves (ha)	G. % current extent protected as proportion of pre-1750 extent	H. % current extent protected as proportion of current extent	Area within the planning area (ha)
3	Medium forest; jarrah-marri		2,661,404.62	1,806,035.91	67.86	492,727.49	18.51	485,203.49	18.23	26.87	938
4	Medium woodland; marri & wandoo	1, 3	1,054,279.89	287,300.55	27.25	46,690.15	4.43	45,483.73	4.31	15.83	2,527
5	Medium woodland; wandoo & powderbark (*Eucalyptus accedens*)		51,730.85	24,058.10	46.51	8,177.95	15.81	8,108.64	15.67	33.70	4,964
7	Medium woodland; York gum (*Eucalyptus loxophleba*) & wandoo	1, 3	179,724.65	22,885.35	12.73	530.29	0.30	519.68	0.29	2.27	466
8	Medium woodland; salmon gum & gimlet	1	694,638.13	346,425.77	49.87	45,259.40	6.52	45,019.60	6.48	13.00	14,539
14	Low forest; jarrah		94,609.36	70,205.15	74.21	58,615.81	61.96	57,908.79	61.21	82.49	24
25	Low woodland; *Allocasuarina huegeliana* & York gum	1	13,765.49	6,849.45	49.76	43.71	0.32	43.49	0.32	0.63	30
27	Low woodland; paperbark (*Melaleuca* sp.)		130,385.33	92,770.71	71.15	70,976.09	54.44	69,436.71	53.26	74.85	18
36	Shrublands; thicket, acacia-casuarina alliance	1	495,430.67	226,242.18	45.67	25,542.77	5.16	25,405.96	5.13	11.23	9,688
37	Shrublands; teatree thicket	1	39,296.52	24,717.36	62.90	4,881.40	12.42	4,657.68	11.85	18.84	1,152
41	Shrublands; teatree scrub	1	194,250.71	182,311.25	93.85	21,734.87	11.19	19,186.52	9.88	10.52	6,288
47	Shrublands; tallerack mallee-heath		1,033,054.74	370,433.21	35.86	183,924.49	17.80	182,639.89	17.68	48.30	7,587
48	Shrublands; scrub-heath	1	30,814.22	12,125.98	39.35	2,414.74	7.84	2,228.88	7.23	18.38	702
125	Bare areas; salt lakes	1	3,485,785.49	3,146,487.23	90.27	244,747.06	7.02	188,445.86	5.41	5.99	60,874
126	Bare areas; freshwater lakes		23,503.39	9,558.32	40.67	10,920.07	46.46	3,570.70	15.19	37.36	3
128	Bare areas; rock outcrops	1	329,836.19	288,813.54	87.56	50,024.43	15.17	48,913.18	14.83	16.94	18,994
131	Mosaic: Medium woodland; salmon gum & gimlet/Shrublands; mallee scrub, redwood & black marlock	1, 2, 3	181,154.83	14,875.75	8.21	1,423.18	0.79	1,339.20	0.74	9.00	1,544
141	Medium woodland; York gum, salmon gum & gimlet	1	1,158,760.28	960,755.60	82.91	139,313.03	12.02	139,169.14	12.01	14.49	44,843
142	Medium woodland; York gum & salmon gum	1, 3	787,948.47	208,347.17	26.44	8,789.97	1.12	8,044.80	1.02	3.86	2,143
147	Succulent steppe with scrub; acacia species over saltbush	1	35,477.63	27,153.79	76.54	4,297.10	12.11	1,896.49	5.35	6.98	4,313
169	Shrublands; mulga & miniritchie scrub	1	430,552.92	430,540.61	100.00	30,175.06	7.01	30,175.06	7.01	7.01	0
221	Succulent steppe; saltbush	1	63,720.06	59,923.05	94.04	3,517.07	5.52	3,418.48	5.36	5.70	387
256	Low woodland; York gum, and cypress pine (adjacent to e6pMLi)		67,665.63	67,660.59	99.99	30,331.29	44.83	30,331.29	44.83	44.83	30,331
314	Succulent steppe with open woodland; York gum over saltbush	1	7,442.34	7,036.96	94.55	1,083.81	14.56	1,083.81	14.56	15.40	1,084
352	Medium woodland; York gum	1, 3	724,268.73	142,018.85	19.61	3,163.18	0.44	3,080.39	0.43	2.17	730
356	Succulent steppe with open woodland; eucalypts over saltbush	1	4,330.03	2,098.70	48.47	158.77	3.67	99.92	2.31	4.76	159

Beard's vegetation associations (Number and description)[1]		Significance criteria[2]	A. Pre-1750 extent (ha)	B. Current extent (ha)	C. % of pre-1750 extent	D. Pre-1750 extent in conservation reserves (ha)	E. % pre-1750 extent protected as proportion of pre-1750 extent	F. Current extent in conservation reserves (ha)	G. % current extent protected as proportion of pre-1750 extent	H. % current extent protected as proportion of current extent	Area within the planning area (ha)
380	Shrublands; scrub-heath on sandplain		580,374.88	351,916.09	60.64	102,627.71	17.68	101,849.48	17.55	28.94	10,874
416	Low woodland; mulga mixed with cypress pine & York gum	1	240,331.19	239,594.51	99.69	14,785.04	6.15	14,785.04	6.15	6.17	12,142
435	Shrublands; *Acacia neurophylla*, *A. beauverdiana* & *A. resinomarginea* thicket	1	994,575.29	762,428.27	76.66	133,747.55	13.45	133,612.85	13.43	17.52	35,620
437	Shrublands; Mixed acacia thicket on sandplain	1	505,364.84	475,077.95	94.01	63,192.73	12.50	63,184.85	12.50	13.30	28,170
483	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex; red mallee mallee and mixed sparse dwarf shrubs over *Triodia basedowii*	1	439,579.05	439,546.87	99.99	22,696.47	5.16	22,696.47	5.16	5.16	22,423
511	Medium woodland; salmon gum & morrel	1	700,692.60	520,615.26	74.30	99,008.89	14.13	96,434.99	13.76	18.52	72,717
516	Shrublands; mallee scrub, black marlock		607,434.08	332,848.54	54.80	146,226.23	24.07	145,790.72	24.00	43.80	567
519	Shrublands; mallee scrub, *Eucalyptus eremophila*	1	2,333,413.96	1,440,062.48	61.71	244,844.01	10.49	243,148.55	10.42	16.88	164,345
520	Shrublands; *Acacia quadrimarginea* thicket		37,922.62	37,369.58	98.54	10,073.92	26.56	10,073.92	26.56	26.96	464
522	Medium woodland; redwood (*Eucalyptus transcontinentalis*) & merrit (*E. floctoniae*)	1	709,714.81	709,228.06	99.93	30,580.07	4.31	30,580.07	4.31	4.31	3,762
535	Medium woodland; rough fruited mallee on greenstone hills	1	24,345.58	23,536.42	96.68	0	0	0	0	0	7,059
536	Medium woodland; morrell & rough fruited mallee (*Eucalyptus corrugata*)	1	13,177.53	5,432.82	41.23	1,293.86	9.82	1,277.38	9.69	23.51	1,294
538	Shrublands; *Acacia brachystachya* scrub	1	147,821.77	144,203.41	97.55	16,994.57	11.50	16,992.69	11.50	11.78	5,260
551	Shrublands; *Allocasuarina campestris* thicket	1, 3	302,423.84	83,684.80	27.67	19,645.28	6.50	19,602.91	6.48	23.42	18,785
552	Shrublands; *Casuarina acutivalvus* & calothamnus (also melaleuca) thicket on greenstone hills	1	33,907.96	31,668.72	93.40	303.65	0.90	302.44	0.89	0.96	24
631	Succulent steppe with woodland and thicket; York gum over *Melaleuca thyoides* & samphire	1	106,852.97	50,232.96	47.01	2,604.61	2.44	2,267.38	2.12	4.51	383
676	Succulent steppe; samphire	1	2,063,413.95	1,963,881.55	95.18	74,093.82	3.59	73,683.23	3.57	3.75	390
684	Mosaic: Shrublands; Shrublands; jam scrub with scattered York gum in the valleys/*Allocasuarina campestris* thicket	1, 3	143,704.04	35,609.28	24.78	7,841.65	5.46	1,271.56	0.88	3.57	6,587
694	Shrublands; scrub-heath on yellow sandplain banksia-xylomelum alliance in	1, 3	346,493.81	67,463.56	19.47	32,261.54	9.31	32,003.31	9.24	47.44	1,870

Beard's vegetation associations (Number and description)[1]		Significance criteria[2]	A. Pre-1750 extent (ha)	B. Current extent (ha)	C. % of pre-1750 extent	D. Pre-1750 extent in conservation reserves (ha)	E. % pre-1750 extent protected as proportion of pre-1750 extent	F. Current extent in conservation reserves (ha)	G. % current extent protected as proportion of pre-1750 extent	H. % current extent protected as proportion of current extent	Area within the planning area (ha)
	the Geraldton Sandplain & Avon-Wheatbelt Regions										
697	Shrublands; scrub-heath on lateritic sandplain in the southern Geraldton Sandplain Region	1, 3	187,289.66	55,905.69	29.85	13,933.90	7.44	13,885.05	7.41	24.84	392
931	Medium woodland; yate	1	31,742.71	14,269.49	44.95	2,396.46	7.55	2,022.84	6.37	14.18	470
936	Medium woodland; salmon gum	1	698,751.99	676,689.18	96.84	15,670.83	2.24	15,398.78	2.20	2.28	7,550
938	Medium woodland; York gum & yate	1, 3	77,552.22	16,919.86	21.82	1,283.70	1.66	1,271.48	1.64	7.51	30
941	Mosaic: Medium woodland; salmon gum & morrel/Shrublands; mallee scrub, redwood	1	34,247.70	17,289.95	50.48	2,825.25	8.25	2,613.72	7.63	15.12	2,825
945	Mosaic: Medium woodland; salmon gum/Shrublands; mallee scrub, redwood & black marlock	1, 3	176,611.70	32,672.36	18.50	4,216.28	2.39	3,917.94	2.22	11.99	4,210
946	Medium woodland; wandoo	1, 3	53,225.38	14,074.77	26.44	1,520.44	2.86	1,503.61	2.82	10.68	419
947	Medium woodland; powderbark & mallet	1	33,788.45	11,698.60	34.62	2,386.43	7.06	2,325.29	6.88	19.88	2,476
948	Medium woodland; York gum & river gum	1, 4	1,441.06	442.92	30.74	6.70	0.46	6.64	0.46	1.50	7
949	Low woodland; banksia	1	218,193.94	122,966.39	56.36	30,657.81	14.05	30,127.60	13.81	24.50	90
950	Medium woodland; *Casuarina obesa*	1, 4	496.91	287.14	57.78	121.10	24.37	23.09	4.65	8.04	121
951	Succulent steppe with sparse woodland & thicket; York gum & Kondinin blackbutt over teatree thicket & samphire	1	27,507.54	11,707.21	42.56	4,454.42	16.19	1,967.68	7.15	16.81	4,454
952	Shrublands; dryandra heath	1, 3	59,175.04	10,712.66	18.10	3,902.37	6.59	3,844.77	6.50	35.89	3,832
953	Succulent steppe with thicket; teatree over samphire (m5)	1	9,928.13	3,233.73	32.57	710.94	7.16	386.10	3.89	11.94	710
954	Shrublands; thicket, Jam & *Allocasuarina huegeliana*	1, 3, 4	6,501.57	1,780.43	27.38	346.19	5.32	328.78	5.06	18.47	346
955	Mosaic: Shrublands; scrub-heath (South East Avon)/Shrublands; *Allocasuarina campestris* thicket	1, 3	139,324.02	15,281.57	10.97	1,791.20	1.29	1,764.01	1.27	11.54	1,791
956	Shrublands; *Allocasuarina campestris* thicket with scattered wandoo	1, 3	25,555.66	3,425.94	13.41	1,201.65	4.70	1,176.12	4.60	34.33	1,160
959	Succulent steppe with sparse woodland & thicket; yorrell & Kondinin blackbutt over teatree & samphire	1	13,092.41	5,666.37	43.28	2,995.37	22.88	1,761.62	13.46	31.09	3,126
960	Shrublands; mallee scrub, redwood & black marlock	1, 3	220,441.13	30,376.26	13.78	11,030.64	5.00	10,947.24	4.97	36.04	11,031
961	Mosaic: Shrublands; scrub-heath (South East Avon)/ Shrublands; *Allocasuarina campestris* thicket	1, 3	27,799.68	5,006.65	18.01	2,886.68	10.38	2,865.22	10.31	57.23	2,887

Beard's vegetation associations (Number and description)[1]		Significance criteria[2]	A. Pre-1750 extent (ha)	B. Current extent (ha)	C. % of pre-1750 extent	D. Pre-1750 extent in conservation reserves (ha)	E. % pre-1750 extent protected as proportion of pre-1750 extent	F. Current extent in conservation reserves (ha)	G. % current extent protected as proportion of pre-1750 extent	H. % current extent protected as proportion of current extent	Area within the planning area (ha)
963	Medium woodland; yate & paperbark (*Melaleuca* spp.)	1	6,072.46	2,247.35	37.01	451.67	7.44	406.57	6.70	18.09	392
967	Medium woodland; wandoo and yate	1, 3	102,984.81	16,069.42	15.60	686.16	0.67	667.44	0.65	4.15	355
968	Medium woodland; jarrah, marri & wandoo	1	296,877.84	94,970.94	31.99	33,516.71	11.29	32,976.00	11.11	34.72	58
972	Medium woodland; jarrah, marri, wandoo & yate	1	23,293.73	8,538.37	36.66	687.23	2.95	571.92	2.46	6.70	0
975	Low woodland; jarrah		17,275.64	15,563.36	90.09	13,664.37	79.10	13,604.22	78.75	87.41	4
976	Succulent steppe with low woodland; myoporum over samphire	1, 4	2,321.77	1,096.63	47.23	438.05	18.87	278.79	12.01	25.42	19
986	Shrublands; mallee-heath (Stirling Range)		30,400.45	15,586.99	51.27	14,245.24	46.86	13,995.98	46.04	89.79	2
988	Succulent steppe with thicket; *Melaleuca thyoides* over samphire	1	96,635.22	29,324.55	30.35	2,362.67	2.44	1,669.53	1.73	5.69	1,027
992	Medium forest; jarrah & wandoo (*Eucalyptus wandoo*)	1, 3	122,048.81	29,400.23	24.09	3,318.40	2.72	3,200.48	2.62	10.89	366
1003	Medium forest; jarrah, marri & wandoo		20,108.58	8,919.98	44.36	4,485.13	22.30	4,459.90	22.18	50.00	604
1004	Mosaic: Medium open woodland; wandoo/Shrublands; mixed heath		9,768.20	3,895.93	39.88	1,627.46	16.66	1,621.99	16.60	41.63	7
1006	Medium woodland; jarrah, wandoo & powderbark	1	44,908.30	21,769.73	48.48	1,995.83	4.44	1,962.74	4.37	9.02	10
1023	Medium woodland; York gum, wandoo & salmon gum (*Eucalyptus salmonophloia*)	1, 3	1,601,605.76	172,944.35	10.80	13,932.61	0.87	12,464.25	0.78	7.21	14,215
1024	Shrublands; mallee & casuarina thicket	1, 3	742,950.54	87,187.48	11.74	8,341.69	1.12	8,206.73	1.10	9.41	8,424
1030	Low woodland; *Banksia attenuata* & *B. menziesii*	1	139,012.86	88,949.55	63.99	13,656.15	9.82	13,432.67	9.66	15.10	202
1036	Low woodland; *Banksia prionotes*		86,320.42	32,026.02	37.10	15,854.23	18.37	15,770.24	18.27	49.24	11
1041	Low woodland; *Allocasuarina huegeliana* & Jam	1, 4	4,781.12	1,507.46	31.53	320.95	6.71	318.44	6.66	21.12	273
1048	Mosaic: Shrublands; melaleuca patchy scrub/Succulent steppe; samphire	1	13,814.90	5,574.00	40.35	36.08	0.26	29.75	0.22	0.53	36
1049	Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	1, 2, 3	833,384.77	56,618.34	6.79	3,583.75	0.43	3,372.40	0.40	5.96	3,488
1053	Shrublands; *Melaleuca uncinata* thicket with scattered York gum	1, 3	13,823.28	3,131.97	22.66	988.83	7.15	866.84	6.27	27.68	986
1055	Shrublands; York gum & *Eucalyptus sheathiana* mallee scrub	1, 3	136,168.62	18,159.95	13.34	1,300.10	0.95	1,282.41	0.94	7.06	1,310
1056	Shrublands; thicket, acacia & *Allocasuarina campestris*	1, 3	21,072.67	4,069.20	19.31	1,002.00	4.75	992.42	4.71	24.39	1,002
1057	Mosaic: Shrublands; Medium woodland; salmon gum & gimlet/York gum & *Eucalyptus sheathiana* mallee scrub	1, 3	145,310.83	17,564.46	12.09	2,879.82	1.98	2,843.25	1.96	16.19	2,880

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1061	Mosaic: Medium sparse woodland; salmon gum & yorrell/Succulent steppe; saltbush & samphire	1	42,747.48	20,355.18	47.62	7,625.25	17.84	5,321.69	12.45	26.14	7,625
1062	Succulent steppe with open woodland & thicket; York gum over *Melaleuca thyiodes* & samphire	1	22,527.45	10,641.74	47.24	2,426.69	10.77	1,683.99	7.48	15.82	2,427
1063	Medium-Low woodland; York gum & cypress pine (*Callitris columellaris*)		172,481.64	163,351.69	94.71	127,366.72	73.84	127,366.72	73.84	77.97	127,367
1065	Mosaic: Shrublands; Medium woodland; wandoo & gimlet/York gum & *Eucalyptus sheathiana* mallee scrub	4	862.67	434.52	50.37	391.58	45.39	377.47	43.76	86.87	392
1067	Medium woodland; salmon gum, morrel, gimlet & rough fruited mallee	1	15,271.65	13,418.79	87.87	1,555.91	10.19	1,555.91	10.19	11.59	1,556
1068	Medium woodland; salmon gum, morrel, gimlet & *Eucalyptus sheathiana*	1	268,900.45	142,088.42	52.84	16,789.89	6.24	16,761.06	6.23	11.80	16,790
1071	Succulent steppe with scrub; acacia species over saltbush & bluebush	4	762.18	762.18	100.00	262.73	34.47	262.73	34.47	34.47	263
1073	Medium woodland; wandoo & mallet	1	18,806.54	6,123.80	32.56	829.74	4.41	543.20	2.89	8.87	830
1074	Succulent steppe with open woodland & thicket; wandoo & *Allocasuarina obesa* over teatree & samphire		4,625.25	2,590.12	56.00	2,300.84	49.75	1,437.10	31.07	55.48	2,301
1075	Shrublands; mallee scrub, *Eucalyptus eremophila* & black marlock (*Eucalyptus redunca*)	1, 3	527,044.71	74,869.81	14.21	28,637.35	5.43	28,326.59	5.37	37.83	27,459
1077	Medium woodland; jarrah & river gum	1, 4	2,539.87	1,500.29	59.07	31.14	1.23	30.93	1.22	2.06	31
1078	Medium woodland; salmon gum, redwood, merrit, gimlet & *Eucalyptus sheathiana*	4	757.32	757.32	100.00	757.32	100.00	757.32	100.00	100.00	757
1079	Mosaic: Medium open woodland; salmon gum & morrel/Succulent steppe; saltbush		10,435.25	7,089.90	67.94	4,515.57	43.27	3,692.22	35.38	52.08	4,516
1081	Shrublands; mallee scrub, *Eucalyptus longicornis* & *E. sheathiana*	1, 3	15,147.74	2,638.07	17.42	426.98	2.82	420.41	2.78	15.94	427
1083	Succulent steppe with open woodland & scrub; wandoo, salmon gum & *Allocasuarina obesa* over teatree & samphire	1	10,380.18	3,712.50	35.77	945.35	9.11	645.69	6.22	17.39	945
1085	Medium woodland; wandoo & blue mallet (*Eucalyptus gardneri*)	1, 3	51,786.78	5,935.05	11.46	16.65	0.03	16.26	0.03	0.27	17
1087	Medium woodland; wandoo, morrell & blue mallet	1, 4	752.94	241.75	32.11	34.72	4.61	19.85	2.64	8.21	75

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1091	Low woodland; *Banksia prionotes* & *Allocasuarina huegeliana*	1, 4	715.73	293.12	40.95	4.30	0.60	1.20	0.17	0.41	4
1092	Medium woodland; wandoo, York gum & morrell	1, 2, 3	77,951.71	7,315.23	9.38	250.44	0.32	177.79	0.23	2.43	260
1093	Succulent steppe with open woodland & thicket; eucalypts & *Allocasuarina obesa* over teatree & samphire	1, 3, 4	8,258.83	1,660.29	20.10	993.19	12.03	433.47	5.25	26.11	992
1094	Mosaic: Medium woodland; York gum & salmon gum/Shrublands; mallee scrub *Eucalyptus eremophila* & black marlock	1, 2, 3	70,340.42	6,317.94	8.98	98.59	0.14	96.39	0.14	1.53	99
1098	Mosaic: Medium sparse woodland; salmon gum & morrel/Succulent steppe; samphire		13,996.84	5,549.30	39.65	2,677.93	19.13	2,287.49	16.34	41.22	2,678
1147	Shrublands; scrub-heath in the south-east Avon-Wheatbelt Region	1, 2, 3	42,855.40	4,074.26	9.51	501.10	1.17	418.97	0.98	10.28	501
1148	Shrublands; scrub-heath in the Coolgardie Region		260,383.60	258,227.40	99.17	44,767.04	17.19	44,766.03	17.19	17.34	26,270
1200	Mosaic: Medium woodland; salmon gum & morrel/Shrublands; mallee scrub *Eucalyptus eremophila* & black marlock (*E. redunca*)	1, 3	161,666.02	22,153.06	13.70	1,962.36	1.21	1,678.38	1.04	7.58	1,962
1271	Bare areas; claypans	1	86,683.77	86,555.32	99.85	206.93	0.24	130.85	0.15	0.15	207
1413	Shrublands; acacia, casuarina & melaleuca thicket	1	1,679,916.32	1,286,855.48	76.60	192,609.01	11.47	192,480.33	11.46	14.96	177,041
1967	Medium woodland; wandoo, yate & river gum	1, 3	25,501.47	7,356.82	28.85	456.19	1.79	316.62	1.24	4.30	95
2047	Shrublands; tamma & dryandra thicket	4	1,462.92	921.00	62.96	467.16	31.93	456.53	31.21	49.57	467
2048	Shrublands; scrub-heath in the Mallee Region	1	322,219.98	160,959.07	49.95	25,173.57	7.81	24,848.71	7.71	15.44	21,578
2093	Succulent steppe with open woodland & scrub; yate over teatree & samphire		9,416.50	4,517.19	47.97	2,707.60	28.75	1,911.36	20.30	42.31	2,633
3041	Mosaic: Low woodland; *Allocasuarina huegeliana* & jam around granite rocks	1, 3, 4	6,373.97	1,839.51	28.86	181.91	2.85	157.78	2.48	8.58	227

[1] = Descriptions are shown as they appear in the DBCA 2017 Statewide Vegetation Statistics, although some species taxonomy for vegetation descriptions may have changed.

[2] Criteria: 1 = Poorly reserved <15% of pre-1750 extent in conservation reserve system (column G).
2 = Extensively cleared <10% of pre-1750 extent remaining and can therefore be considered endangered (column C).
3 = Extensively cleared <30% of pre-1750 extent remaining is the threshold level below which species loss appears to accelerate exponentially at an ecosystem level and can therefore be considered vulnerable (column C).
4 = Limited current extent <2,000ha remaining (column B).

Appendix 4. Proposed reserves

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
Brookton	14214	Crown reserve	131	unvested	timber	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
Broomehill-Tambellup	19926	Crown reserve UCL (PIN 667657)	11 6	unvested	camping, gov't requirements	C	Vest in CPC and add to C36324 Peringillup Nature Reserve. The SWNTS may affect the tenure outcome
	29056	Tunney National Park	56	Broomehill-Tambellup Shire	national park	A	Vest in CPC, subject to consultation with the Shire. Investigate most appropriate tenure category
Bruce Rock	11649	Crown reserve	28	Bruce Rock Shire	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	12985	Crown reserve	130	Bruce Rock Shire	parklands, waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	13327	Crown reserve	90	Bruce Rock Shire	waterway	C	Vest in CPC, subject to consultation with the Shire
	13502	Crown reserve	34	Bruce Rock Shire	waterway	C	Vest in CPC. Consider amalgamation with reserve 17420. Subject to consultation with the Shire
	14171	Crown reserve	40	DWER	waterway	C	Vest in CPC and add to A23141 Pikaring West Nature Reserve
	20076	Crown reserve	33	Bruce Rock Shire	gov't requirements, timber	C	Vest in CPC, subject to consultation with the Shire
Corrigin	10294	Crown reserve	22	unvested	gov't requirements	C	Vest in CPC as a nature reserve, although part of reserve may be considered for 'sandalwood establishment'
	10295	Crown reserve	36	Corrigin Shire	conservation, landscape protection	C	Vest in CPC and add to A30324 Kurrekutten Nature Reserve
	10529 16128 16747	Crown reserves	34 0.4 4	unvested unvested DWER	camping hall waterway	C C C	Vest in CPC as a nature reserve and amalgamate
	12511	Crown reserve	94	unvested	camping, waterway	A	Vest in CPC as a nature reserve, subject to consultation with the Shire
	15411	Crown reserve	2	unvested	children, school	C	Vest in CPC as a nature reserve and amalgamate with R14014
	17299	Crown reserve	39	Corrigin Shire	gravel, landscape protection	C	Vest in CPC, subject to consultation with the Shire
	20416 23693	Crown reserve Crown reserve	3 34	unvested unvested	sheep dip, stock holding yards gov't requirements	C C	Vest in CPC as a nature reserve
	25002	Crown reserve	48	unvested	waterway	C	Vest in CPC as a nature reserve
Cranbrook		UCL (Hay Loc. 1997)	60				Vest the northern half of parcel in CPC as a class 'A' conservation park, subject to consultation with DMIRS and SWNTS resolution.
Cuballing		State Forest No. 51 and 53	16,393				Parts also within the Narrogin, Wandering and Williams shires. Create class 'A' national park*
		State Forest No. 53	110				Parts also within the Narrogin, Wandering and Williams shires. Create class 'A' national park*
	19794	Crown reserve	242	unvested	mallet, timber	C	Vest in CPC as a nature reserve
	20474	Crown reserve	8	unvested	mallet, timber	C	Vest in CPC
	36413	Crown reserve	67	unvested	trigonometrical station	C	Vest in CPC as a nature reserve, and amalgamate with nearby department-managed lots P075785/13 and P064332/10
Dalwallinu		UCL 'Bunketch Siding' (PINs 1001123, 1001125)	80				Vest in CPC as a nature reserve

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
	9235	Crown reserve – Bunketch Rocks	162	unvested	waterway	C	Vest in CPC as a nature reserve
	9237	Crown reserve	82	DWER	conservation, fauna, protection of flora, waterway	C	Vest in CPC and add to A10351 Snake Gully Nature Reserve
	9238	Crown reserve	259	unvested	waterway	C	Vest in CPC as a nature reserve
	9423	Crown reserve – Petrudor Rocks	798	DWER	waterway	C	Vest most in CPC as conservation park, subject to consultation with the Shire on the remainder becoming a Shire recreation reserve
	11159 17039	Crown reserve Crown reserve	62 165	DWER unvested	waterway gov't requirements	C C	Vest in CPC as a nature reserve
	12614	Crown reserve – Nugadong Nature Reserve	405	Dalwallinu Shire	conservation, protection of flora	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	12693 17659	Crown reserve Crown reserve	279 43	unvested WA Rifle Association	gov't requirements rifle range	C C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	15351 17626 24671	Crown reserve Crown reserve Crown reserve	10 56 333	DWER unvested DWER	waterway waterway waterway	C C C	Vest in CPC as a nature reserve
	15463	Crown reserve – Xantippe Tanks	250	DWER	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on the road reserve, tank and associated catchment, existing gravel pit and metal dump
	16117 17859	Crown reserve Crown reserve	3 98	DWER DWER	waterway waterway	C C	Vest in CPC and add to A29326 Nugadong Nature Reserve
	16379 15467 23453	Buntine nature reserve Crown reserve Crown reserve	1,370 49 81	DWER DWER Dalwallinu Shire	conservation, fauna, protection of flora, waterway waterway, LA standpipe recreation	A C C	Environment Protection Authority (EPA) Red Book Recommendation 4.8.1 covers much of R16379. Vest in CPC and add to A26837 Buntine Nature Reserve, subject to consultation with the Shire and Water Corporation
	18245 25191 	Crown reserve Crown reserve UCL (PIN 1050915, and Lot 1 on Diagram 46614	131 4 18 14	Dalwallinu Shire Dalwallinu Shire	conservation, fauna, protection of flora camping	C C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	21148	Crown reserve	117	Dalwallinu Shire	gravel	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	21367	Crown reserve	48	Water Corporation	waterway	C	Vest in CPC as a nature reserve
	26781	Crown reserve	847	DWER	water supply	C	Vest in CPC and add to A26259 Carlyarn Nature Reserve
	32060	Crown reserve	53	DWER	water supply	C	Vest in CPC and add to A27283 Goodlands Nature Reserve
Dowerin	11688 15794	Crown reserve Cullimbin Nature Reserve	405 41	DWER DWER	fauna, protection of flora, waterway conservation, fauna, protection of flora, waterway	C A	Vest in CPC as a nature reserve, and amalgamate C11688 into A15794
	13758 15533	Crown reserve Crown reserve	49 6 22	unvested unvested	waterway quarry	C C	Vest in CPC, amalgamate and add to A38703 Amery Nature Reserve

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
		UCL (PINs 968691, 968624, 968679, Lot 27 on Plan 205703)					
	21415	Crown reserve	95	unvested	gov't requirements	C	Vest in CPC as a nature reserve
Dumbleyung	16776	Crown reserve	356	DWER	conservation, fauna, protection of flora, waterway	C	Vest in CPC and add part to A25711 Tarin Rock Nature Reserve
	18254	Merilup nature reserve	604	DWER	protection of flora, waterway	C	Vest in CPC and add to nature reserve C46838
		UCL (Williams Loc. 15779) UCL (PIN 657575) UCL (PIN 11866729)	388 13 2				Vest in CPC, amalgamate and add to C26664 Dumbleyung Lake Nature Reserve
Katanning	5341	Crown reserve	77	unvested	resting place	C	Vest in CPC and add to A25136 Coblinine Nature Reserve
	9663	Crown reserve	16	DWER	water supply	C	Vest in CPC and add to A32204 Moojebing Nature Reserve
	6272 24447 23240	Crown reserve Crown reserve Crown reserve	113 0.4 8	unvested unvested Katanning Shire	waterway gravel drainage	C C C	Amalgamate and vest in CPC as a nature reserve, subject to consultation with the Shire
Kent	10188 14417 21162	Crown reserve Crown reserve Crown reserve	36 46 11	unvested DWER unvested	water supply dam recreation	C C C	Vest in CPC as a nature reserve
	14522	Kwobrup Nature Reserve	277	DWER	conservation, fauna, protection of flora, waterway	C	Vest in CPC as a nature reserve
	18803	Chinocup Dam Nature Reserve	185	DWER	conservation, fauna, protection of flora, waterway	A	EPA Red Book Recommendation 4.8.6. Vest in CPC as a nature reserve
	28667	Crown reserve	13	DWER	water supply	C	Vest in CPC and add to C48436 Lake Bryde Conservation Park
		UCL (PIN 660500)	82				Vest in CPC and add to nature reserve C23218
Kojonup	9168	Crown reserve	53	unvested	waterway	C	Vest in CPC as a nature reserve
	10000	Crown reserve	63	unvested	river crossing, waterway	C	Vest in CPC and add to A9920 Maragoonda Nature Reserve
	39621	Crown reserve	369	DWER	conservation, fauna, protection of flora, waterway	A	Vest in CPC as a nature reserve
Kondinin		UCL (PIN 975687)	17				EPA Red Book Recommendation 4.7.6. Vest in CPC and add to A22519 Kondinin Lakes Nature Reserve
		UCL (PINs 641393, 641387, 641386) and a closed road	179				Vest in CPC and add to A21253 Lake Gounter Nature Reserve
		UCL (Roe Loc. 3155 on Plan 95401)	79				Vest in CPC as a nature reserve
		UCL Lake Cronin					Proposed expansion of A36526 Lake Cronin Nature Reserve boundaries consistent with EPA Red Book Recommendation 11.10
		UCL North Ironcaps (part PIN 642818) Middle Ironcaps (part PIN 642733)	314 311				EPA Red Book Recommendation 11.9.4. Vest in CPC as nature reserves

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
		South Ironcaps (part PIN 1201292)	298				
		UCL (PINs 642785-7, 12098285, 11997082)	3,578				Vest in CPC, amalgamate and add to nature reserve A28047. The SWNTS may affect the tenure outcome.
		UCL (Roe Loc. 1516 and PIN 641637)	270				Vest in CPC and add to A36128 Dragon Rocks Nature Reserve
		UCL (Roe Loc. 812) UCL (Roe Loc. 1343) UCL (Roe Loc. 1344)	46 48 88				Vest in CPC and add to A21253 Lake Gounter Nature Reserve
		UCL (Roe Loc. 3155)	79				Vest in CPC as a nature reserve, excluding small area for a water tank in association with the Kondinin-Hyden water pipe project
	8390	Crown reserve	476	DWER	waterway	C	Vest most of the reserve (excluding the dam) with CPC as a nature reserve, subject to consultation with the Shire
	17663	Crown reserve	253	DWER	waterway	C	Vest most of the reserve (excluding the picnic site and dam) with CPC as a nature reserve, subject to consultation with the Shire
	18593	Crown reserve	67	DWER	waterway	C	Vest in CPC as a nature reserve
	20340	Crown reserve	984	unvested	mallet, timber	C	Vest in CPC as a class 'A' nature reserve
	23164	Crown reserve	201	DWER	waterway	C	Vest in CPC as a nature reserve
Koorda	9231 21333	Crown reserve Crown reserve	427 159	Water Corporation Koorda Shire	waterway recreation, tennis courts	C C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	14406	Crown reserve	404	DWER	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on excision of dam and associated infrastructure
	15821	Crown reserve	380	Koorda Shire	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on excision of infrastructure area
	16245 20251	Koorda town site nature reserve Crown reserve	271 30	CPC unvested	conservation, fauna, protection of flora gov't requirements	A C	Vest in CPC and add C20251 to A16245, with excision of 4ha and 16ha from A16245 to the Shire as a sanitary site reserve and a consolidated sewage reserve, respectively
	19555 22567	Crown reserve Crown reserve UCL (PINs 747599, 1001334)	30 4 170 135	Koorda Shire Koorda Shire	recreation recreation	C C	Vest in CPC as a nature reserve
	19636	Crown reserve	189	DWER	waterway	C	Vest in CPC as a nature reserve
	19997	Crown reserve	49	DWER	waterway	C	Vest in CPC as a nature reserve
	20007	Crown reserve	10	DWER	water supply tank	C	Vest in CPC and add to nature reserve A23029
	20276 21703 23721	Crown reserve Crown reserve Crown reserve	40 34 0.6	Koorda Shire Koorda Shire Koorda Shire	Recreation golf sheep dip	C C C	Vest in CPC as a nature reserve
Kulin	17806	Crown reserve	43	unvested	town site	C	Vest in CPC
	18293	Crown reserve	54	unvested	waterway	C	Vest in CPC as a nature reserve
	29499	Crown reserve	426	unvested	gov't requirements	C	Vest in CPC as a nature reserve
	34520	Crown reserve	38	unvested	resting place	C	Vest in CPC and add to nature reserve C18311
		UCL (Roe Loc. 3135 and 2692)	206				Vest in CPC as a nature reserve
		UCL (Roe Loc. 1420)	251				Vest in CPC and add to A27927 Lake Hurlstone Nature Reserve

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
Lake Grace	13231	Crown reserve	233	DWER	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on excision of dam and catchment, and with Water Corporation on excision of tank and access
	17648	Crown reserve	348	DWER	conservation, fauna, protection of flora, waterway	A	Vest in CPC as a nature reserve
	18384	Crown reserve	267	Water Corporation	access, waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on excision of water catchment and dam
	18911	Crown reserve	102	DWER	waterway	C	Vest in CPC as a nature reserve
	18960	Crown reserve	47	Water Corporation	waterway	C	Vest in CPC as a conservation park, exclusive of Lot 303 on Plan 64852
	18961	Crown reserve	196	DWER	waterway	C	Vest in CPC as a nature reserve with the cleared area for the purpose of 'timber', subject to consultation with the Shire on excision of dam and catchment
	18981	Crown reserve	32	unvested	waterway	C	Vest in CPC as a nature reserve
	19789	Crown reserve	46	DWER	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on excision of dam and catchment for purpose of recreation and water
	20110	Crown reserve	981	DWER	conservation, fauna, protection of flora, waterway	C	Vest part in CPC as a nature reserve, subject to consultation with the Shire on excision of infrastructure
	20274	Crown reserve	342	DWER	tank	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on excision of dam for purpose of water
	20281 36444	Crown reserve Crown reserve UCL (PIN 645233) UCL (Lot 657 on Plan 155123) UCL (Lot 656 on Plan 204287) UCL (Lot 1025 on Plan 204287)	40 422 30,105 445 467 1,012	unvested unvested	waterway gov't requirements	C C	Vest Crown reserves as individual nature reserves, or if UCL is considered then combine into one nature reserve or add all to A25113 Lake Magenta Nature Reserve
	20710	Crown reserve	90	DWER	waterway	C	Vest in CPC as a nature reserve
	23140 19649	Crown reserve Crown reserve	494 32	unvested unvested	waterway camping	C C	Vest in CPC as a nature reserve and amalgamate
	23842	Crown reserve	155	DWER	water supply	C	Vest in CPC and add to R20218 Kathleen Nature Reserve, subject to consultation with the Shire on excision of dam and catchment
	28449	Crown reserve	243	DWER	conservation, fauna, protection of flora, waterway	C	Vest in CPC as a nature reserve
	34213	Crown reserve	324	DWER	waterway	C	Vest in CPC and add to A34523 Jackson Nature Reserve
	35117	Crown reserve	255	unvested	gravel	C	Vest in CPC as a nature reserve
		UCL (part PIN 644827)	47				Vest in CPC and add to A24435 Damnosa Nature Reserve, less southern section to be retained by the Shire
		UCL (Roe Loc. 102)	142				Vest in CPC as a class 'A' nature reserve
		UCL (Roe Loc. 1683)	307				Vest in CPC as a nature reserve, subject to consultation with the Shire on excision of dam and catchment

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
Merredin	10906	Crown reserve	690	Merredin Shire	water supply	C	Vest in CPC as a nature reserve
	24125	Crown reserve UCL (Avon Loc. 14031)	418 18	Merredin Shire	protection of flora	C	Vest in CPC as a nature reserve
	38543	Crown reserve	114	Merredin Shire	recreation	C	Vest in CPC as a nature reserve
Mt Marshall	12690 19513 22082	Crown reserve Crown reserve Crown reserve UCL (PINs 1000962, 1000963, 1089265)	62 2 175 29	unvested unvested Mt Marshall Shire	waterway waterway fauna	C C A	Vest in CPC as a nature reserve
	13509	Crown reserve	96	Mt Marshall Shire	parklands, waterway	C	Vest in CPC as a nature reserve
	15828 20524	Crown reserve Crown reserve	3,186 1,639	Mt Marshall Shire DWER	waterway waterway	C C	Vest in CPC as a nature reserve
	20523	Crown reserve	969	DWER	water supply	C	Vest in CPC as a nature reserve
	20529	Crown reserve	547	DWER	conservation, fauna, protection of flora, waterway	A	Vest in CPC and add to nature reserve A39703, subject to consultation with the Shire on 2ha excision for Dajoin Well tourist site
	25323	Crown reserve - North Cleary	178	unvested	waterway	C	Vest in CPC as a nature reserve
	29370 36300	Crown reserve Crown reserve	1,071 0.4	unvested unvested	gov't requirements trigonometrical station	C C	Vest in CPC as a nature reserve
Mukinbudin		Crown lease – Avon Loc. 28314	1,188				Vest in CPC as a nature reserve
		UCL (Avon Loc. 28519)	439				Vest in CPC as a nature reserve
		UCL (PIN 1004833) UCL (PIN 1004865) UCL (Ninghan Loc. 3063, 3193-3215,. 3217, 3772) road reserves	30,068 11,597 12,640 187				Vest in CPC as a nature reserve
	12592	Crown reserve					Overlaps two shires – for details see Nungarin Shire
	17926 19814 22819	Crown reserve Crown reserve Crown reserve	16 16 67	unvested trustees Mukinbudin Shire	waterway recreation sheep dip, stock holding yards	C C C	Vest in CPC and add to A23835 Karloning Nature Reserve
	18802	Crown reserve	212	DWER	waterway	C	Vest in CPC as a nature reserve, excluding the thin slivers of this reserve
	20514	Crown reserve	393	DWER	waterway	C	Vest in CPC as a nature reserve
	22163 22164	Crown reserve Crown reserve	71 7	DWER unvested	waterway recreation	C C	Vest in CPC and add to A29303 North Bonnie Rock Nature Reserve
	30876	Crown reserve	233	unvested	gov't requirements	C	Vest in CPC as a nature reserve
Narembeen	9929	Crown reserve	108	WA Agriculture Authority	water supply	C	Vest in CPC as a conservation park, subject to consultation with the Shire
	21130	Gibb Rock Crown reserve	223	DWER	water supply	C	Vest in CPC as a nature reserve for the purpose of 'conservation of flora and fauna and water', subject to consultation with the Shire on a water agreement including excision of tank and access roads

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
	25469	Anderson Rocks reserve	340	DWER	waterway	C	Vest in CPC as a conservation park, subject to consultation with DWER and the Shire
	27348	Crown reserve	175	DWER	water supply	C	Vest in the CPC as a nature reserve, subject to consultation with the Shire on gravel values
	28037	Twine Reserve	174	unvested	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire on tourism and gravel values, and with Aboriginal Legal Service/Quairading Aboriginal Progress Association
Narrogin		UCL (Williams Loc. 9813)	40				Vest in CPC and add to A19120 Birdwhistle Nature Reserve
	16285 17137	Crown reserve Crown reserve	17 3	unvested unvested	railway waterway	C C	Vest in CPC and amalgamate
	19107 29611	Crown reserve Crown reserve	98 4	unvested unvested	mallet, timber gravel	C C	Vest in CPC as a nature reserve and amalgamate, subject to consultation with the Shire
Northam		Crown freehold – department interest (part of Lot 322 on Plan 75994)	108				Vest in CPC as a nature reserve
Nungarin	1477	Crown reserve – Mt Moore/Talgomine	259	unvested	camping, waterway	C	Vest in CPC as a nature reserve
	11215	Crown reserve	122	unvested	waterway	C	Vest in CPC as a nature reserve
	12592	Crown reserve	82	DWER	waterway	C	Vest in CPC as a nature reserve
	21759	Crown reserve UCL (PIN 948554)	748 269	unvested	common	C	Vest in CPC as a nature reserve
		UCL (Avon Loc. 29009)	2,133				Vest in CPC and add to C24789 Lake Campion Nature Reserve
		Crown freehold – department interest (Lot 21 on Plan 65468)	859				Vest in CPC as a nature reserve
Pingelly	1891	Crown reserve	38	Pingelly Shire	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	10753 12895	Crown reserve Crown reserve	54 8	DWER Trustees	conservation, fauna, protection of flora, waterway recreation	A C	Vest in CPC as a 5(1)(h) reserve for 'Conservation and Recreation' and amalgamate
	20097	Crown reserve	37	unvested	mallet, timber	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
Quairading	13002 21459 28892	Crown reserve Crown reserve Crown reserve UCL Quairading town site (Lot 375 on Plan 404466, Lot 500 on Plan 66103, PINs 1097600-1, 977349)	82 56 3 109	unvested Quairading Shire Quairading Shire	clubs, rifle range common drive-in theatre, public recreation	C C C	Vest in CPC as a nature reserve and amalgamate, subject to consultation with the Shire on the exclusion of a portion for the purposes of 'Rural Residential'
Trayning	12356	Crown reserve	188	unvested	water supply	C	Vest in CPC as a nature reserve
	13510	Crown reserve UCL (PIN 954742)	120 36	unvested	waterway	C	Vest with CPC as a nature reserve and amalgamate
	14263	Crown reserve	192	unvested	common	C	Vest in CPC as a nature reserve

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
Victoria Plains		Crown freehold – department interest (Lot 55 on Plan 59030)	221				Vest in CPC as a class 'A' nature reserve
Wagin	9758 22408	Crown reserve Crown reserve	37 2.5	unvested unvested	resting place, waterway children, school	A C	Vest in CPC as a nature reserve and amalgamate
	17278	Crown reserve	1.6	DWER	waterway	C	Vest in CPC and add to A9620 Gnarkaryelling Nature Reserve
West Arthur	11013 14846 21252	Crown reserve Crown reserve Crown reserve UCL (PINs 551940, 552176, 552178, 552197, 552198, 552230) UCL (Hillman town site) closed roads	0.4 0.1 33 39	unvested unvested West Arthur Shire	Gov't requirements churchland racecourse	C C C	Vest in CPC as a nature reserve and amalgamate, subject to consultation with the Shire
	16712	Crown reserve	224	National Trust	grazing, parklands, water supply	C	Vest part in CPC as a nature reserve
	19960	Crown reserve	99	West Arthur Shire	camping, recreation	A	Vest in CPC, subject to consultation with the Shire
Westonia	1431	Crown reserve	522	DWER	conservation, fauna, protection of flora, waterway	C	Vest in CPC and add to C42720 Baladjie Lake Nature Reserve
	2168	Crown reserve	73	unvested	watering places	C	
	14983	Crown reserve	533	Westonia Shire	common	C	Vest western part of R14983 in CPC as a nature reserve
	17965	Crown reserve	292	unvested	waterway	C	Vest in CPC as a nature reserve
	24277	Crown reserve	294	DWER	waterway	C	Vest in CPC as a nature reserve
	25126	Crown reserve	76	DWER	conservation, fauna, protection of flora, waterway	A	Vest in CPC as a nature reserve
		UCL (Yilgarn Loc. 1169) UCL (PINs 970398, 970406, 970441 and 970452)	570 8,116				Vest in CPC as a nature reserve
		UCL (PIN 960833)	261				Vest in CPC as a nature reserve
Wickepin	5288	Crown reserve	72	unvested	waterway	C	Vest in CPC as a nature reserve
	15255	Crown reserve	20	Water Corporation	waterway	C	Vest in CPC as a nature reserve
	20722	Crown reserve	32	unvested	gov't requirements	C	Vest in CPC and add to A9480 Malyalling Nature Reserve
		UCL (PIN 1004161)	7				Vest in CPC and add to A19120 Birdwhistle Nature Reserve
Williams	2296	Crown reserve	68	unvested	landscape protection	A	Vest in CPC as a conservation park
	24791	Crown reserve	186	unvested	settlers requirements	C	Vest in CPC as a class 'A' nature reserve
	21063	Crown reserve UCL (Williams Loc. 11706) UCL (Williams Loc. 5284) UCL (Williams Loc. 15850) UCL (Congelin Town Lots 1-30) UCL (other)	13 42 8 2	unvested	camping, waterway	C	Vest in CPC as a nature reserve and amalgamate
	530	Crown reserve	61	unvested	waterway, resting place	C	Vest in CPC as a class 'A' nature reserve

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
Wongan-Ballidu	9234	Crown reserve	250	Water Corporation	conservation, fauna, protection of flora, waterway	C	Vest in CPC as a nature reserve
	15702	Crown reserve	302	DWER	conservation, fauna, protection of flora, waterway	A	Vest in CPC as a class 'A' nature reserve
Woodanilling	337	Crown reserve	54	unvested	camping, recreation, resting place	A	Vest in CPC as a class 'A' nature reserve, subject to consultation with the Shire
Yilgarn	1318	Crown reserve	249	unvested	resting place, waterway	C	Vest in CPC as a nature reserve
	1319	Crown reserve - Kerman Rock	253	unvested	resting place, waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire and DMIRS
	1361	Crown reserve	252	DWER	resting place, waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	1430	Crown reserve	809	unvested	waterway	C	Vest in CPC as a nature reserve
	2863	Nurdungarra Rock Nature Reserve	811	DWER	catchment, conservation, fauna, protection of flora	C	Vest in CPC as a class 'A' nature reserve, subject to consultation with the Shire
	3113	Weowanie Nature Reserve	259	DWER	conservation, fauna, protection of flora, waterway	C	EPA Red Book Recommendation 11.7.1. Vest in CPC and add to C41936 Yellowdine Nature Reserve
	13524	Mt Holland	259	unvested	water supply	C	EPA Red Book Recommendation 11.9.4. Vest in CPC as a nature reserve, subject to consultation with DMIRS and the Shire
	15848	Crown reserve	907	unvested	common	C	Vest in CPC as a nature reserve, subject to consultation with the Shire and DMIRS on excision of open pit mine
	17381	Crown reserve (Mullawak Tank)	445	unvested	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire and DMIRS
	18773	Crown reserve	448	DWER	conservation, fauna, protection of flora, waterway	A	Vest in CPC as a nature reserve
	18881	Corinthia Nature Reserve	1,476	unvested	common	C	Vest in CPC as an unclassified Conservation Park, subject to consultation with DMIRS and the Shire
	18894	Crown reserve	306	DWER	waterway	C	Vest in CPC as a nature reserve
	18920	Crown reserve	179	DWER	waterway	C	Vest in CPC and add to nature reserve C40460, subject to consultation with the Shire
	18966	Crown reserve - Yellowdine	28,252	unvested	timber	C	EPA Red Book Recommendation 11.7.1. Vest in CPC and add to C41936 Yellowdine Nature Reserve, excluding Yilgarn Loc. 1522 (202ha) (which is the subject of a lease) and PIN 963011 (which is in the department's Goldfields Region)
	19320	Crown reserve	198	unvested	waterway	C	Vest in CPC as a nature reserve
	19590	Crown reserve UCLBullfinch (Yilgarn Loc. 1138, PINs 973713, 973736-7)	1,290 7,221	unvested	common	C	Vest in CPC as a nature reserve
	20212	Dulyalbin Jilbadji Rock	630	DWER	waterway	C	Vest in CPC as a nature reserve
	22710	Crown reserve	5,508	unvested	alunite, gov't requirements and use, industry	C	Vest in CPC and add to nature reserve C42720, subject to consultation with the Shire and DMIRS
	23804	Crown reserve	252	unvested	waterway	C	Vest in CPC as a nature reserve

LGA	Reserve number	Name/Tenure/Location	Area	Vesting	Purpose	Class	Proposal[1]
	28291	Crown reserve - Bodallin Dam (ex-railway)	547	unvested	waterway	C	Vest in CPC as a nature reserve, subject to consultation with the Shire
	28664	Crown reserve	97	Water Corporation	waterway	C	Vest in CPC as a nature reserve
	30445 1434	Crown reserve Crown reserve	8,976 809	unvested unvested	timber waterway	C C	Vest in CPC as a nature reserve
	LR3137/470	ex Ennuin UCL - Dept Interest	43,143				Vest in CPC as a nature reserve

[1] = Proposals in this table will often need to involve significant consultation with local government, other government agencies and/or other stakeholders, and some proposals may not reach a conclusion during the life of the plan or may result in a different outcome than proposed. Some lands that need assessment or negotiation have not been included in this table. Some proposals may not include all of a proposed land parcel.
DWER = Department of Water and Environmental Regulation, CPC = Conservation and Parks Commission.
* Proposal from the Dryandra Woodland Management Plan (DEC 2011).

Appendix 5. Criteria for considering future reserve allocation

Nature reserve criteria

Category	Rating	Comments
Biodiversity conservation	Moderate - High	The reserve should be rated highly across several biodiversity conservation criteria. However, the presence of threatened flora or fauna alone should not justify nature reserve status, unless the taxon's recovery plan contains a specific recommendation requiring land for translocation or changes in land management that are achievable only with this type of tenure.
Viability	Moderate - High	The reserve should have high long-term viability, especially with respect to hydrological processes. Other threats should be minimal or at least manageable. Some poorly represented communities may have low resistance to weed invasion (such as jam woodlands) or occur in sites prone to altered hydrology (such as morrel woodlands). It is therefore acceptable to balance these issues more sensitively against their natural values than would normally be the case.
Competing land use	Low	Competing land uses are usually illegal under Biodiversity Conservation Act regulations. Therefore, the reserve should not contain competing land use that cannot be ceased, relocated or excised without jeopardising natural values.
Compatible use/benefit	Moderate - High	The retention of the reserve in its current state, and with rehabilitation to ensure its viability, should have positive off-site benefits to the community.
Community attitudes	Moderate - High	It is desirable that there is support for the nature reserve option.

National park and conservation park criteria

Category	Rating	Comments
Biodiversity conservation	Moderate - High	The reserve should be rated highly across several biodiversity conservation criteria. However, the presence of threatened flora or fauna alone should not justify park status, unless the taxon's recovery plan contains a specific recommendation requiring land for translocation or changes in land management that are achievable only with this type of tenure.
Viability	Moderate - High	The reserve should have high long-term viability, especially with respect to hydrological processes. Other threats should be minimal or at least manageable. Some poorly represented communities may have low resistance to weed invasion (such as jam woodlands) or occur in sites prone to altered hydrology (such as morrel woodlands). It is therefore acceptable to balance these issues more sensitively against their natural values than would normally be the case.
Competing land use	Moderate - High	Competing land uses: • need substantial management resources to minimise undesirable impacts • have established infrastructure, such as dams or tanks, substantial recreational facilities • cannot be ceased, relocated or excised because of the lack of suitable alternatives. While these land uses are not permitted on parks, they can be managed under this form of tenure. A formal agreement with the community setting firm limits on usage is recommended.
Compatible use/benefit	Moderate - High	The retention of the reserve in its current state, with whatever rehabilitation is needed to ensure its viability, should have positive benefits to the community.

Community attitudes	Moderate - High	It is desirable that there is support for the proposal.

Reserves under section 5(1)(g) or 5(1)(h) of the CALM Act

Category	Rating	Comments
Critical issue:	**The reserve should be in a position (geographical or landscape) to ameliorate the threatening environmental processes or to achieve reintegration through linkage with other remnant vegetation.**	
Biodiversity conservation	Low - Moderate	The reserve area should be greater than 5ha.
Viability	Mixed	The reserve must have high long-term viability, especially with respect to hydrological processes. Other issues, such as weediness, shape and adjoining land use, are largely irrelevant.
Competing land use	Low	Those land uses that threaten the rehabilitation or revegetation operation should be ceased, relocated or excised.
Compatible use/benefit	Moderate - High	The benefits to the community derived from the rehabilitation or revegetation of the reserve should outweigh the disadvantages stemming from the loss of access to the reserve.
Community attitudes	Moderate - High	It is essential that there is funding to implement the proposal. It is desirable that there is also community and LGA support.

Timber reserve criteria

Category	Rating	Comments
Critical criteria:	**Clearing of remnant vegetation is contrary to the principles underpinning the *Salinity Action Plan* strategies. It is therefore unacceptable to clear remnant vegetation to establish trial, production or demonstration plots.**	
Biodiversity conservation	Low	The reserve should contain an area of at least 5ha of cleared land. Those natural values that may exist should be concentrated away from the cleared area.
Viability	Mixed	The reserve must have high long-term viability, especially with respect to hydrological processes. Other issues, such as weediness, shape and adjoining land use are largely irrelevant.
Competing land use	Low	Those land uses that threaten the plots should be ceased, relocated or excised.
Compatible use/benefit	Moderate - High	The benefits to the community derived from the revegetation of the reserve should outweigh the disadvantages stemming from the loss of access to the reserve.
Community attitudes	Moderate - High	It is essential that there is funding to implement the proposal. It is desirable that there is also community and LGA support.

In some cases, the department may recommend additions of small reserves or parcels of land to the conservation reserve system where they are added to other larger reserves or amalgamated to form a larger consolidated reserve.

Appendix 6. Priority ecological communities

Priority ecological communities located within the Wheatbelt Region and their category are:

- Highclere Hills (Mayfield) vegetation complex (banded iron formation) – Priority 1
- Red morrel woodland of the Wheatbelt* – Priority 1
- Pools of the Avon and Dale Rivers – Priority 1
- Canegrass perched clay wetlands of the wheatbelt dominated by *Eragrostis australasica* and *Melaleuca strobophylla* across the lake floor – Priority 1
- Mottlecah dominated heathland on deep white sands – Priority 1
- Natural organic saline seeps of the Avon Botanical District – Priority 1
- Dense melaleuca thickets with emergent mallee *Eucalyptus erythronema var. marginata* and *Eucalyptus transcontinentalis* of the Wheatbelt Region – Priority 1
- Tamma-Dryandra-Eremaea shrubland – Priority 1
- *Banksia prionotes* and *Xylomelum angustifolium* low woodlands on transported yellow sand – Priority 1
- Salt flats plant assemblages of the Mortlock River (East Branch) – Priority 1
- Brown mallet (*Eucalyptus astringens*) communities in the western Wheatbelt on alluvial flats* (previously 'Beaufort River Flats') – Priority 1
- Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs – Priority 1
- Yate (*Eucalyptus occidentalis*) dominated alluvial claypans of the Jingalup Soil System* – Priority 2
- Gypsum dunes (Lake Chinocup) – Priority 2
- Wheatbelt *Allocasuarina huegeliana* over *Pteridium esculentum* fernland community – Priority 2
- *Allocasuarina huegeliana* and *Lepidosperma tuberculatum* growing on the south-western side of granite outcrops adjacent to laterite on the eastern slopes of the Darling Scarp – Priority 2
- Granite outcrop pools with endemic aquatic fauna – Priority 3(i)
- Ironcap Hills vegetation complexes (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded iron formation) – Priority 3(iii)
- Parker Range vegetation complexes – Priority 3(iii)
- Eucalypt woodlands of the Western Australian Wheatbelt – Priority 3(iii)
- Plant assemblages of the Wongan Hills System* – Priority 4(i).

PECs marked with an asterisk are components of the critically endangered 'Eucalypt woodlands of the WA Wheatbelt' EPBC-listed TEC. The 'Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs' PEC is a component of the critically endangered 'Claypans of the Swan Coastal Plain' EPBC-listed TEC. The 'Eucalypt woodlands of the WA Wheatbelt' TEC is also listed in WA as a PEC.

Appendix 7. Fire management objectives and outcomes

Reserve size-class approach:

Reserve size class	Fire management objective(s)	Fire management strategies
Fire Management Area 1 – Agricultural zone		
Single small reserves less than 500ha	Minimise the risk of the loss of threatened or priority species and critical habitat, or locally significant species, vegetation communities or habitat due to inappropriate fire regimes. Bushfire mitigation and suppression activities will aim to protect life and property values in the first instance and then natural and cultural values.	• Excluding circumstances involving the protection of high-value assets (built and natural), the principle management strategy for these reserves will be early suppression of bushfires. • Fire management measures will be implemented to protect and conserve high-value biodiversity assets from inappropriate fire regimes. • Fire management activities will not deliberately endanger threatened species. • Internal fire access tracks will not normally be built. Existing internal tracks will not normally be maintained, or may be maintained upon agreement with neighbouring landowners. • Perimeter access tracks can be built or maintained based upon values and risks. Tracks that are adjacent and run parallel to roads will be closed and rehabilitated provided they serve no specific management purpose. • Vegetation modification (scrub-rolling/slashing) to mitigate against bushfires impacting on life and property values will not normally be undertaken unless there is a risk to life and built property values. • Temporary fire control lines should only be considered when there is a threat to life/property and biodiversity values, otherwise the strategy of allowing bushfires to burn out to the reserve boundary is preferred. Any temporary control lines created during bushfire suppression will be rehabilitated.
Single reserves 500–2,000ha	Minimise the risk of species loss and associated habitat. Use prescribed fire or other management to protect and maintain viable specific species habitats and community types. Bushfire mitigation and suppression activities will aim to protect life and property values in the first instance and then natural and cultural values.	• Excluding circumstances involving the protection of high-value assets (built and natural), the principle management strategy for these reserves will be early suppression of bushfires. • Fire management measures may be implemented to protect and conserve high-value biodiversity assets from inappropriate fire regimes. • Fire management activities will not deliberately endanger threatened species. • Perimeter access tracks can be built and/or maintained. Tracks that are adjacent and parallel to roads will be closed and rehabilitated provided they serve no specific management purpose. • Generally, no new internal fire access tracks will be built unless they fulfill a specific need. In some cases, existing internal access may be reviewed. • Vegetation modification (scrub-rolling/slashing) will only be considered where there is a significant risk to life and built property values directly threatened by bushfire. • Prescribed burning can be undertaken to achieve biodiversity outcomes, and in specific instances where it provides protection to life and property. In all cases, the values at risk and the consequence of delay will be analysed. Generally, the principles for introducing prescribed fire on these reserves will be (i) after the minimum inter-fire period has been achieved, and (ii) in conditions that ensure no more than 30 per cent of

Reserve size class	Fire management objective(s)	Fire management strategies
		the reserve is burnt in a single event and management strategies will aim to achieve at least 20 per cent in each successional age class of early, mid and late. • Temporary fire control lines may be used for specific purposes and in bushfire suppression. These fire control lines will be closed and rehabilitated following works, unless they are determined to be needed for future management. Bushfire suppression will rely on either direct or indirect attack based on conditions and severity.
Single reserves 2,000–5,000ha	An appropriate prescribed fire regime for high-value reserves and their assets will be identified and implemented to ensure high-value assets are not lost. Bushfire mitigation and suppression activities will aim to protect life and property values in the first instance and then natural and cultural values.	• Special fire management measures will be implemented for key communities or specific plant and animal species that are known to be fire sensitive or fire dependent. • Perimeter access tracks can be built and/or maintained. Tracks that are adjacent and parallel to roads that are not used for management purposes will be closed and rehabilitated. The building of new internal fire access tracks will need to balance their strategic value against the environmental impact. • Prescribed burning may be undertaken (i) after the minimum inter-fire period of threatened and/or other fire regime sensitive species has been achieved, and (ii) in conditions that ensure no more than 30 per cent of the reserve is burnt in a single event and that ongoing prescribed fire regimes incorporate best practice environmental fire management regimes, acknowledging that this type of work will need to be adaptive incorporating current and future learning. • Bushfire suppression activities will rely on either direct or indirect attack based on conditions and severity. • Building of temporary fire control lines, scrub-rolling and back burning are permitted to protect life and property values and where possible to prevent a bushfire from burning the entire reserve.
Single large reserves more than 5,000ha, or a cluster of reserves	An appropriate prescribed fire regime for each reserve or cluster that fit this category will be implemented to ensure values are not lost. Bushfire mitigation and suppression activities will aim to protect life and property values in the first instance and then natural and cultural values.	• The principal management strategies for these reserves will be bushfire suppression, maintaining access and where applicable prescribed burning. This will be dependent on location of values at risk and vegetation types involved. • Fire management measures will be implemented for key plant and animal species that are known to be fire sensitive or fire dependent. • Perimeter access tracks can be built and/or maintained. Tracks that are adjacent and parallel to roads that are not used for management purposes will be closed and rehabilitated. Internal tracks should be signposted with track names. • Prescribed burning may be undertaken (i) after the minimum inter-fire period of threatened and/or other fire regime sensitive species has been achieved, and (ii) in conditions that ensure no more than 30 per cent of the reserve is burnt in a single event and that ongoing prescribed fire regimes incorporate best practice environmental fire management regimes, acknowledging that this type of work will need to be adaptive incorporating current and future learning. • Bushfire suppression activities will rely on either direct or indirect attack based on conditions and severity. • Building of temporary fire control lines, scrub-rolling and back burning can be used on the perimeter and internally to protect life/property values and to prevent the bushfire burning the entire reserve. • Liaise with owners of built assets on CALM Act lands to protect their assets from bushfire.
Fire Management Area 2 – Uncleared zone		

Reserve size class	Fire management objective(s)	Fire management strategies
General fire management	Maintain and protect biodiversity through a spatial mosaic of fuel ages (time since fire) with inter fire periods in vegetation communities. Bushfire mitigation and suppression activities will aim to protect life and property values in the first instance and then natural and cultural values.	• Protect all assets (built and natural) from inappropriate fire regimes by establishing low-fuel areas on a rotational basis using vegetation modification and prescribed fire. • Apply prescribed fire, where appropriate and depending on the community type, past fire history and access, to establish and maintain a mosaic of fire age classes. • Establish and maintain a network of strategic fire access tracks to support efficient access to and containment of bushfires. • Gain a better understanding, through practical and theoretical knowledge, of fire behaviour and ecology of the sandplain shrublands and woodlands. Where possible, establish and undertake fire research to identify fire behaviour and ecology research opportunities. • Use an adaptive management approach as knowledge becomes available and incorporate this knowledge into the fire management program. • Work proactively with DFES, LGAs and local bush fire brigades to determine appropriate action to take to control bushfires.
	Mitigate the risk from bushfires emanating from department-managed land to neighbouring agricultural lands, public utilities, community assets and other built assets.	• Develop and implement a works program to mitigate the threat of uncontrolled bushfire in areas identified as high risk (for example, the lifeline corridors along the Great Eastern Highway). • Liaise with owners of built assets on CALM Act lands to protect their assets from bushfire. • Use fuel modification and prescribed fire to maintain low-fuel areas where life and property values are at risk. • Maintain a network of fire access tracks to support the containment of bushfires. • Work proactively with DFES, LGAs and local bush fire brigades to determine appropriate action to take to control bushfires.

Fire management outcomes by vegetation type in FMA 2, and FMA 1 size classes 2,000-5,000ha and more than 5,000ha:

Vegetation type	Fire management outcome	Prescribed fire regime	Bushfire response
Woodlands	Protect from high intensity bushfire, and where appropriate regenerate mid and understory species that are senescing.	In eastern woodlands, develop and apply prescribed fire to surrounding sandplain and mallee heath vegetation to maintain a low-fuel mosaic. In western woodlands, undertake prescribed fire to mitigate the size of bushfires and to regenerate low and mid storey species, and in relation to natural brown mallet stands where appropriate apply prescribed fire to regenerate.	Minimise bushfire size commensurate with potential impacts and resource capacity.

Vegetation type	Fire management outcome	Prescribed fire regime	Bushfire response
Mallee shrubland	Establish a mosaic of age classes appropriate for the conservation of flora and fauna. Reduce the risk of large-scale bushfires and their impact on surrounding woodlands, community values and department-managed assets.	Apply prescribed fire under appropriate conditions to achieve a mosaic of age classes. Adopt the principle, when planning for subsequent rotations, of not re-burning areas within minimum tolerable fire interval periods of key indicator species in conjunction with spatial and fuel considerations in determining intervals between planned fires.	Minimise bushfire size commensurate with potential impacts and resource capacity.
Mallee heath / shrub heath	Establish a mosaic of age classes appropriate for conservation of flora and fauna Reduce the risk of large-scale bushfires and their impact on surrounding woodlands, community values and department-managed assets.	Apply prescribed fire under low to moderate fire intensity conditions. Adopt the principle, when planning for subsequent rotations, of not re-burning areas within minimum tolerable fire interval periods of key indicator species in conjunction with spatial and fuel considerations in determining intervals between planned fires.	Minimise bushfire size commensurate with potential impacts and resource capacity.
Shrublands and western heath (kwongan)	Establish a mosaic of age classes within targeted management areas appropriate for conservation of flora and fauna. Reduce the risk of large-scale bushfires and their impact on surrounding woodlands, community values and department-managed assets.	Apply prescribed fire under moderate fire intensity conditions. Adopt the principle, when planning for subsequent rotations, of not re-burning areas within minimum tolerable fire interval periods of key indicator species in conjunction with spatial and fuel considerations in determining intervals between planned fires.	Minimise bushfire size commensurate with potential impacts and resource capacity.
Succulent steppe Fringing vegetation associated with lakes	Protect from unplanned bushfire	Use prescribed fire to regenerate fringing vegetation if required.	Minimise bushfire size commensurate with potential impacts and resource capacity.
Rock outcrops and fringing vegetation	Protect from unplanned bushfire	Use prescribed fire to regenerate vegetation associated with rock outcrops if required. Use prescribed fire to establish a low-fuel mosaic where applicable.	Minimise bushfire size commensurate with potential impacts and resource capacity.

Appendix 8. Top ranked recreation sites and reserves for recreation potential

The following table shows a selection of sites that have the potential for recreation development and promotion. Bolded CALM Act reserves are recognised departmental recreation sites (Map 5). The managing authority is bracketed. The ranking is taken from Moncrieff (2000). The department does not necessary promote or encourage the development of any of these sites by mentioning them in the table. The list is also not exhaustive, and more analysis may exclude or add specific areas to this list.

Central Wheatbelt	Southern Wheatbelt
Mt O'Brien (private property)/**Mt Matilda – Wongan Hills Nature Reserve** (department)	**Dryandra Woodland** (department)
Kellerberrin-Trayning Road (Kellerberrin and Trayning Shires)/Durokoppin Nature Reserve (department)	**Dumbleyung Lake Nature Reserve** (department)
Buntine Rock Nature Reserve (department)	Wave Rock (private)
Bruce Rock Nature Reserve (department/private property)	**Pallarup Nature Reserve** (department)
Baladjie Lake (department/DWER/Westonia Shire)	Lake Poorrarecup (Cranbrook Shire)
Hunts Soak (Yilgarn Shire)	**Boyagin Nature Reserve** (department/Pingelly Shire)
Lake Cronin Nature Reserve (department)	Mt Madden (DWER)
Totadgin Conservation Park (department)	Lake Parkeyerring Nature Reserve (department) and Wagin Lakes system
Lake Ninan Nature Reserve (department/Wongan-Ballidu Shire)	**Buckley's Breakaway Nature Reserve** (department)
Weira Reserve (Mukinbudin Shire)	Lake Norring (Wagin Shire)
Mt Stirling Nature Reserve (department)	Emu Rocks (department)
Meckering Earthquake Fault (Cunderdin Shire)	Lake Nunijup (Cranbrook Shire)
Merredin Peak (Merredin Shire)	Claypit Nature Reserve/Wickepin Water Tank Reserve (department/DWER)
Bulgin Rock Nature Reserve (department)	Lake Qeerearrup (Woodanilling Shire)
Oak Park (Goomalling Shire)	Bennetts Lake – Dunn Rock Nature Reserve (department)
Xantippe Tank (Dalwallinu Shire)	Hillman Nature Reserve (department)
Sandford Rocks Nature Reserve (department)	Yilliminning Rock (Shire of Narrogin)
Kokerbin Nature Reserve (department/Bruce Rock Shire)	Anderson Rock (DWER)
Korrelocking Nature Reserve (department/Wyalkatchem Shire)	Farrah Reserve (Kojonup Shire)
Karalee Rock (National Trust)	Lake Ewlyamartup (Katanning Shire)
Mt Marshall (Mt Marshall Shire)	Nine Acre Rock (private property)
Mt Collier (Koorda Shire)	Lake Bryde (department and DWER)
Billyacatting Hill Nature Reserve (department)	Birdwhistle Rock Nature Reserve (department)
Dingo Rock Nature Reserve (department)	Malyalling Old School Site and Sports Oval (Wickepin Shire)
Namelcatchem Nature Reserve (department)	The Humps (DWER)
Frog Rock Nature Reserve (department)	Kondinin Lake (department/Kondinin Shire)

Central Wheatbelt	Southern Wheatbelt
Yorkrakine Rock Nature Reserve (department)	Yornaning Dam (DWER/Cuballing Shire)
Toapin Weir (Quairading Shire)	Harrismith Reserve (unvested)
Gathercole Nature Reserve (department)	Sewell Nature Reserve (department)
Lake Campion Nature Reserve (department)	Lake Mears Nature Reserve (department)
Yenyening Lakes Nature Reserve (department)	**Williams Nature Reserve** (department)
	Toolibin Nature Reserve (department)
	Coyrecup Nature Reserve (department)
	Lake Janet Nature Reserve (department)
	Tutanning Nature Reserve (department)

Appendix 9. Waterbodies where power boating, including waterskiing, occurs

The following table shows sites where waterskiing occurs, or is known to have occurred, and recommended actions. Please refer to Section 17 *Visitor activities* for background.

Waterbody	Managed by the department?	Tenure (*purpose*) of department-managed waters	History of gazettal for power boating	Recommended department management action where applicable
Southern Wheatbelt				
Lake Ewlyamartup	No	n/a	Yes	n/a
Lake Norring	No	n/a	Yes	n/a
Lake Qeerearup	No	n/a	Yes	n/a
Lake Poorrarecup[1]	No	n/a	Yes	n/a
Lake Nunijup[1]	No	n/a	Yes	n/a
Lake Dumbleyung	Yes (part only)[2]	Two nature reserves (*Conservation of flora and fauna*, and *Flora and fauna*)	Yes, only waters contained in R26665 (vested in the Shire of Dumbleyung)	CALM Act approvals in place to allow boats to access gazetted area
Bennetts Lake	Yes	Nature reserve (*Conservation of flora and fauna*)	Yes, lawful activity under the CALM Act	Manage on-going gazettal with DoT and the community
Lake Coyrecup	Yes[1]	Two nature reserves (*Conservation of flora and fauna*, and *Flora, fauna and recreation*)	No	Not allow use. Lake Ewlyamartup is sufficiently close so as not to warrant gazettal
Lake Parkeyerring	Yes[1]	Two nature reserves (*Recreation and conservation of flora and fauna*)	No	Not allow use based on low use and low lake levels
Lake Bryde	Yes	Conservation park	No	Work to prohibit use based on lake levels generally below 1.5m and management of threatened species and communities
Lake Yealering	No	n/a	No	n/a
Lake Mears	Yes	Nature reserve (*Conservation of flora and fauna*)	No	Consider gazettal in future if there is community desire and lake levels support it
Lake White	Yes	Nature reserve (*Conservation of flora and fauna*)	No	Too infrequent fill events to warrant

Waterbody	Managed by the department?	Tenure (*purpose*) of department-managed waters	History of gazettal for power boating	Recommended department management action where applicable
Lake White West	Yes	Nature reserve (*Conservation of flora and fauna*)	No	Lake levels would not permit gazettal
Taarblin Lake	Yes	Nature reserve (*Conservation of flora and fauna*)	No	Lake levels would not permit gazettal
Kondinin Lake	Yes[3]	Nature reserve (*Recreation and Conservation of Flora and Fauna*)	No	Consider gazettal in future if there is a Shire of Kondinin and community desire, and lake levels support it
Unnamed lake on Lake Gounter Nature Reserve	Yes	Nature reserve (*Conservation of flora and fauna*)	No	Prohibit future use
Central Wheatbelt				
Yenyening Lake system: Ski Lake	Yes	Nature reserve 31837 (*Recreation and conservation of flora and fauna*)	No	Support gazettal if lake levels sufficient, and work with Shire of Beverley to change the reserve category and purpose to accommodate waterskiing
Narembeen Ski Lake	Yes (part only)[2]	Nature reserve (*Conservation of flora and fauna*)	No	n/a
Lake Baandee	No	n/a	Yes	n/a
Lake MacDermott	No	n/a	No	n/a
Lake Campion	Yes	Nature reserve (*Conservation of flora and fauna*)	No	Not supported
Lake Ninan	Yes (part only)[2]	Nature reserve (*Conservation of flora and fauna*)	No	Not supported
Lake Hinds	Yes	Nature reserve (*Conservation of flora and fauna*)	No	Not supported
Kevills Lake	No	n/a	No	n/a

[1] = Shire reserve on lake frontage only (terrestrial). [2] = Shire reserve across part of lake where waterskiing occurs. [3] = Jointly vested reserve co-vested and co-managed by the Shire of Kondinin.

Appendix 10. Commercial apiary site assessment

Criteria and approach for assessing commercial apiary sites in the planning area

	Suitable	Suitable but conditional	Highly constrained
Approach	Maintain or increase numbers of apiary sites in these areas. Standard permit conditions would apply	Maintain or increase numbers of apiary sites in these areas. Additional permit conditions would apply such as increased hygiene control and seasonal, site location and access restrictions. Research and monitoring at these sites may be required	Close, and relocate where possible, any current apiary sites in these areas. Prevent any new apiary sites in these areas
Environmental Criteria			
1. Threatened and other conservation significant flora within a 2km radius[1]	No rare, priority 1 or 2 flora present that are visited by honey bees	Rare, priority 1 or 2 flora present that are visited by honey bees and impacts are seasonal or undetermined[2]	Rare, priority 1 or 2 flora present that are visited by honey bees and impact is predicted to be year-round[2]
		Rare, priority 1 or 2 flora present that are visited by honey bees, but no predicted impact[3]	n/a
	No priority 3 or 4, endemic, disjunct or relictual flora present that are visited by honey bees	Priority 3 or 4, endemic, disjunct or relictual flora that are visited by honey bees present[4]	n/a
2. Significant ecological communities within a 2km radius	No TECs or PECs	TEC or priority 1 or 2 PEC present and impacts are seasonal[2]	A TEC or priority 1 or 2 PEC present and impact is predicted to be year-round[2]
		TEC or priority 1 or 2 PEC present, but no predicted impact[3]	
		Priority 3 or 4 PEC present and flora is visited by honey bees[4]	
3. Threatened fauna and other significant habitats (i.e. habitats for fauna adversely impacted by honey bees) within a 2km radius	No old growth forest or other known habitat of hollow nesting threatened fauna present	Old growth forest or other known habitat of hollow nesting threatened fauna is present[5]	n/a
	No threatened, priority 1 or 2 pollen or nectar feeding birds or mammals present	Threatened, priority 1 or 2 pollen or nectar feeding birds or mammals present that are seasonally impacted[2]	Threatened, priority 1 or 2 pollen or nectar feeding birds or mammals present and impact is predicted to be year-round[2]
	No fauna watering points at fauna breeding centres and re-introduction sites present	n/a	Fauna watering point at fauna breeding centres and re-introduction sites present[6]
	No other significant habitats or communities present	Other significant habitats or communities are present that are seasonally impacted[7]	Other significant habitats or communities are present that are impacted year-round
Management Criteria			
1. Previous use	A conservation reserve that has authorised historic use of commercial beekeeping	-	A conservation reserve that has no authorised historic use of commercial beekeeping

	Suitable	Suitable but conditional	Highly constrained
2. Access	Public or suitable management vehicle only access is available	-	There is no public or suitable management vehicle only access or current access is being closed
	No gazetted wilderness	'Candidate' wilderness only	Gazetted wilderness or wilderness proposed to be gazetted present
3. Recreation sites or dwellings within a 500m radius	No built accommodation/ camping/day-use site present	-	Built accommodation/ camping/day-use site present
4. Tracks and trails within a 200m radius	No walk trail present (Class 1 or 2)	Walk trail (Class 1 or 2) present, but only used infrequently, or proposed walk trail (Class 1 or 2)	Walk trail (Class 1 or 2) present and used frequently
5. Disease control[8]	Low risk of *P. cinnamomi* spread	*P. cinnamomi* present or area identified as protectable from *P. cinnamomi* spread, but there is an existing site Disease present or vegetation identified as being susceptible to disease and there is a risk of spread from existing apiary activities	Area identified as protectable from *P. cinnamomi* spread and there are no existing sites Disease present, or vegetation identified as susceptible to disease and there are no existing sites
6. Apiary sites within 3km radius	No other apiary sites present		Apiary site present
7. Feral honey bee management within 2km	-	Feral honey bee control program in place[9]	-
8. Weed management within a 2km radius	No high or moderate environmental weeds present that are considered to have an increased seedset due to honey bees	High or moderate rated environmental weeds that are considered to have an increased seed set due to honey bees, but flower seasonally[10]	High or moderate rated environmental weeds that are considered to have an increased seed set due to honey bees and flower year-round
9. Other management concerns	No impact on department operations or the requirements of other authorities controlling Crown land or Government reserves	An impact on department operations or the requirements of other authorities controlling Crown land or Government reserves that can be managed	An impact on department operations or the requirements of other authorities controlling Crown land or Government reserves that cannot be managed

Notes

[1] This process has been based on where there is spatial data for threatened and other conservation significant flora. A list is available for the threatened and other conservation significant flora within the planning area (and buffer), which has been assessed as being impacted by honey bees. This apiary assessment should be adaptive through the life of the plan and the best data incorporated. For example, if during an application for a new site or during a review of an existing site, any new locations of these identified species are found, then this data should be included and the assessment should be re-run for the site.

[2] Impacts are seasonal or undetermined (see *Guidance for Additional Conditions – A*). Where impacts are predicted to be year-round, the area will be considered to be highly constrained.

[3] Visited by honey bees, but no predicted impact. These flora and communities are still of high conservation significance and a precautionary approach is warranted (see *Guidance for Additional Conditions – B*).

[4] As with note 3 above, priority 3 or 4, endemic, disjunct and relictual flora are of conservation significance and a precautionary approach is warranted. In addition, although populations of these species may be widespread and impacts on these populations may not threaten the existence of the species, there still may be some populations that should be afforded higher protection (e.g. the population may be (1) at the species' range end, (2) the largest viable population or (3) genetically significant) (see *Guidance for Additional Conditions – C*).

[5] If there is a current apiary site and there are feral honey bees present, then use can continue year-round. However, old growth forest and other significant habitats for hollow nesting fauna will be targeted for feral honey bee control (see *Guidance for Additional Conditions – D*). For new sites within old growth forest see *Guidance for Additional Conditions – E*.

[6] Native fauna breeding centres and fauna re-introduction sites often have watering points. Commercial beekeeping near these sites may disturb the animals from drinking.

[7] No other significant habitat or community likely to be impacted by honey bees has been identified during the planning process. However, they may be identified during the life of this management plan.

Other significant habitats may be identified due to:
- new research/information
- changes in threat status of fauna
- changes in resource availability – for example, directly after a fire, when competition between species such as honey possums and honey bees would be at its highest.

[8] Standard disease control conditions will apply. The soil dryness index may be used to restrict vehicle access to the sites. There should be no new sites established in areas that are:
- protectable from *P. cinnamomi*
- designated Disease Risk Areas
- in vegetation associations identified as susceptible to disease.

[9] There may need to be seasonal restrictions (see *Guidance for Additional Conditions – D*) when a feral honey bee control program is in place.

[10] High or moderate environmental weeds are a high priority for the department to control (see *Guidance for Additional Conditions – F*).

Guidance for additional conditions

A. Seasonal restriction based on flowering period of flora or target flora with respect to pollen or nectar feeding birds/mammals. Site must be available for a minimum of one month otherwise the impact is year-round. Placement and number of hives also may be restricted if threatened flora/fauna occurs at apiary site.

B. Placement (at least 100m from populations) and number of hives may be restricted. Monitoring of representative samples for health of adult populations and seedling recruitment or TEC/PEC to ensure there is no decline due to apiary management, considering other factors such as drought, disease, fire, environmental weeds and other disturbances. If unacceptable impacts are shown or observed later, then treatment will be the same as A.

C. There may be a need to review populations within the planning area to determine whether these populations are significant to the conservation of the species. If deemed significant then treatment will be the same as A.

D. When a feral honey bee program is in place, then use of the site will be restricted during periods when the queen may swarm, such as Spring or a suitable method to restrict the queen should be implemented.

E. For new sites in old growth forest where there are no feral honey bees present, a condition may be that if during the period of the permit, feral honey bee hives are located within two kilometres of the site, the site will be temporarily restricted until the feral honey bees are controlled.

F. Seasonal restriction based on flowering period of environmental weed however, only until the environmental weed has been successfully eradicated.