



Albany coast parks and reserves

management plan 90

2017



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Front cover photos

Main The new recreation facilities at The Gap in Torndirrup National Park. *Photo – DBCA*

Top left Gilbert's potoroo or ngilgyte (*Potorous gilbertii*). *Photo – Dick Walker/Gilbert's Potoroo Action Group*

Top right Close-up view of scarlet banksia (*Banksia coccinea*). *Photo – Farmstay at Denmark WA*

Header photo The new recreation facilities at The Gap in Torndirrup National Park. *Photo – DBCA*

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Conservation and Parks Commission

Department of Biodiversity, Conservation and Attractions

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1. Overview

Parks and reserves managed by the [Department of Biodiversity, Conservation and Attractions](#) (DBCA or the department) within the *Albany coast* (Map 1), in addition to having immense importance for biodiversity, are also rich in Noongar and other cultural heritage, have spectacular coastal landforms and scenery that attract many visitors, and are an integral part of the greater Albany community.

Located within the global biodiversity hot-spot of the South West Botanical Province, the *Albany coast* area has high conservation value based on the presence of several large, intact protected areas such as the Gull Rock, Torndirrup, Waychinicup and West Cape Howe national parks and Two Peoples Bay Nature Reserve that with adjoining Crown lands provide important coastal conservation connectivity; areas of high plant species diversity and endemism; and important refuges for threatened fauna (including the critically endangered Gilbert's potoroo or *ngilgyte* (*Potorous gilbertii*) and several threatened ground-dwelling birds), flora and ecological communities.



Flinders Peninsula in Torndirrup National Park (looking eastwards). Note, Breaksea Island in the upper left and Mt Gardner in Two Peoples Bay Nature Reserve further behind. Photo – DBCA

The Minang¹ people's historical occupation of the land (*boodja*) around Albany (or '[Kinjarling](#)' meaning 'place where it rains a lot') has left a rich Noongar cultural heritage. Numerous sites of significance occur across the landscape including prominent locations such as Mt Manypeaks, Waychinicup, North and South Sisters, and Michaelmas and Breaksea Islands, which feature in Noongar stories about the creation of features of the Albany landscape. This country continues to have cultural and spiritual significance for Minang people.

¹ 'Minang' refers to Noongar people in the Albany area (see www.daa.wa.gov.au/globalassets/pdf-files/maps/state/tindale_daa.pdf, www.noongarculture.org.au/noongar). The spelling of 'Minang' should also be seen to encompass the Menang, Mineng, Mirnang, Mirnong and other spellings.

Albany was the first official colonial settlement in Western Australia (WA), the first federal military base, WA's principal port before the development of Fremantle Harbour and was the last Australian port of call for the World War I ANZAC ships on their way to the battlefields of Gallipoli and the Western Front, and several heritage sites relate to these historical periods.

The spectacular coastal bays, beaches, headlands and cliffs are recognised as some of the best scenic coastal locations in Australia. The coastal parks and reserves provide a range of popular recreation and tourism opportunities including the internationally-recognised long distance Bibbulmun Track, and breathtaking scenic destinations such as 'The Gap' or *yorga warling*² and 'Natural Bridge'. Together, the parks and reserves of the *Albany coast* make significant contributions to the conservation reserve system and are highly valued by the community, particularly the people of Albany.

2. Management plan area

This management plan, prepared by the Conservation and Parks Commission (the Commission) through the agency of the department, covers 56 existing terrestrial parks and reserves totalling 32,457ha (Map 1, Appendix 1). The lands covered by this management plan, referred to as the planning area, are mainly located in the City of Albany local government authority (LGA) area, as well as southern parts of the shires of Plantagenet and Jerramungup (Map 1). The planning area extends from Hay River in the west to the Pallinup River and Beaufort Inlet in the north-east, and inland largely to the City of Albany boundary (Map 1). It also includes nine island nature reserves and four small islands (Black Rock, Rock Dunder and Inner and Coffin islands) that are part of Two Peoples Bay Nature Reserve.

Three statutory management plans have been prepared for parts of the planning area: *South Coast Regional Management Plan 1992–2002* (CALM 1992a), *Two Peoples Bay Nature Reserve Management Plan 1995–2005* (CALM 1995a) and *West Cape Howe National Park Management Plan 1995–2005* (CALM 1995b). Interim management guidelines also exist for Torndirrup, Gull Rock and Waychincup national parks, as well as Mount Manypeaks and Arpenteur nature reserves. A non-statutory management plan also exists for Cheyne Bay: Cape Riche to Pallinup River (reserves 14986, 14987 and 31240) (Map 1). This management plan replaces these plans as the statutory management plan for the parks and reserves within the planning area (including any proposed reserves that become vested with the Commission).

Existing reserves

The existing reserves within the planning area covered by this plan are listed in Appendix 1, and include:

National parks

There are five national parks that occupy an area of 14,892ha:

- West Cape Howe National Park (3,605ha) located about 28km³ west of Albany
- Torndirrup National Park (3,935ha) located 8km south of Albany
- Gull Rock National Park (2,104ha) located 8km east of Albany
- Waychincup National Park (3,982ha) located 37km northeast of Albany
- Hassell National Park (1,265ha) located 45km northeast of Albany.

Nature reserves

There are 40 nature reserves that occupy an area of 17,131ha, including:

- Two Peoples Bay Nature Reserve (4,745ha) located 21km east of Albany
- Mount Manypeaks Nature Reserve (1,328ha) located 40km northeast of Albany
- nine island nature reserves (Bald, Breaksea, Cheyne, Eclipse, Green, Michaelmas, Mistaken, Seal and Shelter islands) totalling more than 1,150ha, stretching 130km apart and located up to 6km offshore

² Meaning 'woman crying'.

³ Distances and directions between individual department-managed lands and Albany are approximate.

- several inland nature reserves in the interior hinterland of Albany, including Mill Brook (1,484ha), Basil Road (1,162ha), Bakers Junction (1,087ha), North Sister (1,008ha) and Down Road (777ha) nature reserves and four unnamed nature reserves.

Other reserves or lands

There are also several other types of land tenure managed by the department within the planning area, including:

- six section 5(1)(h)⁴ reserves totalling 408ha (including Mt Martin and Voyagers Park reserves)
- a small (7ha) unnamed conservation park located 6km west of Albany
- a small (20ha) timber reserve located about 35km west of Albany
- a small (1ha) unnamed miscellaneous reserve within Albany.

Proposed reserves

Several changes to existing reserves and proposed additions to the conservation reserve system are also considered by this plan (Section 14 *Biogeography – Conservation reserve system*, Appendix 2, Map 1).

Plans relevant to adjacent areas

Other [statutory management plans](#) that cover adjacent areas include the [Walpole Wilderness and Adjacent Parks and Reserves Management Plan 2008](#) (which covers part of Redmond State Forest), the [Stirling Range and Porongurup National Parks Management Plan 1999–2009](#) and the *Forest Management Plan 2014 – 2023* (FMP) (Conservation Commission 2013), which provides the over-arching planning and management framework for lands in the south-west (within the FMP area) vested in the Commission including Redmond State Forest and the nearby timber reserves F188/25, F190/25 and F221/25.

Some coastal reserves lie next to, or in the case of several islands are surrounded by, the marine environment (Section 14 *Biogeography – Conservation reserve system*). Direction for planning and management of State marine waters off the south coast is provided by the ‘*Oceans of opportunity*’ proposed strategic framework for WA’s South Coast marine waters (Government of Western Australia 2010). The Marine Parks and Reserves Selection Working Group (MPRWG 1994) identified three marine areas with significant conservation and recreation value adjoining the planning area: West Cape Howe, King George Sound – Princess Royal Harbour⁵ and Cape Vancouver to Bald Island.

3. Key values and management issues

The specific values and management issues described in this section are the highest priority and/or best known, and are a focus for management in this plan. However, there are many other specific values and management issues present within the area and/or described in the plan. The importance of managing the key values and management issues and monitoring the effectiveness of implementation is reflected in their use as key performance indicators (KPIs) for the plan, as indicated below (Section 6 *Performance assessment*).

Key values

Parks and reserves within the planning area are important for the following specific key values (CALM 1995a, 1995b):

- large areas of relatively intact and undisturbed habitat located along or within close proximity of the coast that provide extensive coastal connectivity within the region
- three wetlands of national significance (Moates Lake System, Lake Pleasant View System and Oyster Harbour), and 35 wetlands of regional significance. Moates Lake is one of the deepest natural lakes in south-west Australia
- fourteen threatened plant species, including the critically endangered feather-leaved banksia (*Banksia brownii*), Albany or granite banksia (*Banksia verticillata*), blue tinsel lily (*Calectasia cyanea*), broad-leaf daviesia (*Daviesia ovata*) and Albany cone bush (*Isopogon uncinatus*)

⁴ Section 5(1)(h) of the *Conservation and Land Management Act 1984*.

⁵ Collectively known as *mammang koort* meaning ‘heart of the whale’.

- the endangered *Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia* threatened ecological community, the vulnerable ‘*Subtropical and Temperate Coastal Saltmarsh*’ threatened ecological community, 18 priority ecological communities, and 14 significant vegetation associations that have been extensively cleared, are poorly reserved or are of limited extent
- thirty-two threatened and 22 other specially protected animal species, including the critically endangered Gilbert’s potoroo and endangered noisy scrub-bird or *jeemuluk (Atrichornis clamosus)* which are both endemic to the planning area
- eleven registered Noongar heritage sites of archaeological, mythological, ceremonial, cultural and spiritual significance, and other cultural heritage sites associated with early exploration, whaling, settlement, convicts and shipping
- natural, rugged and diverse landforms, with vegetation patterns, combine to create spectacular coastal landscapes of outstanding scenic quality
- a diversity of recreational experiences and opportunities such as bushwalking, picnicking, rock climbing, abseiling, fishing, hang gliding, camping, birdwatching and whale watching. The Bibbulmun Track walk trail passes through West Cape Howe and Torndirrup national parks and terminates in Albany. Torndirrup National Park also contains the well-known day-use sites: ‘The Gap’ and ‘Natural Bridge’.

Key management issues

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

- impacts of Phytophthora Dieback and aerial canker disease and other biosecurity threats on susceptible species and plant communities
- inappropriate [fire regimes](#) – particularly frequent fires that are intense enough to kill fire regime specific species⁶, and large and intense bushfires
- weeds – particularly Sydney golden wattle (*Acacia longifolia*), Victorian tea-tree (*Leptospermum laevigatum*), taylorina (*Psoralea pinnata*), arum lily (*Zantedeschia aethiopica*) and gorse (*Ulex europeus*)
- introduced and other problem animals – particularly the red fox (*Vulpes vulpes*), cat (*Felis catus*), rabbit (*Oryctolagus cuniculus*) and feral honeybee (*Apis mellifera*)
- insufficient ecological and genetic resources to maintain viable populations/asset value – small population sizes of species and habitat fragmentation
- unauthorised visitor access and behaviour such as driving off designated tracks, informal camping and campfires, and overcrowding at popular recreation sites during peak periods.



The critically endangered Albany or granite banksia (*Banksia verticillata*) is one of fourteen threatened plants within the planning area. Photo – Sarah Barrett/DBCA

⁶ 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. For example, mohan (*Melaleuca viminea*) requires infrequent, moderate to high intensity summer fires for thicket regeneration.



4. Management direction

Vision

The parks and reserves of the Albany coast and their unique values such as threatened plant and animal species, wetlands, Noongar and other cultural heritage, spectacular scenic landscapes and diverse recreation opportunities, are conserved for and enjoyed by present and future generations.

Objectives

Legislative or overarching objectives

The overarching objective of this plan, in accordance with section 56(1) of the *Conservation and Land Management Act 1984* (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)(h) reserve and timber reserve. Miscellaneous reserves are vested or held in the name of the Executive Director, or have management responsibility with the Executive Director.

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”.

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 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:

- conserve and protect biodiversity and ecological integrity
- conserve and protect the value of the land to the culture and heritage of Noongar people, and conserve and protect other cultural heritage
- provide for recreation, tourism and community use for the appreciation of the area’s landscape, natural and cultural heritage values
- provide for sustainable resource use
- improve the knowledge, understanding and appreciation of key values, aid performance assessment and provide a scientific basis for improving and adapting future management to achieve best practices.

5. Legislative and policy framework

The department administers the CALM Act, which provides for the management of conservation reserves⁷ and other specific lands and waters (see below), and the *Wildlife Conservation Act 1950* (Wildlife Conservation Act), which provides for the conservation and protection of all native flora and fauna across WA. The *Biodiversity Conservation Act 2016*, which received Assent on 21 September 2016, will eventually fully replace the Wildlife Conservation Act. These acts and other legislation (administered by other government departments and relevant in protecting the values of the planning area and/or implementing the plan) are referred to throughout the plan, and can be obtained from the [State Law Publisher](#).

Under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), actions that have, or are likely to have, a significant impact on a matter of national environmental significance (for example, listed threatened species and ecological communities, and migratory species), need approval from the responsible Australian Government Minister, in addition to any approval that may be needed in WA.

Land categories

Sections 5(1), 6, 8AA and 8A of the CALM Act list and define the categories of land and water to which the Act applies. The land categories of existing conservation reserves and other specific lands and waters relevant to the planning area (Appendix 1) are:

- nature reserve – generally for the purpose of conservation of flora and fauna, these reserves have the management objective to maintain and restore the natural environment, and to protect, care for, and promote the study of indigenous flora and fauna, and to preserve any feature of archaeological, historic or scientific interest
- national park – generally for the purpose of national park, these reserves have the management objective to fulfil so much of the demand for recreation as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna, and the preservation of any features of archaeological, historic or scientific interest
- conservation park – generally for the purpose of conservation park, these reserves are managed for the same purpose as national parks, but mostly have regional or local, rather than national significance
- section 5(1)(h) reserve – these reserves can have a variety of specific purposes, depending on the key values of particular reserves, which the land may be vested for
- timber reserve – generally for a range of purposes including conservation, recreation, water catchment protection and timber production on a sustained yield basis, as well as other purposes prescribed by the regulations, timber reserves have the management objective to achieve the optimum yield in production consistent with the satisfaction of long-term social and economic needs.

International conservation agreements

Australia is a signatory to several important [international conservation agreements](#) that affect management of the planning area, and these include:

- China-Australia Migratory Bird Agreement (CAMBA)
- Japan-Australia Migratory Bird Agreement (JAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
- Convention of Migratory Species of Wild Animals ('Bonn Convention')
- Convention on Biological Diversity ('Rio Convention')
- Convention on Wetlands of International Importance especially as Waterfowl Habitat ('Ramsar Convention').

The planning area will be managed consistent with relevant legislation, [department policies](#), national and international obligations, and the purpose and management objectives of relevant categories of land managed by the department. This management plan provides a summary of operations proposed to be undertaken in the planning area as required under section 55(1)(b) of the CALM Act.

⁷ Conservation reserves are Crown reserves that are protected for conservation and have an [IUCN category](#) of I – IV. Generally, nature reserves, national parks and conservation parks are known as 'conservation reserves', although some CALM Act section 5(1)(g) and (h) reserves and miscellaneous reserves also meet these IUCN categories.

6. Performance assessment

Performance assessment is recognised as an essential part of environmental management systems, and the results of performance assessments serve many uses including (i) the promotion of adaptive management, (ii) improving management planning, and (iii) promoting accountability and public support for management actions (Conservation Commission 2012). The Commission will evaluate the success of the implementation of this plan in accordance with section 19(1)(g) of the CALM Act by assessing the achievement of selected KPIs that target key objectives of the plan, delivery of management actions and other mechanisms as appropriate. The Commission's [Position Statement No. 9 Criteria for developing key performance indicators for management plans prepared under the CALM Act](#) provides guidance on setting performance criteria for evaluating management plans. A portfolio of evidence (such as photographs, maps, figures, checklists, on-ground surveys, incident investigation reports or records, interviews, observations and written correspondence) relating to the KPIs will be required to be established and maintained by the department throughout the life of the plan to prove this management plan has been successfully implemented.

The Commission assessed management of the conservation reserves within the planning area through the *Albany Parks Performance Assessment 2010* (Conservation Commission 2010). An initial, general qualitative analysis of the achievement of key objectives by the department, as part of the Commission's assessment process, indicated that for the scattered hinterland reserves the overall judgment of a 'fair' management standard was typical, as the *'size, shape and location of these scattered hinterland reserves make them open to a raft of threatening processes'* (Conservation Commission 2010). The performance assessment report records that *'threatening processes are known and when and where possible are mitigated'*. For the larger reserves on the coast, the overall judgment of a 'good' management standard had been achieved, with threatening processes identified and values effectively managed. The exception to this was Gull Rock National Park, which had a 'poor' management standard associated with inherited management issues pre-dating its vesting in the Commission (Conservation Commission 2010, Appendix 1), and improvement in the management standard of this park (on the basis of the implementation of controls, infrastructure and management actions) will be a focus of this plan.

7. Administration

The planning area lies within the department's Albany District of the South Coast Region (or region) (Map 1). The day-to-day implementation of the management plan will be the responsibility of the department's Albany District Manager, who coordinates the operational management of parks and reserves in the planning area, within allocated budgets and other resources. Operational management is also supported by staff from the South Coast Region and the department's specialist branches.

8. Term of the plan

This management plan will guide management of the planning area for a period of 10 years from the date that a notice is published in the *Government Gazette*. During this time, amendments to the management plan may be made in accordance with section 61 of the CALM Act. If an amendment is necessary, proposed changes will be released for public comment. At the end of the ten-year period, the management plan may be reviewed and a new plan prepared. If the plan is not reviewed and replaced at the end of the 10-year period, this plan will remain in force until a new management plan is approved.



Strategic objective

A key strategic objective of this plan is to *conserve and protect the value of the land to the culture and heritage of Noongar people, and conserve and protect other cultural heritage* (Section 4 Management direction).

9. Noongar cultural heritage

Noongar people of the planning area

[Noongar people](#)⁸ have a close association with their country (*boodja*). Noongar heritage and *boodja* are interconnected. Noongar heritage encompasses laws and practices, connection to *boodja* and traditional ecological and cultural knowledge of *boodja* and its biodiversity. Noongar heritage also includes the archaeological records of Noongar 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 *boodja*. Noongar heritage provides an essential emotional, physical and spiritual link to traditions, culture, practices and identity.

Under traditional laws and customs, Noongar people have responsibilities for looking after *boodja*, just as *boodja* 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 Noongar culture and heritage. The protection of Noongar heritage is therefore a matter of protecting Noongar cultural identity, and facilitating access to *boodja* 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 Noongar ‘world view’ and knowledge of *boodja*. Through accessing *boodja* Minang people seek to promote and retain connectivity with the landscape, and connecting with *boodja* is a cultural practice to foster spiritual renewal.

The Minang people, who have inhabited the Albany region for more than 40,000 years, are one of the 14 language groups of the Noongar people (Bates 1985). Noongar land use activities in the Albany region were focused on hunting, gathering and particularly fishing, which occurred largely around the coastal areas, inlets, rivers and lakes and provided a range of foods such as mammals, birds and eggs, many reptiles and frogs, fish (especially marine species from the lower reaches of rivers, and from estuaries and inlets), some invertebrates (especially the larvae of some beetles and moths), and a wide range of roots, seeds and fruits (Goode *et al.* 2005). The seasonal abundance of particular foods coincided with each of the [Noongar six seasons](#) and also determined the patterns of movement of the Noongar people. Early records acknowledge the importance of the seasons. Assistant Colonial Surgeon J.S. Nind recorded that “*As the country does not abound in food, they are seldom stationary, removing, according to the time of the year, to those parts which produce the articles of provision that may be in season. During the winter and early spring they are very much scattered; but as summer advances they assemble in greater numbers. It is at this season that they procure the greatest abundance of game*” (Nind 1831).

In the warmer months, large groups of Minang people gathered in the King George Sound and Oyster Harbour areas to harvest the rich resources in the area and to conduct ceremonies and social business. In the winter months, while the coastal areas around the margins of these large water bodies were still occupied intermittently, people tended to break up into smaller family units and disperse into the hinterland to the open woodlands to hunt game. This dispersal into the hinterland was focused upon the use of the King River and Kalgan River (*Kalganup*), and other rivers within the region as traditional paths that facilitated this pattern of migration.

⁸ The spelling of ‘Noongar’ should be seen to encompass the Nyungar, Nyoongar, Noongah and Nyungah spellings.

This pattern of traditional use of *boodja*, coupled with the religious belief in the water spirit (water snake or *Mardjit*), made the region's waterways places of high significance. Some of the many other places of significance in the planning area include Mt Manypeaks (or *Yoolberup*), South Sister (or *Twerturtup*) and Two Peoples Bay (or *Toolerberup*).



The cultural heritage place of *Toolerberup* in Two Peoples Bay Nature Reserve. Photo – Lee Hollingsworth/DBCA

Contact with Europeans occurred first with sealers/whalers and maritime explorers, followed by overland explorers and then by surveyors and settlers. Between 1791 and the early 1830s, European explorers and settlers such as Vancouver, Baudin, Flinders, King, D'Urville, Lockyer, Barker and Nind (Section 10 *Other cultural heritage*) made many observations and accounts of the Minang people documenting details of family and tribal custom and structure, language, philosophy, history, shelter construction, farming methods, food gathering, and hunting techniques. Following the handing over of control of King George Sound Settlement in 1831 to the Swan River Colony (Section 10 *Other cultural heritage*), settlers began arriving looking for land. Expansion of colonial settlements followed, with ensuing displacement of Noongar people from their traditional lands as European farmers cleared and settled the country. Townships and stations became the focal point for Noongar living, altering Noongar traditional life and leading to population decimation because of introduced diseases. Despite the impact of colonisation on Minang people, they have continued a system of law and culture over the planning area since settlement and their historical occupation of *boodja* has left a rich cultural heritage, with numerous sites of significance across the landscape. Minang people continue to use the planning area to practice their laws and customs and undertake their customary activities.

Noongar heritage sites

Noongar heritage sites, which link Noongar cultural tradition to *boodja* and people across time, hold great meaning and significance to Minang people in the area. There are eleven [registered Aboriginal sites](#) within the planning area, and six more sites listed as 'other heritage places', including artefact scatters, mythological sites, engravings, grinding areas, food and ceremonial sites. Seven of the seventeen sites are mythological sites, which feature in mythological stories about the creation of features of the landscape in the area. Based on the location of existing sites, potential sites are more likely to be located on the coast, near a water source (fresh, salt or seawater), and in areas surrounding lakes (Goode *et al.* 2005). However, 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*, Noongar heritage sites are protected whether registered or not, and it is an offence to, in any way, alter a Noongar heritage site or object unless permission is granted in accordance with the Aboriginal Heritage Act. If proposed management actions may disturb a site, an assessment is required before the operation proceeds. The department will work with the [Department of Planning, Lands and Heritage](#) (DPLH) and Noongar people and apply the State Government's *Aboriginal Heritage Due Diligence Guidelines* (DAA 2013) to guide management actions to ensure Noongar heritage sites are not adversely impacted.

Noongar people's connection to *boodja*

Noongar people have a strong desire to care for *boodja* and practice customary activities according to their traditional laws and customs, to be involved in cooperative management of conservation reserves and to strengthen cultural ties to the land. Working with Noongar people to care for the land is essential for the preservation of natural and cultural heritage, as well as enriching cross-cultural awareness. The involvement of Noongar people in cooperative management of department-managed lands and waters (or CALM Act lands) also provides cultural, spiritual and economic benefits to Noongar people. The Commission and the department acknowledge the aspirations of Noongar people to:

- have their traditional rights to *boodja* recognised
- conduct customary activities on department-managed lands and waters
- participate in the ongoing planning, decision-making and management of department-managed lands and waters.

Native title

The planning area falls within two [registered native title claims](#): Southern Noongar (WC96/109) and Wagyl Kaip (WC98/70), as well as the unregistered Single Noongar Claim (Area 1) (WC03/6). The Wagyl Kaip/Southern Noongar claim area is one of six regional claim groups within the South West Noongar area, and all claim groups have approved Indigenous Land Use Agreements (ILUA) under the South West Native Title Settlement (SWNTS). The SWNTS is the largest and most comprehensive agreement to settle Aboriginal interests over land in Australia since colonisation. Involving around 30,000 Noongar people and covering about 200,000km², 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. 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 over the ILUA areas. Until then, the 'future act provisions' of the *Native Title Act 1993* (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. The South West Aboriginal Land and Sea Council (SWALSC) is the native title representative body for the Noongar people within the planning area. Native title claimants and SWALSC have been notified of the management planning process, and consulted during the preparation of this management plan.

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 department will continue to recognise that Noongar people have strong and enduring interests in department-managed lands and waters and desire to continue cultural activities in these areas, and will continue to work closely with local Noongar people on land management activities.

Involving Noongar people in management

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 *boodja*, and will help to fulfil the longstanding aspirations of Aboriginal people to be involved in the management of the land and to do traditional activities on *boodja*. The department's [Corporate Policy Statement No. 87: Aboriginal joint management](#) provides guidance on involving Noongar people in the management of conservation reserves in the planning area. 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.

Customary activities

The CALM Act (and associated regulations), together with the Wildlife Conservation Act, allow Noongar people to access lands and/or waters managed by the department to conduct traditional activities, subject to regulations. The department's [Corporate Policy Statement No. 86: Aboriginal customary activities](#) provides guidance on establishing a framework for decision-making in relation to recognising activities undertaken by Aboriginal people for customary purposes, and in the application of relevant regulations. Such traditional customary purposes may be for medicinal, artistic, ceremonial or other cultural purposes.

The hunting and gathering of food by Noongar people is an important part of their culture, enabling them to maintain traditional relationships with *boodja*, share knowledge and partake in traditional practices. Noongar people in the region continue to access the planning area to undertake cultural activities and gather a range of traditional foods. The hunting and gathering of food by Noongar people in conservation reserves needs to consider the need for special provisions for the taking of some species (for example, threatened species), and ensure that the use of wildlife does not result in an overall decline in population abundance or altered distribution of species. Also the food taken cannot be sold for commercial gain and the activity must not impinge upon the safety of others and has to be consistent with the objectives of the land.

The department will work with registered native title claimant groups, joint management parties and local Noongar 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 Noongar people. Local area arrangements have been developed for West Cape Howe National Park. The development of relationships at a local level is vital to the ongoing management of customary activities on department-managed lands and waters. It is possible that during the life of this plan the native title rights and interests of Noongar people, and/or management arrangements with Noongar people, may change. The department will continue to recognise the interests of Noongar people on reserves where native title has been extinguished and their desire to continue cultural activities and customs in these areas, and will also ensure conformity with any changes to legislation or Government policy during the life of the plan.

Working relationships with Noongar people

A greater respect for and understanding of Noongar culture may help all people in having a greater attachment to *boodja* 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, SWALSC and local Noongar people) on different issues at different levels on a regular basis, the department will continue to build and strengthen relationships with Noongar people, communities and representative bodies through a variety of strategies and projects.

Education

The department promotes a greater awareness of Noongar culture because firstly, other Australians generally have a poor understanding of Noongar culture. It is essential that this lack of understanding is redressed for reconciliation to occur. The second, and equally as important point, is to encourage people to explore Noongar culture and its relationship to *boodja*.

The department promotes 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.

Noongar language is used extensively across the planning area for localities, roads, farms and reserves, including for example Waychinicup National Park which has the meaning 'place of emu footprint' (Vernice Gillies personal communication). Torndirrup National Park is named after one of the [local Noongar tribal divisions](#) (Nind 1831, Sandiford 1988). Some of the spellings and meanings are not always known or correctly given. The sharing of Noongar language and stories will deepen the respect for Noongar culture and spirituality and create a greater awareness of the traditional and contemporary history of the area. Some of the ways that the cultural ties between Noongar people and *boodja* can be better appreciated, cross-cultural awareness enriched, and working relationships strengthened is through:

- the naming of reserves, individual recreation sites or park features/places, including dual naming (Section 14 *Biogeography*, Parks and Wildlife 2013b)

- using appropriate signage and cultural interpretation at key sites (Section 22 *Visitor experience*)
- developing walk trails that will tell stories about the significance of key sites, such as the ‘Kinjarling Trail’ (Section 24 *Visitor activities*).

The development of walk trails may also provide opportunities for direct employment (through research, designing of routes, enunciating the stories, and determining the significance of them and their construction) and to develop enterprises such as guided cultural awareness tours, bush survival skills training and the production and teaching of bush foods and medicines. The department also provides opportunities for cultural activities for Noongar students and young people on department-managed lands in partnership with elders.

Employment

Employment of Noongar people is another way of creating greater cross-cultural awareness upon which to build better working relationships between the department and Noongar people. It is also an important mechanism for developing expertise among Noongar people and providing long-term employment. To achieve a just and equitable Noongar employment outcome on conservation lands and waters, the department has initiated the *Mentored Aboriginal Training and Employment Scheme*. This 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 employed within the department’s regional workforce, and criteria relating to Aboriginal people are included in staff selection processes.

There are opportunities for the development of Aboriginal tourism in the area, which can deliver tourism and other social and economic benefits to Noongar people (Tourism WA 2010, 2011; Section 22 *Visitor experience – Regional recreation context*). The department can facilitate and support opportunities for access to land and tenure for the development of tourism, and can help facilitate the development of indigenous interpretation and product (Tourism WA 2010). It is important that Noongar culture is told and shared by Noongar people, not only as the traditional owners of that culture, but also to ensure an authentic experience for tourists.

Other avenues for employment include commercial licenses or contracts. Licenses are issued by the department for commercial activities such as firewood collection, or wildflower picking (see *Managing economic and resource values*). Contracts are where services are supplied directly to the department, such as weed spraying on reserves. The assessment of new restricted tourism licences includes a consideration of Aboriginal employment outcomes and culturally appropriate service delivery.

Management objective

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

Management actions

1. Work with Noongar people to assess the value of the land to the culture and heritage of Noongar people and ensure that this knowledge informs and guides all management actions. Where consent is given by Noongar people to use traditional knowledge, ensure it is appropriately acknowledged.
2. Ensure that liaison with Noongar 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 Noongar people, consistent with legislation, Government policy and the SWNTS.
4. Apply the relevant ‘future act provisions’ under the Native Title Act to department work.
5. Consider information located on all heritage registers and databases, apply the *Aboriginal Heritage Due Diligence Guidelines*, and liaise with DPLH, Noongar people, representative corporate body and other relevant stakeholders about the appropriate protection, conservation and management of cultural heritage to ensure heritage sites are protected.
6. Consistent with legislation and regulations, help and facilitate the needs and aspirations of Noongar 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 appropriate department staff are trained in Noongar heritage site identification and recording requirements.

8. Ensure that department staff undertake cross-cultural awareness training based on local knowledge and experiences.
9. Ensure that management adapts to and conforms with any legislative or policy changes and native title resolutions during the life of this plan.
10. Encourage training, employment and economic development opportunities through cooperative and joint management arrangements.

Key performance indicators

Performance Measure	Target	Reporting
Protection of Noongar heritage sites	No disturbance of Noongar heritage sites as a result of department operations without formal approval and consultation	Annually
Involvement of Noongar people in management	Relevant commitments to joint and cooperative management through the SWNTS within the planning area are met	Every five years

10. Other cultural heritage

Other heritage sites

While there are no sites in the planning area on the *World Heritage, Commonwealth Heritage, National Heritage* and *List of Overseas Places of Historic Significance* [lists](#), several sites are listed on the now closed (2007) [Register of the National Estate](#) (RNE), including Gull Rock, Torndirrup and Hassell national parks and Basil Road and Lake Powell nature reserves. The RNE is no longer a statutory list, although it serves as an archive of information which may continue to be relevant to statutory decisions about protection.

At the State level, the *Heritage of Western Australia Act 1990* provides for the registering and protection of sites of historic interest as ‘heritage places’, which are registered on the [WA Register of Heritage Places](#). Sites in the planning area on this register include Breaksea Island and lighthouse, Eclipse Island and lighthouse, and the sealers’ oven in Waychinicup National Park. The *Heritage of Western Australia Act 1990* also requires LGAs to maintain a ‘municipal inventory’ of places of heritage significance in their area. The City of Albany’s [Municipal Heritage Inventory](#) includes Fisherman’s shack in Two Peoples Bay Nature Reserve and the sealers’ oven.

Heritage sites that may have some historic interest but may not meet the criteria for heritage listing under legislation, are managed in accordance with the department’s [Corporate Policy Statement No. 18: Recreation, Tourism and Visitor Services](#) and are entered on the department’s *Recreation and Tourism Information System* database. There are nine sites of cultural heritage significance listed on this database.

Early colonial history

The planning area has a rich history of other cultural heritage associated with early exploration, sealing and whaling industries, settlement, convicts and shipping. [Early colonial exploration](#) of the Albany area began in the 17th century when Thijssen and Nuyts on board the ship *Gulden Zeepaard* explored the coast in 1627. Commander George Vancouver explored the coast from around Chatham Island (near Walpole) to King George Sound in the vessels *Discovery* and *Chatham* in 1791. Following more visits to the King George Sound area by Flinders (1801), Baudin and Freycinet (1803), King (1818, 1821 and 1822) and D’Urville (1826), Major Lockyer arrived at King George Sound on the *Amity* in 1826 and established a penal settlement (Frederickstown, now Albany) as part of the colony of New South Wales. This first official colonial settlement in WA, named ‘King George Sound Settlement’ (or *mammang koort*), was administered by a succession of military officers, including Lockyer, Wakefield and Barker, until March 1831 when control was handed over to the Swan River Colony. In 1832 the settlement was named ‘Albany’ by Governor Stirling. Albany was part of the international trading routes from 1831, and many explorers, settlers and natural scientists subsequently visited or settled in the area, including Charles Darwin who visited King George Sound in March 1836 in the *Beagle* (Armstrong 1985, 2015) and Government botanist James Drummond who classified the flora of the Albany area in 1840. Albany is also the site of the first federal military base (1893-1956).

Other notable early natural scientists included Jacques Labillardière in 1791, who collected numerous zoological and flora specimens and went on to publish [Novae Hollandiae Plantarum Specimen](#), the first general description of the flora of Australia. In 1801 the botanist Robert Brown, ship’s botanist on the voyage led by Mathew

Flinders, collected more than 500 plant species from the Albany area. In 1803 Francois Peron, ship's naturalist on *Le Geographe*, collected and described thousands of zoological specimens. In the early 1840s John Gilbert, an ornithologist and taxidermist for the Zoological Society of London, collected numerous Western Australian specimens for the naturalist John Gould, including the Gilbert's potoroo collected from King George Sound.

During the early 1800s, American, British, French and Australian whalers and sealers began operating off the South Coast, and King George Sound became a port of call for whaling and sealing vessels, taking advantage of the sheltered waters, abundant fresh water and available wood supply. The armed [English whaling vessels *Kingston and Elligood*](#) arrived in Albany in 1800. The sealers' oven (Heritage Place 3343) in Waychinicup National Park is evidence of the activities of sealers during the early 1800s. Sealers were active on Breaksea and Eclipse islands during 1826-27 (Abbott 2006) and by the time William Lovett and Thomas Sherratt had begun whaling and sealing in King George Sound and eastward in 1835, sealing had declined. Whaling became an important source of revenue to the infant colony and by the 1840s bay whaling stations had been established at Two Peoples Bay (1842), Torbay (1844), Cheyne Beach (1846) and Cape Riche (Gibbs 2010). Several vessels were wrecked along the south coast while engaged in whaling and sealing, including the *Avis* at Two Peoples Bay in 1842 and the *Arpenteur* at Cheyne Beach in 1849. Bay whaling in King George Sound continued until the 1890s, and was eventually replaced by shore whaling from 1912 to 1916, followed by development of the modern whaling industry after World War II (Cheynes Beach Whaling Company started operation in 1952 in King George Sound next to Torndirrup National Park) until closure of the industry in 1978.

Following establishment of the King George Sound settlement, numerous expeditions into or through the hinterland and beyond were made including those of Major Lockyer (1827) along the Kalgan River, Captain Wakefield (1828) in the Porongurup Range, Dr Wilson (1829) in the Mount Barker area, Captain Bannister (1830-31) between Perth and Albany, Dr Collie (1831) in the Porongurup area, Ensign Dale (1832) in the Porongurup Ranges, Eyre (1841) from Adelaide to Albany, Roe (1848) in the western part of the region, and Forrest (1870) from Perth to Adelaide.

Convicts were based in Albany from 1826-1831 and then again from the early 1850s to 1872. During this period, convicts were tasked with the building of public works such as roads and bridges, public offices, lighthouses and wells. With the opening of steam ship routes to Australia in 1852, Albany became a strategic settlement of national importance having sheltered waters and abundant fresh water and provisions in an ideal location. Lighthouses paid for by the British Admiralty were erected in King George Sound.

Many of the islands near Albany were used from the early to late 1800s for a variety of uses such as food (seabirds), sealing and whaling, navigation, agriculture, gardening, quarantine, military training (Abbott 2006), and some are still used today (Section 30 *Utilities and services*). Breaksea Island and lighthouse heritage site (Heritage Place 3353) consists of a convict built lighthouse (built in 1858), a replacement lighthouse (built in 1902), and two quarters buildings with ancillary buildings (built in 1902 and 1908). The site is culturally significant because:

- the lighthouse is rare as a complex of structures illustrating part of the history of development of lightstations in WA, and the remains of the 1858 lighthouse and keeper's quarters building is the largest and most complete of its type in the State
- the place demonstrates the importance of Albany as WA's principal port before the development of Fremantle Harbour, the navigational aids that were built to improve its safety for shipping, and the development of a lightstation through time
- it was the second lighthouse built in WA
- it is one of only two convict built lighthouses in WA.

Restoration of this site in 2009–2010 ensured the conservation of this important complex allowing for tourism opportunities to be identified for the future. Further restoration works are required, and the department and Great Southern Development Commission (GSDC) will continue to work together to improve facilities on Breaksea Island.

The Eclipse Island lighthouse precinct (Heritage Place 15740), built in 1926, demonstrates the reaffirmation of the importance of Albany as a harbour in the inter-war period.



Lighthouse on Breaksea Island. Photo – Steve Toole/DBCA

The fisherman's shack (Heritage Place 15576) at Two Peoples Bay was part of a group of shacks built after WWII. While the other shacks were removed after the area was made a reserve in 1966, this shack has been preserved for use by department staff and scientific visitors to the reserve.

Many features and place names in the planning area were named by or derived from early explorers (Sandiford 1988). For example, Eclipse Island was named by English navigator George Vancouver in 1791 on the day of an eclipse of the sun. Vancouver also named the southern-most point in WA at Torbay Head in West Cape Howe National Park in 1792. 'Manypeaks' is a name given by Captain Matthew Flinders in January 1802 while surveying the south coast on board the *Investigator*. Cheyne Beach was named after George Cheyne who was a pioneer of Cape Riche.

The *Heritage Tourism Strategy for WA* (HCWA and TWA 2006) 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. The region is generally considered to have the strongest history and heritage offering in the south-west (with Albany being the first settlement in WA, the main port for WA until the opening of the port of Fremantle, an integral site of ANZAC history as well as home to the last operating whaling station in Australia). There are opportunities for heritage tourism in Waychinicup, Gull Rock and Torndirrup national parks and Breaksea Island and Eclipse Island nature reserves (GSDC 2015). Site development (Section 24 *Visitor activities*) of the remains of the No. 35 Radar Station at Stony Hill (Heritage Place 15845) in Torndirrup National Park, which was operational from May 1943 to October 1945, may provide an opportunity to interpret the role this site played in World War II.

Management objective

To identify, conserve and protect other cultural heritage sites, in consultation with relevant stakeholders.

Management actions

1. Control access to, protect, maintain and monitor known or identifiable other cultural heritage consistent with legislation and department policy.
2. Consider information located on all heritage registers and databases, and liaise with relevant stakeholders about the appropriate protection, conservation and management of other cultural heritage, particularly before any management or development operations to ensure heritage sites are protected.
3. As resources allow, identify, research, document and map other cultural heritage across the planning area.
4. Assess and, where necessary, propose statutory protection for identifiable heritage of cultural significance, particularly natural heritage sites on the former *Register of the National Estate*.
5. Develop and implement heritage management plans for priority heritage sites, including surveys where resources allow.
6. Where appropriate, support heritage tourism development opportunities.



Strategic objective

A key strategic objective of this plan is *to conserve and protect biodiversity and ecological integrity* (Section 4 *Management direction*). The conservation of threatened species and threatened ecological communities is guided by department policies (Section 5 *Legislative and policy framework*). While species records are drawn from many sources, most records are from [NatureMap](#). Plant and animal names follow those used by *NatureMap*, WA Museum and the WA Herbarium's [FloraBase](#). However, there may be alternate spellings for many of the common and Noongar names for plants and animals (Abbott 1983, 2001, 2009).

11. Climate

The planning area has a Mediterranean climate characterised by mild wet winters and mild to hot dry summers. Proximity to the coast means that [average temperatures](#) in Albany in summer range from 15.5–22.9°C with infrequent very hot days, the highest recorded temperature at 44.8°C (8 February 1933). Average winter temperatures are in the range from 8.2–15.8°C, with the lowest recorded temperature at 0.1°C (25 July 1943). Maximum and minimum temperatures are strongly influenced by distance from the coast with inland parts experiencing a far greater range in mean temperatures than coastal areas. Frosts are relatively common inland during the winter months, as are daytime temperatures of more than 30°C during the summer. Annual rainfall at Albany has historically varied from 1,395mm (recorded in 1955) to 628mm (recorded in 1972), but averages 927mm, and decreases northwards and eastwards to around 500mm at Wellstead.

The climate affects the key values and management issues of the planning area, particularly through the effects of rainfall, temperature and wind (Gilfillan *et al.* 2009). Management responses reflect environmental conditions. For example, rainfall combined with warm temperatures provides ideal conditions for the growth of *Phytophthora Dieback* disease and, although most rainfall occurs in the cooler months (May to August), summer rainfall is significant and may necessitate seasonal closures of access to disease prone areas. In addition, tracks may erode during heavy rain. Wind potentially impacts on erosion and fire management. Erosion is particularly likely to occur in sandy areas where tracks are aligned with the wind direction. Sand blasting of vegetation can also cause problems for rehabilitation in eroded areas. During winter, there are occasional westerly storms with strong winds, and severe erosion of beaches can occur, particularly when storms coincide with high tides. Bushfire suppression can be seriously hampered during strong winds.

In the south-west of WA, rainfall has already decreased and is projected to continue decreasing throughout this century. Annual average rainfall since 1975 has declined by eight per cent in Albany relative to the long-term average (Department of Water [DoW] 2014). A further decline in rainfall of two to six per cent by 2050 is expected in coastal areas and up to 15 per cent by 2050 in inland areas (DoW 2010a). A reduction in rainfall has contributed to reduced runoff and streamflow trends across the region, and by 2050 streamflow is expected to reduce by 10 per cent in coastal areas and by up to 40 per cent for inland areas (DoW 2014). Future increases in temperature are also anticipated, although maximum temperatures in the Albany coast area are projected to decrease (IOCI 2012). This, coupled with a likely higher frequency of episodic weather events (flooding, drought), may exacerbate existing threatening processes such as dieback and the impact of fire, reduce habitat suitability for native taxa, and compound coastal erosion. Malcolm *et al.* (2006) suggest that the south-west of WA is especially vulnerable to climate change in terms of the potential for the extinction of threatened species (Section 14 *Biogeography*). Threatened species potentially most impacted by climate change in the South Coast Region include climate refugial and relictual species, species dependent on freshwater wetlands, geographically localised species, migratory species, species occurring in highly fragmented or patchy habitats, and species occurring in small populations. Gilfillan *et al.* (2009) suggest that nearly 80 per cent of threatened fauna and 95 per cent of threatened flora in the South Coast Region are extremely or highly vulnerable to climate change. Climate change is also likely to impact threatened species through their interactions with other threatening

processes. For example, climate change may lead to increased fire frequency, intensity, seasonality and risk, increased *Phytophthora Dieback* spread, and risk of invasion by weeds and introduced and other problem animals. Physical landscapes and structures, including recreation and heritage sites, may also be affected by climate change through rising sea levels, coastal inundation and increased severe weather events, which may require further assessment, planning and management of potential risks and mitigating actions.

Integrating the results of climate change impact studies within current management strategies at a range of management levels (Dunlop and Brown 2008), such as the regional (whole-of-forest or ecosystem), community (or landscape) and species (or operational) level, could help improve the survival and resilience of species, communities and ecosystems, increase the likelihood of successful adaptation and decrease their vulnerability to climate change. Gilfillan *et al.* (2009) suggest that the best management options for climate change in relation to threatened species recovery in the South Coast Region are to continue to build their resilience by improving landscape connectivity, maximising population viability and reducing the impact of other threatening processes. At the regional level, conservation strategies include preserving vegetation corridors (such as through the [South Coast Macro-Corridor network](#), Section 26 *Involving the community*), adding to the conservation reserve system and implementing species recovery programs. At the community or landscape level, strategies include improving resilience by increasing and refining existing management actions for other threats (such as diseases, inappropriate fire regimes, weeds and introduced and other problem animals). 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. The achievement of conservation outcomes under climate change will be greatly helped by (i) good monitoring and flexible management, (ii) coordination of conservation activities across protected areas and other Crown lands such as City of Albany-managed reserves and the intervening matrix of agricultural and urban lands and non-protected native habitats (Section 26 *Involving the community*), and (iii) planning over longer times and larger scales (Dunlop and Brown 2008). All of the individual actions used to manage protected areas 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 (NRMCC 2004).

Management objective

To improve the survival of species and ecosystems by increasing their resilience to climate change.

Management actions

1. Incorporate the potential for climate change impacts upon threatened species and communities and other values into management actions and develop effective response strategies, with a focus on building their resilience by improving landscape connectivity (including encouraging compatible off-reserve management), maximising population viability and reducing the impact of other threatening processes.
2. Incorporate the results of climate change impact studies, as they become available, into current conservation strategies at the regional, community and species level.

12. Geology, landforms and soils

The planning area overlies Archean to Proterozoic-age (3,000–1,100 million years ago) bedrock comprising granite, layered gneiss, migmatite, minor metamorphosed iron formation and dolerite in the Biranup and Nornalup Zones of the Albany-Fraser Orogen (Myers 1990). Granite forms large rocky outcrops such as Mt Gardner (408m ASL) and Mt Manypeaks (565m ASL). The dominant rock type along the coast west of Bald Island is granite, with batholiths (large bodies of rock) exposed throughout the landscape in that area. At Torndirrup National Park, the Southern Ocean has sculpted the ‘Natural Bridge’, ‘The Gap’ and ‘Blowholes’ in the coastline granites and gneisses (Copp 2001). Torndirrup National Park has a predominance of migmatite, whereas West Cape Howe has dark grey to black dolerite that forms the western part of the peninsula (CALM 2001). The Albany–Fraser Orogen is unconformably overlain by the Cenozoic (less than 65.5 million years ago) sedimentary rocks of the Eucla Basin initiated during rifting along the future margins of Australia and Antarctica (Fitzsimons and Buchan 2005). The onshore portion comprises Eocene-age sandstone and siltstone of the Plantagenet Group, which typically dips very shallowly to the south and infills palaeodrainage and depressions. The dominant lithology is the Pallinup Formation, comprising marine sandstone, siltstone and spongolite, which overlies clay, siltstone, sandstone and lignite of the Werillup Formation.

Tertiary to recent (45 million years old to present) weathering products, drainage and coast-related sediments cover much of the Plantagenet Group within the planning area. Laterite, a residual product formed by intense weathering of underlying basement rocks during the past 65 million years, is extensive because of the strength of

the capping, although it is uncommon at the coastline. The drainage-related sediments include sand, silt, clay and conglomerate deposited in creeks, swamps and lakes. Re-working by wind and water has deposited thick alluvial deposits in valleys and produced local dune sands. Near the coast, beach sands (comprising quartz, feldspar and silica sands from the erosion of bedrock that has been washed to the nearshore area, and lime sand originating from the calcareous shells of marine animals that have been broken up by wave action) have been deposited on the shoreline and blown inland to form extensive high dunes and inland sand sheets. The lime sand of dunes can be rapidly cemented to form a very porous limestone referred to as eolianite, and prominent hills and coastal cliffs of eolianite can be seen especially at King George Sound.



The black dolerite cliffs in West Cape Howe National Park. Photo – Paul Roberts/DBCA

Some of the south-west's most stunning coastline stretches between Walpole and Mount Manypeaks, where windswept coastal heaths give way to massive granite outcrops and boulder-strewn headlands, sheer cliffs, and steep sandy slopes and dunes that form a series of spectacular bays and peninsulas (Copp 2001). The main landform regions are the Avon, Stirling and Coastal regions (CALM 1992a). The Avon landscape is dominated by laterised plateaus with dissected edges. Inland the drainage lines become saline. There is substantial variation in soil types including red earths, red duplex soils, yellow sands and red and yellow duplex soils. The Stirling region, a narrow belt along the south coast, is characterised by laterised plateaus, with dissected edges and emergent quartzite ranges, and is dominated by yellow duplex soils on the plains and dissected areas and by shallow sandy soils on the mountain ranges (CALM 1992a). The Coastal region in the planning area is dominated by granitic and gneissic headlands and intervening curved sandy beaches. The planning area falls within the Albany Sandplain Zone, where soils are sandy duplex soils, often alkaline and sodic, with some sands and gravels (Schnoknecht *et al.* 2004). The sandy soils are highly susceptible to wind and water erosion, have low water holding capacity and low fertility. Inappropriate management activities and/or recreational development and activities in these areas can add to erosion issues (Section 22 *Visitor experience*, Section 23 *Visitor access*). Some coastal areas (Pallinup River, Lake Powell Nature Reserve and areas within Gull Rock, Waychinicup and West Cape Howe national parks) have a high to moderate risk of [acid sulfate soils](#) in low-lying areas, swamps, lakes, estuaries and lower reaches of rivers.

The range of geological, landform and soil features, assemblages, systems and processes in the planning area (also known as geodiversity), including the range of atmospheric, hydrological and biological processes currently acting on rocks, landforms and soils, underpins and shapes our landscapes, biodiversity and habitats, land use and local character. Key geodiversity phenomena of very special conservation significance that need to be conserved are recognised as '[geoheritage](#)'. For Noongar people, geoheritage is an integral part of their culture and beliefs. Many landscape features and past geological events are a part of their dreamtime stories and ceremonies, and this experiential heritage has been passed from generation to generation over thousands of years

(Section 9 *Noongar cultural heritage*, Worboys 2012). While there is a geoheritage site at Nanarup limestone quarry, there are no geoheritage sites within the planning area⁹.

Management objective

To identify, protect and conserve geological features, landforms and soils.

Management actions

1. Identify and protect geological features, landforms and soil types vulnerable to environmental damage (such as coastal dunes).
2. Assess the potential for impact on geological features, landforms and soil types from land uses, proposed developments and activities, including management operations such as providing access roads/tracks, constructing firebreaks and recreational site development.
3. Identify and then consider the potential for creating acid sulfate soils during the planning and management of operations, and avoid disturbing, compacting or displacing saturated soils at risk.
4. Liaise with relevant stakeholders on the protection, conservation and management of geological features, including the Geological Survey of WA to determine whether significant features across the planning area are worthy of consideration for inclusion on the register of the State's Geoheritage Sites.

13. Hydrology

Surface water

The surface water hydrology in the planning area is characterised by southerly-flowing drainage lines that extend up to 80km inland and discharge into inlets or estuaries, including the Hay, Kalgan, King, Goodga, Angove, Waychinicup and Pallinup rivers, and Mill and Marbellup brooks. While the Pallinup and Kalgan rivers are generally saline (greater than 3,000mg/L) (although the Kalgan River is brackish [1,500-3,000mg/L] near the coast), the very short coastal rivers are generally fresh (Smith 1997). The major estuaries in the area include Wilson, Torbay and Beaufort inlets, and Oyster and Princess Royal harbours.

Wetlands occur as lakes, swamps, rivers, inlets and estuaries. Many of the wetlands have high conservation values, which include their importance as feeding and nesting areas for migratory and other birds (Section 5 *Legislative and policy framework* and Section 16 *Native animals and habitats*). While there are no wetlands of international significance in the planning area, there are three [wetlands of national significance](#):

- the Moates Lake System within Two Peoples Bay Nature Reserve includes Lake Gardner, Moates Lake, Angove Lake and tributaries and is a good example of a system of stream-fed fresh and brackish lakes impounded by coastal sand. Moates Lake is one of the deepest natural lakes in south-west Australia. This system is identified as meeting one Ramsar criterion (Criterion 3c: Australasian bittern [*Botaurus poiciloptilus*]) for listing as a wetland of International Importance (Jaensch and Watkins 1999). The Two Peoples Bay/Mount Manypeaks area is an Important Bird Area (Section 16 *Native animals and habitats*)
- the Lake Pleasant View System includes South Sister Lake, Lake Corimup, White Lake, Tarnup Lake and Lake Pleasant View, within several nature reserves in the vicinity of Lake Pleasant View Nature Reserve. This system is a good example of near-permanent freshwater marshes with peat substrate. Lake Pleasant View, or *Lake Ballogup* meaning 'big blue breasted swamp hen' (Goode *et al.* 2005), is identified as meeting one Ramsar criterion (Criterion 3c: Australasian bittern) for listing as a wetland of International Importance (Jaensch and Watkins 1999). The Lake Pleasant View system is an Important Bird Area (Section 16 *Native animals and habitats*)
- Oyster Harbour and its associated tidal vegetation (Sandiford and Barrett 2010), which overlaps much of the western and northern coastal fringe of Gull Rock National Park and Mt Martin and Voyagers Park reserves, is unique among estuaries of the south coast of WA in having a deep and permanent opening to the sea, with full tidal exchange.

Wetlands of regional significance in the planning area include:

- Wilson Inlet Ridge Swale (near Hay River and Morley beaches)
- Lake William (West Cape Howe National Park)
- Marbellup Flats and Seven Mile Creek (which overlap into Down Road Nature Reserve)

⁹ See [Department of Mines, Industry Regulation and Safety](#)'s (DMIRS) [GeoVIEW.WA](#) online database.

- Powell Lake (Lake Powell Nature Reserve)
- paluslopes on granite (Torndirrup National Park)
- Mill Brook (Mill Brook Nature Reserve)
- Johnston Creek (Bakers Junction Nature Reserve)
- Ledge Point wetland and Gull Rock Lake (Gull Rock National Park)
- Moates Lake, Gardner Lake, Gardner Lake Dunes and Angove Lake (see above)
- Lake Pleasant View, South Sister Lake, Tarnup Lake, White Lake and Lake Corimup (see above)
- Cheyne Downs (Cheyne Road Nature Reserve)
- Cheyne Road C (which partly overlaps Waychinicup National Park)
- Sunday Swamp (Hassell National Park)
- Mettler (Mettle Lake Nature Reserve)
- Cheyne (which partly overlaps proposed reserve 14943)
- un-named 1, un-named 2 and un-named wetland 13 (in proposed reserve 31240)
- floodplains on granite and un-named wetland 5 (in proposed reserve 43087).



Above left Moates Lake in Two Peoples Bay Nature Reserve. Gardner Lake, Two Peoples Bay and the Southern Ocean are in the background, Angove Swamp is in the top left-hand corner, and Goodga River enters Moates Lake in the foreground. Photo – Alf Lorkiewicz/DBCA

Above right Lake Pleasant View. Photo – Alan Clarke/DBCA

Groundwater

Groundwater can be found in all the geological units of the area, but the size and salinity of supplies depends on factors such as rainfall, topography and the nature of the surficial, as well as the underlying geological units. In general, fresh groundwater is scarce and supplies are small. In the Albany-Fraser Orogen, groundwater can be obtained from fractured rocks, weathered rock and patches of Bremer Basin and alluvial valley sediments preserved within the older geological units, although groundwater here is generally brackish to saline and fresh water is generally available only in a few areas. Sediments of the Bremer Basin contain lenses of sand within the silty and clayey sediments. The sands generally contain brackish to saline groundwater, but locally contain fresh groundwater from which large supplies have been developed. The confined sandstone (Werillup Formation) aquifer is the main aquifer in the region and contains the most significant groundwater resources in the area (Smith 1997). The Albany Groundwater Area is a major regional supply of fresh groundwater (DoW 2010b, Section 28 *Water resources*). Fresh groundwater also occurs as a veneer overlying saline water within the coastal dune sands and eolianite. Groundwater salinity generally increases to the north and east as rainfall decreases, and increases with depth as well as with distance along the direction of groundwater flow (DoW 2014). Near the coast groundwater is fresh to saline, but further inland groundwater is generally stock quality (generally less than 8,000mg/L) to hypersaline (up to 100,000mg/L). The Werillup Formation and Pallinup Siltstone are recharged by rainfall, leakage from overlying Quaternary sediments and leakage from bedrock (Smith 1997). Interactions between groundwater and surface water hydrological systems are generally not well understood for the wider planning area, although in some areas groundwater contributes to surface water hydrology, such as at Lake

Pleasant View where some of the water supply is from groundwater and some also comes from inflow across winter-wet flats¹⁰.

Altered hydrological regimes

Extensive clearing in the upper catchments and associated agricultural activities (such as cropping, fertilizing and grazing) along with increasing urbanisation/development has led to changes to the hydrological system (Storer *et al.* 2011). This has directly or indirectly contributed to many threats to the planning area, such as:

- changes in surface run-off and rising groundwater tables
- changes in lake levels and prolonged inundation of wetland areas
- loss of riparian vegetation
- erosion, sedimentation and siltation
- secondary salinity (although much of the planning area is naturally brackish or saline)
- elevated nutrient levels leading to eutrophication, algal blooms and weeds
- potential acid sulfate soils
- pollution
- inappropriate fire regimes.

Wetlands across the southwest are threatened by salinity and other factors such as acidic groundwater, clearing of fringing vegetation and eutrophication, and invertebrates and waterbirds have been shown to be sensitive to salinity and other factors such as water depth and emergent vegetation (Cale *et al.* 2004). While several wetlands in the planning area are relatively undisturbed and fresh (Storey *et al.* 1993, Cale *et al.* 2004), monitoring programs are nevertheless important for the future conservation of freshwater invertebrates and waterbirds by detecting change and providing a reference point for restoration activities. Several wetlands in the planning area are routinely monitored for water depth, pH and salinity under the *South West Wetlands Monitoring Program* (SWWMP) including Lake Pleasant View, Moates Lake, Mettler Lake, Lake Powell and lakes within Cheyne Road and North Sister nature reserves (Lane *et al.* 2013). September and November water levels of Lake Pleasant View have oscillated between 0.1m and 2.2m, and salinities have mainly been within the range 0.2–0.9 parts per thousand (ppt) (exceptionally to 1.6 ppt) for the past 33 years since monitoring of this wetland began in 1979 (Lane *et al.* 2013). Lake Pleasant View is also one of 25 SWWMP wetlands that has been intensively monitored for potential changes in plant and animal communities, shallow groundwater levels and detailed water chemistry. Angove Lake, Gardner Lake and Lake White have been previously monitored in the past but are not currently being monitored under the SWWMP program (Lane *et al.* 2013). Lake Pleasant View is also one of forty-four significant wetlands across WA that has been surveyed as part of the [Inland Aquatic Integrity Resource Condition Monitoring project](#).

Large areas of mid to upper catchments have been planted with tree crops (22 per cent of agricultural land in the hinterland of the Albany LGA in 2001 was hardwood plantation). If large areas were to be all harvested at once and/or returned to agriculture, there may be significant impacts on local hydrology and associated threats. Working with plantation owners to minimise these impacts will be important, for example by encouraging staging of tree harvests and the replacement planting of perennial rather than annual crops.

It is possible that water tables may be lowering at Little Grove (near Torndirrup National Park) and the Gull Rock lakes. Plant deaths and *Banksia* communities changing to peppermint woodland have been observed, although it is unclear whether these changes are related to (i) a natural decline in aquifer recharge associated with declining rainfall, (ii) water abstraction from the borefield accessing the underlying aquifer, or (iii) other causes such as changes in salinity (Sandiford and Barrett 2010). Utber and Newell (2008) suggest that salinity is a potential hazard to threatened species and communities on the South Coast, including threatened and priority flora species, aquatic fauna species (such as Balston's pygmy perch [*Nannatherina balstoni*], western trout minnow [*Galaxias truttaceus hesperius*] and mud minnow [*Galaxiella munda*]) or fauna species that rely on water ecosystems (such as the water-rat or rakali/ingwirigin [*Hydromys chrysogaster*]), scarlet banksia (*Banksia coccinea*) thicket ecological communities, and most vegetation associations particularly vegetation associations 126 (Bare areas; freshwater lakes) and 973 (Low forest; paperbark [*Melaleuca raphiophylla*]). Further verification of the risk and impacts of salinity and changes in water table levels is needed, and ecological water requirements for groundwater-dependent ecosystems need to be researched to determine threshold parameters

¹⁰ See the information sheet on the Lake Pleasant View System at www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands.

for maintaining suitable condition. Any future water source development needs to recognise and account for the ecological values of the waterways, wetlands and other water-dependent environments.

Management objective

To protect and conserve natural surface and groundwater hydrological regimes, particularly the wetland and river systems, and minimise the impacts of altered hydrological regimes on key values.

Management actions

1. Identify and protect watercourses, inlets, lakes and wetlands from damage or disturbance during management activities that may affect water quality or quantity.
2. Assess development proposals for their potential adverse impacts on hydrological features, and refer or recommend referral of development proposals with the potential to impact significantly on the values of the planning area to the [Department of Water and Environmental Regulation](#) (DWER) for consideration of assessment under the *Environmental Protection Act 1986*.
3. Assess, maintain and improve the condition of wetlands of national and regional significance and other watercourses, inlets, lakes and wetlands, including the collation of water indicators in a monitoring database, consistent with standards for measuring indicators of wetland condition, particularly within the Lake Pleasant View SWWMP wetland.
4. Liaise with relevant stakeholders on the protection, conservation and management of hydrological features, including DWER on issues of water quality and quantity and with adjacent land and plantation owners to minimise disturbance within catchments and encourage and support perennial cropping, revegetation, creekline fencing and public and private agro-forestry.

Key performance indicator

Performance measure	Target	Reporting
The condition of Lake Pleasant View	No sustained negative trends in water depth and salinity of Lake Pleasant View because of management activities	Every five years

14. Biogeography

The planning area lies within the unique biogeographic region of ‘Southwest Australia’, which is recognised as one of the [world’s biodiversity hotspots](#) (Myers *et al.* 2000). The Albany area rates the second highest out of 27 areas in the South Coast Region for numbers of threatened species, and rates very highly with respect to the conservation status and level of endemism of threatened species (Gilfillan *et al.* 2009). The Pallinup area also rates highly for threatened species. Areas of highest priority for management of biodiversity include Two Peoples Bay, Mount Manypeaks, Bald Island, Eclipse Island, Michaelmas Island, Lake Pleasant View, South Sister, North Sister, White Lake, Cheyne Road and Mettler Lake nature reserves, reserve 23850 and Waychinicup National Park. The priority of these areas is recognised and enacted throughout the plan through actions relating to the management of reserves, threatened species and communities, habitats and key management issues.

However, as with many parts of the ‘Southwest Australia’ biodiversity hotspot, the planning area has incurred significant native vegetation loss and continues to be impacted by a range of threats including land clearing, salinity, introduced and other problem animals, weeds and *Phytophthora Dieback*. In the South Coast Region, up to 50 per cent of the original vegetation has been cleared leaving the remaining native vegetation highly fragmented (Gilfillan *et al.* 2009), which continues to threaten the long-term viability of many species. The main consequences of fragmentation have been changes to the number and type of species found across the landscape, and changes to ecological processes within and external to vegetation remnants. Small and isolated species populations/vegetation remnants, including the many small inland reserves (Conservation Commission 2010), are vulnerable to decline due to edge effects, chance disturbance events such as bushfire, less capacity to buffer against ongoing disturbances such as predation by foxes and cats, loss of genetic variation and increased inbreeding, and reduced reproductive capacity below a threshold where an organism can no longer replace itself (Hobbs and Yates 2003). The survival of many threatened species depends on a range of *in situ* (on-site) conservation measures such as protecting, enhancing and connecting areas of remnant vegetation, and mitigating threatening processes and *ex situ* (off-site) conservation measures such as seed storage and cryostorage¹¹, captive breeding, and translocation and reintroduction. The conservation reserve system plays an important central role

¹¹ The storing of viable plant or animal tissues at very low temperatures.

in ensuring biodiversity conservation objectives are met and that there are sufficient ecological and genetic resources to maintain viable populations. Outside the conservation reserve system, biodiversity conservation objectives will also be achieved through the linking or connecting of remnant vegetation, protection of remnant vegetation and the creation of new habitat (Section 26 *Involving the community*).

Conservation reserve system

The [National Reserve System](#) (NRS) is a collaboration between the State and the Australian governments to conserve Australia's biodiversity through the establishment and maintenance of a comprehensive, adequate and representative (CAR) system of protected areas (Commonwealth of Australia 2010b). Creation of a CAR reserve system helps meet obligations under the international Convention on Biological Diversity (Section 5 *Legislative and policy framework*). Conservation reserves are managed to achieve biodiversity objectives that are consistent with *Australia's Biodiversity Conservation Strategy 2010-2030* (Commonwealth of Australia 2010a) and *Australia's Strategy for the National Reserve System 2009-2030* (Commonwealth of Australia 2010b). The Commission's [Position Statement No. 2 Implementation of Conservation Reserve Proposals](#) also provides guidance on achieving a CAR conservation reserve system. CAR targets for the national reserve system are outlined in Commonwealth of Australia (2010b).

The planning framework for the systematic development of a CAR reserve system is provided by the [Interim Biogeographic Regionalisation for Australia](#) (IBRA). Australia's landscapes are classified into 89 geographically distinct 'bioregions' based on common climate, geology, landform, native vegetation and species information. The bioregions and subregions are the reporting unit for assessing the status of native ecosystems and their level of protection in the NRS. In this way, IBRA is used as a dynamic tool for monitoring progress towards building a CAR reserve system.

The planning area lies mainly within the Jarrah Forest IBRA region (Southern Jarrah Forest subregion) and Esperance Plains IBRA region (Fitzgerald subregion), as well as the far south-eastern extremity of the Warren IBRA region. The level of protection of pre-European¹² (pre-1750) vegetation within conservation reserves for IBRA regions (Government of Western Australia 2014) is:

- 14 per cent of the Jarrah Forest region (616,514ha)
- 28 per cent of the Esperance Plains region (812,336ha)
- 46 per cent of the Warren region (386,816ha).

The level of protection of pre-European (pre-1750) vegetation within conservation reserves in the Southern Jarrah Forest subregion is 16 per cent (428,177ha) and in the Fitzgerald subregion is 27 per cent (431,698ha).

Most of the area of proposed reserves within the planning area is within the Esperance Plains IBRA region and Fitzgerald subregion. However, the representativeness of conservation reserves within bioregions is [one of several priorities for biodiversity conservation for the NRS](#), with others including vegetation communities (Section 15 *Native plants and plant communities*), threatened species and communities, and other special areas.

Proposed changes to the conservation reserve system

Existing reserves

Several changes to the tenure of existing reserves are proposed (Appendix 2, Map 1). These changes either derive from long-standing proposals from the *South Coast Region Regional Management Plan* (CALM 1992a) or were identified during the preparation of this management plan to address protection of values, management issues and/or anomalies with the purpose and objectives of the reserves (Section 5 *Legislative and policy framework*).

The *Two Peoples Bay Nature Reserve Management Plan 1995–2005* (CALM 1995a) proposal to change the purpose of Two Peoples Bay Nature Reserve to national park (Appendix 2) will be considered during the life of the plan given (i) the area is nationally and internationally recognised for its importance for scientific study and the conservation of more than 10 threatened native animals that have been recorded there, (ii) the reserve meets

¹² '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. See also catalogue.data.wa.gov.au/dataset/pre-european-dafwa-003.

criteria for a national park, and (iii) the very popular visitor use of the reserve (Section 22 *Visitor experience*) is facilitated within national parks but not in nature reserves (Section 5 *Legislative and policy framework*).

The security of tenure of Crown reserves created under the *Land Administration Act 1997* varies, depending upon whether the reserve is [classified](#) as ‘class A’ or ‘other than class A’ (unclassified). However, many of the existing reserves in the planning area were created under the previous *Land Act 1933* and classified as class A, B or C. The level of approval required to alter their area or purpose reflects the security of tenure. Changes to ‘class A’ reserves require the agreement of both Houses of Parliament. Changes to ‘other than class A’ require approval at Ministerial level. Many unclassified reserves have been progressively upgraded to ‘class A’. During the life of the plan the classification of all conservation reserves will be reviewed to ensure that (i) reserves have the most appropriate security of tenure, and (ii) all conservation reserves in the planning area that are currently ‘other than class A’ be changed to ‘class A’ (Appendix 2).

There are nine reserves that lie next to the coast and another nine reserves that are islands. Twelve of these reserves are vested to the low-water mark, five reserves are vested to the high-water mark, and the water mark level for Bald Island is unknown (Appendix 1). Where there are no adjoining marine reserves, terrestrial reserves should be vested to the low-water mark (Conservation Commission 2009). The feasibility of gazetting Mt Martin and Voyagers Park reserves, Torndirrup and Waychinicup national parks, and Mount Manypeaks Nature Reserve to the low-water mark will be investigated during the life of the plan (Appendix 2).

While some reserve names are formally State-approved¹³, there are 14 reserves that have unofficial names and several others that have no names at all (Appendix 1). The department’s *Nomenclature Guidelines* provide guidance on the process of approval of names for reserves, features or assets, which includes community consultation and referral to the department’s Nomenclature Committee, the Commission and the State’s [Geographic Names Committee](#) (where names are formally approved). Unofficial names for reserves, and any suggested for un-named reserves, should be adopted and proposed as official names on a case-by-case basis in consultation with key stakeholders, including Noongar people and LGAs.

Proposed reserves

There are 22 proposed additions to the conservation reserve system, which total more than 27,000ha (Appendix 2, Map 1). Many of the proposed additions arise from long-standing recommendations in the *South Coast Region Regional Management Plan 1992–2002* (CALM 1992a) or other management plans (CALM 1995a, 1995b). However, some additions to the planning area have been identified based on (i) developing a CAR conservation reserve system, and (ii) protecting significant threatened flora, fauna and ecological communities (Appendix 2). Some proposed additions will also improve the status of significant vegetation associations (Section 15 *Native plants and plant communities*) and enhance the *South Coast Macro Corridor* network (Section 26 *Involving the community*, Section 16 *Native animals and habitats*, Appendix 2). Seven proposed additions are covered by existing mining tenements including one mining lease (Section 27 *Mineral and petroleum exploration and development*). While many reserve proposals from previous plans (CALM 1992a, 1995a, 1995b) have been completed, there are many that remain uncompleted (Key Finding 1 in Conservation Commission 2010). Land acquisition (land purchase or transfer) for addition to the conservation reserve system is dependent on several factors (including the values/assets of land, owner willingness to sell, land prices, available funding for purchase, and other relevant State and local government agency use and agreement), and can take considerable time and resources to complete. Several proposed reserves are vested with and managed by the City of Albany and Shire of Jerramungup, and on-going discussions will need to continue with these and other key stakeholders such as DWER, Water Corporation, DMIRS, mining tenement holders and Noongar people over the future planning and use of the proposed reserves. The department will continue to consider properties that are a high priority for acquisition in the context of funding availability and Statewide priorities.

Management objective

To improve the level of protection of native ecosystems in the conservation reserve system.

Management actions

1. Implement the tenure recommendations in Appendix 2, subject to government consideration and determination.

¹³ Names that have been formally approved by the Executive Officer, Chairman, the Geographic Names Committee or the Minister for Lands are deemed to be ‘official’ or ‘approved’ names (see www0.landgate.wa.gov.au/maps-and-imagery/wa-geographic-names).

2. Liaise and negotiate with relevant local authorities, State agencies, Noongar people and other key stakeholders to add important Crown reserves to the conservation reserve system.
3. Manage any proposed reserve additions in Appendix 2, which become vested with the Commission or managed by the department under the CALM Act, in accordance with this management plan.
4. Seek to incorporate adjoining or nearby land into the conservation reserve system, if identified as having high conservation value or management benefits, and subject to government consideration and determination.
5. Investigate and, where practicable, gazette existing and proposed coastal reserves in Appendix 1 to the low-water mark during the life of the plan.
6. Establish official reserve names for unofficially named and un-named conservation reserves in Appendix 1, in accordance with the department's *Nomenclature Guidelines* and in consultation with Noongar people and other key stakeholders.
7. Consider amending the land category and purpose of Two Peoples Bay Nature Reserve from nature reserve to national park during the life of the plan.

Key performance indicator

Performance measure	Target	Reporting
Protection of native ecosystems in the conservation reserve system	Increase the area of Southern Jarrah Forest and Fitzgerald IBRA subregions in conservation reserves by completing tenure recommendations identified in Appendix 2	Every five years

15. Native plants and plant communities

The planning area has high plant species richness, as evidenced by Hopper and Gioia's (2005) flora collection density map (based on the number of specimens lodged with the WA Herbarium per 10km²), which shows the Albany area and surrounds with one of the highest flora collection densities in the south-west of WA (Gilfillan *et al.* 2009). Within the planning area, 896 native vascular plant species have been recorded, along with 63 native non-vascular plant species including 29 fungi, 18 mosses, seven algae and five lichens. The most species-rich of the 91 vascular and 44 non-vascular plant families are Fabaceae (legumes, peas and wattles – 102 species), Proteaceae (banksias and grevilleas – 100 species), Myrtaceae (eucalypts and paperbarks – 89 species), Orchidaceae (orchids – 86 species), Cyperaceae (sedges – 77 species). The most species-rich of the 311 vascular and 54 non-vascular plant genera are *Stylidium* (36 species), *Leucopogon* (34 species), *Banksia* (33 species), *Schoenus* (29 species), *Acacia* (22 species) and *Eucalyptus* (21 species). Similar trends in the dominance of the flora at these different levels have been reported elsewhere (Beard *et al.* 2000, Hopper and Gioia 2004). Sandiford and Barrett (2010) recorded 796 species in the greater Albany area. Two Peoples Bay Nature Reserve contains 622 vascular plant species (CALM 1995a, Cochrane 2009). Many parts of the planning area have been poorly surveyed, and more surveys, as well as processing/vouchering of collected species, is likely to increase the number of flora species recorded.

Flora of conservation significance

Threatened flora

Section 23F(2) of the Wildlife Conservation Act provides for the Minister to declare (via the *Wildlife Conservation [Rare Flora] Notice 2016*) flora species to be [specially protected](#) for the following reasons:

- Schedule 1 – flora that are considered likely to become extinct or rare, as critically endangered flora – the five critically endangered species in the planning area are the feather-leaved banksia, Albany banksia, blue tinsel lily, broad-leaf daviesia and Albany cone bush
- Schedule 2 – flora that are considered likely to become extinct or rare, as endangered flora – the four endangered species in the planning area are the dwarf spider orchid (*Caladenia bryceana* ssp. *bryceana*), *Caladenia granitora*, dwarf hammer orchid (*Drakaea micrantha*) and Jerramungup myoporium (*Myoporum cordifolium*)
- Schedule 3 – flora that are considered likely to become extinct or rare, as vulnerable flora – the five vulnerable species in the planning area are the Manypeaks rush (*Chordifex abortivus*), Two Peoples Bay andersonia (*Andersonia pinaster*), Good's banksia (*Banksia goodii*), tall donkey orchid (*Diuris drummondii*) and south-coast mignonette orchid (*Microtis globula*)
- Schedule 4 – flora presumed to be extinct – the two species (also listed by Robinson and Coates 1995) that may occur in the planning area are *Coleanthera virgata* and *Frankenia decurrens*.



The blue tinsel lily (*Calectasia cyanea*) is one of five critically endangered plants in the planning area. Photo – Sarah Barrett/DBCA

Twelve threatened species are also listed under the EPBC Act¹⁴. Nine threatened species are found in areas proposed for reservation (Appendix 2), including three species (*Scaevola macrophylla*, mountain paper-heath [*Sphenotoma drummondii*] and *Verticordia helichrysantha*) that don't occur within existing reserves in the planning area.

Single species recovery plans have been prepared¹⁵ for feather-leaved banksia, blue tinsel lily, broad-leaf daviesia, Albany cone bush, dwarf spider orchid and Manypeaks rush. The *South Coast Threatened Species and Ecological Communities Strategic Management Plan* (Gilfillan *et al.* 2009), *Declared Rare and Poorly Known Flora in the Albany District* (Robinson and Coates 1995) and the Albany District Threatened Flora Recovery Team provide guidance on the management of other threatened and priority flora species in the area. This guidance does not replace the recovery plan process, but provides priorities and actions for management of threatened and priority flora species that do not have recovery plans, such as the Albany banksia. Critically endangered species (which may also be significant at national and international levels) are a priority for the development of recovery plans and implementation of recovery actions (Gilfillan *et al.* 2009).

Priority flora

There are 62 [priority species](#)¹⁶ recorded in the planning area, including two Priority 1 (P1) species, 18 Priority 2 (P2) species, 15 Priority 3 (P3) species and 27 Priority 4 (P4) species. Fifty-four priority species are found in areas proposed for reservation, and 33 of these are not found within existing reserves in the planning area.

Endemic flora

Most (65 per cent) of the threatened flora that occur within the region are endemic to the region (Gilfillan *et al.* 2009). Some of the threatened and priority flora taxa endemic to the City of Albany LGA include *Astartea transversa* (P2), *Caladenia granitora* (E), *Chamelaucium* sp. Cape Vancouver (P2), *Chamelaucium* sp. Waychinicup (P2), *Leucopogon altissimus* (P3), *Leucopogon* sp. Manypeaks (P1), *Pomaderris grandis* (P4), and *Scaevola xanthina* (P2).

¹⁴ See www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora. These species have further profile information on the *Species Profile and Threats Database* at www.environment.gov.au/cgi-bin/sprat/public/sprat.pl, including a Conservation and/or Listing Advice and information about recovery plans.

¹⁵ See www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans. Some of these recovery plans have been adopted under the EPBC Act (see specific species in the *Species Profile and Threats Database*).

¹⁶ Priority 1 and 2 flora are still considered to be under threat even though they are not declared as 'rare' under the Wildlife Conservation Act.

Plant communities

Vegetation associations

The planning area lies across the Warren, Menzies and Esperance Plains botanical districts of the South West Botanical Province (Beard 1972, 1979, 1980; Beard *et al.* 2000), which broadly align with the IBRA ‘bioregions’ (Section 14 *Biogeography*, Beard *et al.* 2013). The eastern limit of the Jarrah Forest and Warren IBRA regions marks the transition zone from the wetter forested south-west of WA to the drier interior and eastern coastal areas of the Esperance Plains IBRA region, which is vegetated by mallee, woodland and shrubland associations, and is where many plants reach their eastern or western limits of occurrence. Biogeographically, this area is unique with a high level of endemism, and many short-range endemic species are found in a restricted area (Cowling *et al.* 1994, Wardell-Johnson and Horwitz 1996, Harvey 2002, Hopper and Gioia 2005).

There are 25 vegetation associations¹⁷ within existing reserves of the planning area (Beard 1972, 1979, 1980), and another seven vegetation associations if the proposed additions are included. Thirteen vegetation associations occur in the Southern Jarrah Forest subregion, five vegetation associations in the Warren region and 14 vegetation associations in the Fitzgerald subregion. Of the 32 vegetation associations, 14 are significant in that they have been extensively cleared (three), poorly reserved (12) or are of limited extent (three) (based on criteria used by Hopkins *et al.* 2000).

Extensively cleared

Three vegetation associations within the planning area have been cleared by more than 70 per cent from their pre-European extent, and therefore are considered vulnerable where species loss appears to accelerate exponentially at an ecosystem level (Hopkins *et al.* 2000). Vegetation association 352 (Medium woodland; York gum) has been cleared by more than 80 per cent, vegetation association 938 (Medium woodland; York gum and yate) by more than 78 per cent, and vegetation association 994 (Low forest; jarrah and casuarina [probably *Allocasuarina fraseriana*]) by more than 71 per cent.

Limited current extent

Three vegetation associations are limited in extent (that is, there is less than 2,000ha remaining). Vegetation association 973 (Low forest; paperbark [*Melaleuca raphiophylla*]) has been extensively cleared and now only 1,911ha remains. Vegetation associations 977 (Low forest; teatree and casuarina) and 2016 (Low forest; bushy yate) are naturally limited in extent. Only 114ha of vegetation association 977 remains along the lower reaches of Sleeman River and close to Hay River and Morley beaches, and only 284ha of vegetation association 2016 remains, which is on Bald Island Nature Reserve.

Poorly reserved

Twelve vegetation associations within the planning area are poorly reserved¹⁸, including:

- four vegetation associations that are also extensively cleared or limited in extent (352, 938, 973 and 994)
- three vegetation associations (48 [Shrublands; scrub-heath], 968 [Medium woodland; jarrah, marri and wandoo] and 978 [Low forest; jarrah, *Eucalyptus staeri* and *Allocasuarina fraseriana*]) that are only located in existing reserves in the planning area
- four vegetation associations (128 [Bare areas; rock outcrops], 938, 969 [Mosaic: Medium forest; jarrah-marri/Low forest; jarrah] and 994) that are within both existing and proposed reserves in the planning area
- six vegetation associations (50 [Shrublands; dwarf scrub on granite (south coast)], 125 [Bare areas; salt lakes], 352, 931 [Medium woodland; yate], 973 and 977) that are only located in proposed reserves in the planning area
- five vegetation associations (50 [3.2 per cent], 352 [0.4 per cent], 938 [1.6 per cent], 969 [2.4 per cent] and 973 [4.9 per cent]) that have less than five per cent within conservation reserves.

The number of poorly reserved vegetation associations, particularly within proposed reserves, highlights the importance of proposed additions to the conservation reserve system (Appendix 2). Proposed reserve 29883

¹⁷ See catalogue.data.wa.gov.au/dataset/dpaw-statewide-vegetation-statistics to access Statewide vegetation statistics reports on the pre-European and current extent of vegetation types of WA within IBRA or IBRA sub-regions.

¹⁸ Calculated as the percentage of current extent protected as a proportion of pre-1750 extent. The significance of the ‘poorly reserved’ vegetation associations is only for as long as the vegetation associations are considered poorly reserved. During the life of the plan, more land may be reserved with these vegetation associations or it may even be appropriate to use a higher percentage reservation level such as 20 or 30 per cent, which may mean more vegetation associations are poorly reserved.

contains extensive areas of vegetation association 994 along with a small pocket of vegetation association 973. Proposed reserve 33257 contains pockets of vegetation associations 352, 931 and 938. Proposed reserves 14986 and 14987 contain vegetation association 50. The Morley Beach unallocated Crown land¹⁹ (UCL) contains vegetation associations 125 and 969.

There is little information about the condition of these vegetation associations within the planning area. Any development within the planning area needs to consider the effect on the vegetation associations, particularly those that are extensively cleared, poorly reserved and of limited extent.

Other plant community descriptions

The *Albany Regional Vegetation Survey* (ARVS) (Sandiford and Barrett 2010) provides a local and regional overview of the native vegetation within 30km of Albany (at 1:5,000 scale) to help land use and conservation planning in the region. The ARVS describes 67 vegetation units, and describes, maps and assesses the condition and conservation status of the vegetation. Sandiford and Barrett (2010) attribute particularly high vegetation diversity along the coastal fringe overlying granitic hills and slopes to the underlying geology and associated soils which change over very small areas with granite, limestone, laterite and deep sands occurring in close proximity.

Broad vegetation types across the planning area include karri (*Eucalyptus diversicolor*) forest, woodlands of jarrah (*E. marginata*), flat-topped yate (or swamp yate) or moidj (*E. occidentalis*) and jarrah – marri (*Corymbia calophylla*), granite shrublands with fringing *Eucalyptus* or *Allocasuarina* woodlands, *Banksia* shrublands, heaths on seasonally waterlogged flats, coastal dune scrub, wetlands and dampland. Each vegetation type is differentiated by key features.

The small pockets of karri forest in the area are at the far south-east end of their range. The karri forest takes 15–25 years to reach reproductive maturity, seven years to produce mature viable seed in the canopy, and 100–150 years to reach structural maturity. These forests are an important habitat for relictual invertebrates, as well as providing visual amenity.

Low, mixed jarrah woodland occurs on mid to upslope lateritic soils as islands in the agricultural landscape. Dynamic woodlands²⁰ of flat-topped yate are restricted to creek lines and riverine habitats. Dynamic woodlands may be more resilient to more frequent disturbance, however mature trees may be killed by moderate intensity fires. These woodlands maintain catchment stability and water quality through reducing salinity, sedimentation, turbidity and sustaining the water table balance. Low mixed jarrah-marri woodlands are a visual amenity, are enjoyed by visitors for picnicking and scenic horse trails, and are an important structural element of the landscape that provides roosting and nesting habitat for cockatoo species.

The mallee with proteaceous²¹ heath shrubland is rich in species, structurally diverse, but highly susceptible to *Phytophthora Dieback*. This vegetation type is characterised by the presence of plant species that have ‘obligate seeder’ and ‘serotinous’ plant fire responses²².

Granite shrublands and fringing *Eucalyptus* or *Allocasuarina* woodlands are found on and around granite exposures that range from lower damper slopes to drier skeletal soils and pockets of deep sand. The moist or rock environments form a refuge from episodic events (such as fire and drought). Within these shrublands and woodlands there is a higher ratio of plant species with an ‘obligate seeder’ plant fire response than ‘resprouters’. Frequent fire may reduce the seed store. Within this vegetation type there is a relatively high number of endemic

¹⁹ 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 or declared or otherwise dedicated under the *Land Administration Act 1997* or any other Act. DPLH nominally controls [UCL and unmanaged reserves](#). However, the department has responsibility for the on-ground management of fire, feral animals and weeds on non-metropolitan, non-town site UCL and unmanaged reserves.

²⁰ ‘Dynamic’ woodlands occur where there is relatively frequent ground disturbance, for example river valleys and swamps (Barrett *et al.* 2009).

²¹ Proteaceous vegetation is dominated by plant species from the Proteaceae family including *Adenanthos*, *Banksia*, *Grevillea*, *Hakea*, *Isopogon* and *Lambertia* species.

²² The response of plant species to fire are normally classified into four groups: (i) ‘resprouters’ are plants that resprout from buds beneath the bark or rootstock following a disturbance event such as fire, (ii) ‘seeders’ are plants that rely on seed to reproduce (‘obligate seeders’ are plants that rely solely on seed for reproduction, whereas ‘serotinous obligate seeders’ rely solely on seed contained in the canopy where a trigger such as fire is required to release the seed, (iii) ‘ephemeral species’ are plants that complete their life cycle rapidly after fire from long-lived soil seed stores, and (iv) ‘geophytes’ are plants with bulbs or rhizomes below the ground such as orchids, sundews and clematis (Burrows and Wardell-Johnson 2003).

species. They are also characterised by granite outcrops, provide scenic vantage points, and are associated with short-range endemic invertebrates.



Swamp bottlebrush (*Beaufortia sparsa*) heath/*Evandra aristata* sedgeland in Down Road Nature Reserve. Photo – E. Sandiford (Sandiford and Barrett 2010)

Banksia shrublands, heaths and seasonally waterlogged flat heathland are floristically diverse, and are highly flammable at short intervals. They are a feature of nutrient poor sandplains, and are characterised by a high number of serotinous obligate seeder species, and are susceptible to *Phytophthora* Dieback. The key habitat qualities include forming thickets that provide shelter and food resources for fauna. They contain a high proportion of unique ecological communities.

The vegetation of Bald, Breaksea, Eclipse and Michaelmas islands was mapped by Abbott (1981), and the number of vegetation units varies from four (Eclipse Island) to nine (Breaksea Island). Many of the other islands have either very little or relatively uniform vegetation. The vegetation structure and species composition of each island vary in relation to exposure to salt-bearing winds, geology and degree of human visitation and use. Vegetation types on these islands are dominated by *Melaleuca*, *Carpobrotus*, *Agonis* and *Rhagodia* species.

Particular threats to plants and plant communities include *Phytophthora* Dieback and other plant diseases such as aerial canker and *Armillaria*, inappropriate fire regimes, weeds, introduced and other problem animals, herbivory, altered hydrological processes, insufficient ecological and genetic resources to maintain viable populations, and alternate land use and encroachment (including mineral exploration and mining activities that can damage or disturb native vegetation, change drainage, loss of habitat, fragment habitat and potentially spread *Phytophthora cinnamomi*) (Gilfillan *et al.* 2009).

Management objective

To identify, protect and conserve native plants and plant communities.

Management actions

1. Identify native plants and plant communities that may need special protection, and implement appropriate strategies to minimise the impacts from threats.
2. Assess and, where necessary, propose statutory protection for species of conservation significance.
3. Assess all proposed operations and developments for potential impacts on native plants and plant communities, particularly species of conservation significance.
4. Manage species of conservation significance, including surveying and monitoring, seed collection, translocation and phosphite application, and management of threats including disease, herbivory and weeds consistent with priorities established by the Albany District Threatened Flora Recovery Team, particularly for critically endangered species.
5. Develop, revise and/or implement recovery and translocation plans for species of conservation significance, consistent with priorities established by the Albany District Threatened Flora Recovery Team and nature conservation plans, particularly for critically endangered species.
6. Undertake or encourage systematic flora and vegetation surveys and mapping of the planning area including proposed additions, and analyse vegetation across the planning area to inform adequate protection of representative areas.
7. Liaise with industry users to ensure a consistent approach to vegetation mapping and to gain a better understanding of the condition of vegetation associations.
8. Survey priority flora species, consistent with priorities established by the Albany District Threatened Flora Recovery Team, to resolve current knowledge gaps concerning distribution, abundance and threatening processes to confirm their conservation status.
9. Improve the biological and ecological knowledge about threatened flora, including research into fire response, optimum fire regimes, susceptibility to plant diseases and reproductive biology, and use this to implement, adapt and improve management of threatened flora species.
10. Identify and rehabilitate areas of degraded habitat.
11. Add land to the conservation reserve system that contains vegetation associations that are either poorly reserved, extensively cleared or limited in extent; or contains known populations of species of conservation significance.
12. Manage significant vegetation associations so the percentage of remaining vegetation is maintained.
13. Assess the vegetation condition of the vegetation associations within the planning area.
14. Promote the conservation of native plants and plant communities, particularly threatened and other significant flora and significant vegetation associations, through information, interpretation and education products and programs.

Key performance indicator

Performance measure	Target	Reporting
Conservation status of threatened flora species	No decline in the conservation status of threatened flora species	Every five years, or as per recovery plans if applicable

16. Native animals and habitats

The planning area has a rich and diverse array of native animals because of the large size of many coastal parks and reserves, the natural diversity of the South West Botanical Province, and the diversity of plant communities and habitats including forests, woodlands, heath and shrublands, wetlands, riparian zones, estuaries, and islands.

Thirty-one native mammal taxa from thirteen families have been recorded in the planning area including three eared seals (Otariidae), four kangaroos and wallabies (Macropodidae), one potoroo (Potoroidae), four possums (Burramyidae, Tarsipedidae, Phalangeridae and Pseudocheiridae), one bandicoot (Peramelidae), seven dasyurids (Dasyuridae), three rodents (Muridae), seven bats (Vespertilionidae and Molossidae) and one echidna (Tachyglossidae).

One hundred and forty-three bird taxa from 53 families have been recorded within the planning area. The most species-rich bird families are Meliphagidae (honeyeaters – 12 species), Anatidae (ducks, geese and swans – 11 species), Psittacidae (parrots and cockatoos – 10 species) and Scolopacidae (sandpipers – eight species). Three [Important Bird Areas](#) (or Key Biodiversity Areas) occur in the planning area: Lake Pleasant View (for resident waterbirds), Two Peoples Bay and Mount Manypeaks (for resident waterbirds and south-west endemics) and Eclipse Island (for seabird island species).

Twenty-four reptiles have been recorded in the planning area, including 14 skinks (Scinidae), one gecko (Gekkonidae), three front-fanged venomous snakes (Elapidae), three legless lizards (Pygopodidae), one monitor lizard (Varanidae), one non-venomous snake (Boidae) and one freshwater turtle (Cheluidae).

Ten amphibians have been recorded in the planning area: two from the tree frog family Hylidae, two from the burrowing family Limnodynastidae, and six from the ground-dwelling family Myobatrachidae.

Fifty-four species of fish from 31 families have also been recorded in the planning area including freshwater, estuarine and marine species.

There have been 192 invertebrate species from 98 families recorded in the planning area, with the most species-rich families being Chironomidae (non-biting midges – 15 species), Dytiscidae (predacious water beetles – 14 species), Araneidae (orb-weaving spiders – 11 species), Chydoridae (small waterfleas – 8 species) and Lecanidae (stag beetles – 8 species). Some studies on aquatic invertebrate fauna at specific locations such as Two Peoples Bay and Lake Pleasant View indicate that these freshwater wetland areas are relatively rich in invertebrate taxa (Storey *et al.* 1993, Cale *et al.* 2004). Cook *et al.* (2008) compared selected river systems in the South Coast region for a range of ecological values, and found that the total aquatic macroinvertebrate species richness ranged from 29 to 134 species (with an average of 69.7 species) for rivers in the Western South Coast bioregion. Framenau *et al.* (2008) conducted comprehensive surveys for short-range endemic invertebrates across the south coast region, and target survey sites included those identified as potential refugia by Gilfillan (2002). A number of short-range endemic species were identified in the planning area, including representatives from the Diplopoda, Mygalomorphae, Mollusca and Araneomorphae, and some of these have now been listed as threatened.

The planning area is particularly important for protecting and conserving threatened animals, especially in the Two Peoples Bay–Mount Manypeaks area because of the numbers and rarity of threatened animals found there.

Fauna of conservation significance

Threatened and other specially protected fauna²³

Section 14(4) of the Wildlife Conservation Act provides for the Minister to declare (via the *Wildlife Conservation [Specially Protected Fauna] Notice 2016*) fauna species to be [specially protected](#) for the following reasons:

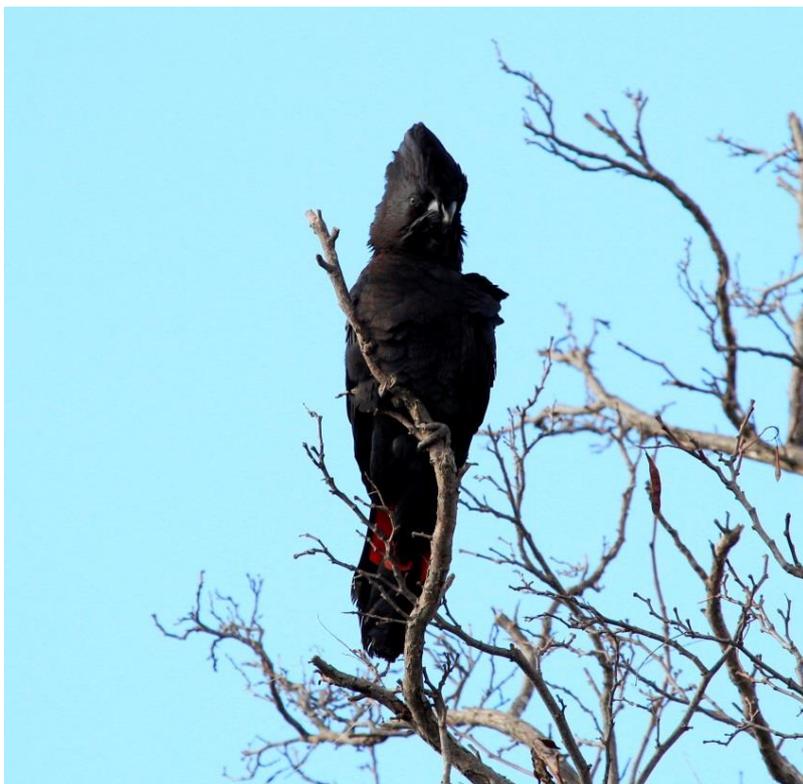
- Schedule 1 – fauna that is rare or is likely to become extinct as critically endangered fauna – the three species occurring in the planning area are the Gilbert’s potoroo, western ringtail possum or *ngwarr/ngorh* (*Pseudocheirus occidentalis*) and western ground parrot or *kyloring* (*Pezoporus flaviventris*), although this latter species was last recorded in the planning area in 2003 and may be presumed extinct
- Schedule 2 – fauna that is rare or is likely to become extinct as endangered fauna – the 11 species that occur in the planning area are the dibbler (*Parantechinus apicalis*), noisy scrub-bird, Australasian bittern or *bardanitch* (*Botaurus poiciloptilus*), Baudin’s cockatoo or *ngolyenok* (*Calyptorhynchus baudinii*), Carnaby’s cockatoo or *ngolak* (*Calyptorhynchus latirostris*), sooty albatross (*Phoebastria fusca*), western whiplbird (western heath) or *tarding* (*Psophodes nigrogularis nigrogularis*), Indian yellow-nosed albatross (*Thalassarche carteri*), black-browed albatross (*Thalassarche melanophris*), western trout minnow and WA pill millipede (*Cynotelopus notabilis*)
- Schedule 3 – fauna that is rare or is likely to become extinct as vulnerable fauna – the 18 species that occur in the planning area are the western quoll or chuditch (*Dasyurus geoffroii*), Australian sea-lion or *barlard* (*Neophoca cinerea*), subantarctic fur-seal (*Arctocephalus tropicalis*), quokka (*Setonix brachyurus*), curlew sandpiper (*Calidris ferruginea*), great knot (*Calidris tenuirostris*), forest red-tailed black cockatoo or *karak/carratch* (*Calyptorhynchus banksii naso*), western bristlebird or *booteritch* (*Dasyornis longirostris*), wandering albatross (*Diomedea exulans*), malleefowl or *ngow/ngaow* (*Leipoa ocellata*), bar-tailed godwit (*Limosa lapponica menzbieri*), flesh-footed shearwater or *borroot* (*Puffinus carneipes*), shy albatross (*Thalassarche cauta*), Atlantic yellow-nosed albatross (*Thalassarche chlororhynchos*), mud minnow, Balston’s pygmy perch, Carter’s freshwater mussel (*Westralunio carteri*), Main’s assassin spider (*Zephyrarchaea mainae*)

²³ Those species listed on schedules 1–3 of the Wildlife Conservation Act are collectively referred to as ‘threatened fauna’, and those species listed on schedules 5–7 of the Wildlife Conservation Act are collectively referred to as ‘other specially protected fauna’.

- Schedule 4 – fauna presumed to be extinct – the Lewin’s rail (*Rallus pectoralis clelandi*) has been recorded in the planning area (Abbott 1996)
- Schedule 5 – migratory birds protected under an international agreement (see also ‘Migratory birds’ below) – the 20 species that occur in the planning area are eastern great egret (*Ardea modesta*), red knot (*Calidris canutus*), curlew sandpiper, red-necked stint (*Calidris ruficollis*), great knot, wandering albatross, bar-tailed godwit (*Limosa lapponica*), rainbow bee-eater (*Merops ornatus*), sooty albatross, glossy ibis (*Plegadis falcinellus*), grey plover (*Pluvialis squatarola*), flesh-footed shearwater, Caspian tern (*Sterna caspia*), Indian yellow-nosed albatross, shy albatross, Atlantic yellow-nosed albatross, black browed albatross, grey-tailed tattler (*Tringa brevipes*), common sandpiper (*Tringa hypoleucos*) and common greenshank (*Tringa nebularia*)
- Schedule 7 – other specially protected fauna – the two species that occur in the planning area are the New Zealand fur seal²⁴ (*Arctocephalus forsteri*) and peregrine falcon or gwetulbur (*Falco peregrinus*).

Carratch – forest red-tailed black cockatoo

Its call sounds as though it is saying ‘carratch’, and it’s different from the white-tailed bird. The feathers of carratch are quite powerful in terms of spirituality and are greatly sought after. Noongar people didn’t usually eat this bird, it’s a symbolic, totemic creature which is revered by Noongar people. It’s a large gentle bird and as we all know is at risk of being lost to us all (source: WA Museum, Albany).



The vulnerable forest red-tailed black cockatoo or carratch/karak (*Calyptorhynchus banksii naso*). Photo – Rick Dawson/DBCA

Twenty-three threatened species are listed under the EPBC Act²⁵. Fifteen threatened species are listed under the [IUCN Red List of Threatened Species](#). Seventeen threatened species located in some of the areas proposed for

²⁴ Also known as the long-nosed fur seal (see www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=20 and <http://www.iucnredlist.org/details/41664/0>).

²⁵ See www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna. Most of these species have further profile information on the *Species Profile and Threats Database* at www.environment.gov.au/cgi-bin/sprat/public/sprat.pl, including a Conservation and/or Listing Advice and information about recovery plans.

reservation, including the greater sand plover (*Charadrius leschenaultia*), lesser sand plover (*Charadrius mongolus*) and *Atelomastix cullenii* millipede, don't occur within existing reserves (Appendix 2).

Single-species recovery plans have been prepared²⁶ for Gilbert's potoroo, dibbler, Carnaby's cockatoo, western trout minnow, chuditch, quokka, western ringtail possum, malleefowl and Australian sea-lion. Multi-species recovery plans have been prepared for South Coast threatened birds, forest black cockatoos, and albatrosses and giant petrels. Several recovery teams oversee and/or implement a range of recovery actions to help in the recovery of threatened species. In addition, a regional strategic management plan has been produced for threatened species and ecological communities of the South Coast (Gilfillan *et al.* 2009), which includes strategic actions for a regional approach to threatened species recovery (including priority fauna).

Reintroductions and translocations of threatened animals in the planning area have concentrated on the Gilbert's potoroo and noisy scrub-bird (Friend *et al.* 2005, Gilfillan *et al.* 2009). However, Abbott (2008) shows that several threatened species have historically been recorded in the planning area and may be candidates for possible reintroductions or translocations including the numbat (*Myrmecobius fasciatus*), brush-tailed phascogale or wambenger (*Phascogale tapoatafa wambenger*), woylie or woile (*Bettongia penicillata ogilbyi*), western barred bandicoot or marl (*Perameles bougainville*) and banded hare-wallaby or murnin/merrnine (*Lagostrophus fasciatus*).

A key focus for this plan is to manage threatened species because of the number of threatened species in the planning area that are endangered and/or restricted in their occurrence. In particular, the focus for species recovery in this plan is on the Gilbert's potoroo and South Coast threatened ground-dwelling birds.

Gilbert's potoroo

The critically endangered Gilbert's potoroo, which is perhaps the world's rarest marsupial (Friend 2011), is restricted to a wild population in Two Peoples Bay Nature Reserve, and translocated populations on Bald Island and a predator-free enclosure in Waychinicup National Park.

The potoroo in Two Peoples Bay Nature Reserve occurs in long-unburnt dense shrubland on Mount Gardner, and management of this population focusses on fox control (quarterly aerial baiting complemented by monthly ground baiting along firebreaks), fire management (including maintenance of firebreaks, fire preparedness, prescribed burning to break up the large long-unburnt area and reduce the risk of catastrophic bushfire, and bushfire suppression), Phytophthora Dieback hygiene practices, visitor management to restrict access to potoroo areas, and population monitoring and management.

While the recovery of Gilbert's potoroo, following its rediscovery at Two Peoples Bay in 1994, initially relied on development of *ex situ* methods such as captive breeding to produce animals for a reintroduction program, since the successful translocation of Gilbert's potoroos to Bald Island Nature Reserve in 2005, rapid growth of this population has dramatically reduced the importance of other recovery methods. A 380ha enclosure at Norman's Beach in Waychinicup National Park was built in 2008, and with potoroos from Bald Island and Two Peoples Bay nature reserves translocated into the enclosure in 2010/11, this new population also appears to be a success. Recovery is continuing to focus on the implementation of the [Gilbert's Potoroo Recovery Plan](#), particularly to increase the numbers of Gilbert's potoroos in the wild and increase the number of locations in which they occur. Establishment of potoroos at the Waychinicup enclosure in vegetation types different from those used at Two



The critically endangered Gilbert's potoroo or *ngilgyte* (*Potorous gilbertii*). Photo – Dick Walker/Gilbert's Potoroo Action Group

²⁶ See www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/197-approved-recovery-plans. Some of these recovery plans have been adopted under the EPBC Act (see specific species in the *Species Profile and Threats Database*).

Peoples Bay implies that a wider range of potential translocation sites may be available than previously believed. Future recovery (Parks and Wildlife 2014b) will include:

- monitoring – of the Mount Gardner, Bald Island and Waychinicup National Park (enclosure) populations, and of the enclosure for incursion by cats or foxes
- translocation – experimental release of animals to unfenced sites where predators are controlled, and evaluating further potential sites, both on the mainland and on other islands
- undertaking trials of *Eradicat*® cat bait on non-target species at Two Peoples Bay Nature Reserve and Waychinicup National Park
- continued use of the captive breeding facility at Two Peoples Bay Nature Reserve to temporarily house animals during quarantine and parasite removal while being moved between field sites.

South Coast threatened ground-dwelling birds

The Two Peoples Bay–Mount Manypeaks area has been considered as the most significant area for endangered birds in mainland Australia (Garnett 1992), and is an ‘important bird area’ for threatened endemic birds. Threatened ground-dwelling birds known from this area include the western bristlebird, noisy scrub-bird and western whipbird. These species overlap extensively in their distributions, have largely declined due to similar factors, and are at risk from the same key threats. For these reasons, the management and recovery of these species, along with the western ground parrot, should be integrated for the most efficient use of resources and expertise (Parks and Wildlife 2014a).



The endangered noisy scrub-bird or jeemuluk (*Atrichornis clamosus*) is one of several South Coast threatened ground-dwelling birds. Photo – Alan Danks

Noisy scrub-birds are found in dense vegetation, including low forest, scrub thicket and heath that is long unburnt (that is, 10 or more years post fire) (Parks and Wildlife 2014a). Western bristlebirds occur in floristically diverse, closed, near-coastal heaths 1–1.5m tall with a wide variety of shrubs, usually with abundant sedges and thickets of low eucalypts 2–4m tall. Western whipbirds occur in heath-like thicket associations on coastal dunes and in low, dense mallee woodland or shrubland with an understorey of dense, stunted shrubs (Higgins and Peter 2002). However, there is still a level of uncertainty about habitat preferences, particularly in relation to the responses of these taxa to fire and post-fire regeneration (Parks and Wildlife 2014a).

These threatened birds are highly susceptible to local extinction through ecological

processes or chance events, due to the small size, number and fragmented nature of their populations, which also renders them susceptible to a loss of genetic variation through inbreeding depression²⁷, genetic drift²⁸ and founder effect²⁹ (Parks and Wildlife 2014a). The key threats are loss or degradation of habitat through too frequent and/or too extensive fires, predation by introduced predators, native vegetation clearing and climate change, as well as other threats including *Phytophthora Dieback*, disturbance by introduced animals (particularly hard-hoofed animals), weed invasion and changes in hydrological regimes (Parks and Wildlife 2014a).

Actions that should continue for the recovery of these species (within an adaptive management framework) (Parks and Wildlife 2014a), include:

- continuing habitat management and threat abatement of all areas occupied by South Coast threatened birds within an adaptive management framework, including:

²⁷ Inbreeding depression is the reduced ability of a population to survive and reproduce itself as a result of the breeding of related individuals.

²⁸ Genetic drift is the change in the frequency of a gene variant in a population due to random sampling of organisms.

²⁹ The founder effect occurs when a small group of migrants that is not genetically representative of the population from which they came establish in a new area.

- predator control – fox and cat control
- fire management (prescribed burning and bushfire control) – fire is generally excluded from critical habitat for these taxa and, until further information becomes available, a post-fire age of at least seven years is presumed to be required by these species. Fire management is aimed at minimising the impact on occupied and habitat critical for these species, and a burning program and bushfire response protocol will be developed and implemented. Species response will be regularly monitored following a fire through any area that has been identified as ‘habitat critical’ for a particular taxon, such as the *Project Phoenix* program following the 2004 Mt Manypeaks fire (Parks and Wildlife 2014a)
- Phytophthora Dieback hygiene protocols, field interpretation and mapping of Phytophthora Dieback, and excluding access to areas affected through fencing and signage
- developing a formal monitoring program for threats.
- identifying, refining and mapping the area of habitat critical for the survival of each of the South Coast threatened birds, particularly in relation to fire age, vegetation structure and food availability – which helps in management operations, responding to proposals, and allows the identification of areas for potential future translocations. This will include monitoring to determine whether the condition of critical habitat is becoming unfavourable for South Coast threatened birds and maintaining records (Key Finding 2 in Conservation Commission 2010)
- continuing existing translocation programs – including the development of a western ground parrot translocation and captive breeding program
- developing survey and monitoring protocols for South Coast threatened birds to improve detection of population changes, in particular small changes in populations. Monitoring programs use similar methods for each species, but are dependent on the location of the site and factors being monitored
- continuing research to (i) develop an understanding of the biological and ecological factors that limit the distribution and numbers of South Coast threatened birds (including interactions with predators, habitat requirements and response to fire), (ii) resolve the taxonomic status of the two western whipbird subspecies, and (iii) increase the survival chances and total population size of the western bristlebird and western whipbird through creation of management prescriptions that will benefit all threatened South Coast animals (Parks and Wildlife 2014b)
- publishing and distributing South Coast threatened birds information and facilitating community participation in recovery and management activities – there has been strong community involvement and support in many management operations including population monitoring, biological and ecological research, translocations of the noisy scrub-bird and western bristlebird, and abatement of threats.

Migratory birds

Of the 19 migratory bird species listed under international agreements, 15 are listed under the Bonn Convention, 13 are listed under CAMBA, 14 are listed under JAMBA and 10 are listed under ROKAMBA (Section 5 *Legislative and policy framework*). These species are on the national *Migratory Species List* and protected under the EPBC Act. The white-bellied sea-eagle (*Haliaeetus leucogaster*) is also listed under CAMBA, although it is not on listed as a migratory species under the Wildlife Conservation or EPBC acts.

Six migratory bird species (sharp-tailed sandpiper [*Calidris acuminata*], pectoral sandpiper [*Calidris melanotos*], greater sand plover, lesser sand plover, Pacific golden plover [*Pluvialis fulva*] and marsh sandpiper or little greenshank [*Tringa stagnatilis*]) occur in proposed reserves but not within existing reserves (Appendix 2). The proposed reserve at Morley Beach (Appendix 2) is one of several sites within Wilson Inlet that is internationally significant because it regularly supports more than one per cent of the [East Asia-Australasia Flyway](#) population estimate for the red-necked stint (Bamford *et al.* 2008, Taylor 2015).

Priority fauna

There are eight Priority fauna species recorded in the planning area, including:

- one Priority 1 species – *Windbalea viride* (a cricket species in the family Tettigoniidae)
- seven Priority 4 species hooded plover (*Charadrius rubricollis*), western brush wallaby or *kwarl* (*Macropus irma*), western false pipistrelle (*Falsistrellus mackenziei*), water-rat, quenda or *quoint/kwent* (*Isodon obesulus fusciventer*), tammar (*Macropus eugenii derbianus*), blue-billed duck (*Oxyura australis*).

Seven priority species are located in some of the areas proposed for reservation (Appendix 2).

Endemic fauna

There are six threatened species endemic to the area, including Gilbert's potoroo, noisy scrub-bird, western whipbird, western bristlebird, western trout minnow and western archaeid spider.

Habitats

Wetlands

The planning area contains several wetlands that provide valuable habitat for waterbirds, including wetlands in the Lake Pleasant View and Two Peoples Bay/Mount Manypeaks areas which are recognised as [Important Bird Areas](#) for resident waterbirds. 'Sensitive waterbirds'³⁰, such as the Australasian bittern, Australian little bittern (*Ixobrychus dubius*), spotless crane or *ne-na-meet/warradja* (*Porzana tabuensis*), swamp harrier or *djilyoordo* (*Circus approximans*) and little pied cormorant or *kokoko* (*Microcarbo melanoleucos*), have been recorded at wetlands in Lake Pleasant View, Mettler Lake and Cheyne Road nature reserves (Section 13 *Hydrology*, Clarke *et al.* 2011). These SWWMP wetlands continue to be important for sensitive waterbirds, particularly as there has been no discernible change to the habitat in since the 1980s and/or early 1990s (Clarke *et al.* 2011), unlike many other wetlands in the south-west. Lake Pleasant View and Mettler Lake nature reserves have been identified as potential candidates for listing as internationally important under the Ramsar Convention because they have supported the globally-threatened Australasian bittern in the past 2-3 decades, and continue to support this species (Jaensch *et al.* 2009, Clarke *et al.* 2011). These wetlands will become both more important for conservation if the climate becomes more variable and more vulnerable to changes in rainfall and hydrological cycles (Dunlop and Brown 2008), and therefore monitoring of these wetlands, particularly for the Australasian bittern, will continue to be important during the life of the plan.



Jointed rush (*Baumea articulata*) surrounded by low fine sedge is valuable habitat for the endangered Australasian bittern or *bardanitch* (*Botaurus poiciloptilus*) in South Coast wetlands. Photo – Alan Clarke/DBCA

Islands

Islands off the southern coast provide important habitat for terrestrial fauna and breeding sites for seabirds, such as the little penguin or *koolidja/chule-a-gar* (*Eudyptula minor*), flesh-footed shearwater and great-winged petrel (*Pterodroma macroptera*) (Cochrane *et al.* 2010, Conservation Commission 2009). Eclipse Island is an

³⁰ 'Sensitive waterbirds' are those that typically depend on inundated, dense live vegetation (sedge beds/tussocks, shrub thickets) or live trees for shelter and/or breeding, and that are (or may become) of conservation concern because (i) they have numerically small populations, (ii) they are rarely recorded in large numbers, (iii) they are known to occur in relatively few wetlands, or (iv) they breed in relatively few wetlands (Clarke *et al.* 2011).

'Important Bird Area' for nesting seabirds, and is one of 17 breeding sites of the New Zealand fur seal in WA (Shaughnessy 1999). Bald Island is a valuable translocation site for threatened species such as Gilbert's potoroo and noisy scrub-bird, which were translocated to the island in 2005 and 1992 respectively (Friend *et al.* 2005). Haul Off Rock is an important breeding site for both the Australian sea-lion and New Zealand fur seal, and is proposed as an addition to the conservation reserve system (Shaughnessy 1999, Appendix 2).

Biosecurity and human disturbance of important fauna sites are important issues for island habitats (Conservation Commission 2009, Section 18 *Weeds*, Section 23 *Visitor access*). Islands, or portions of islands, that either support major breeding colonies of seals and/or seabirds, or are otherwise considered vulnerable to human disturbance should be considered for prohibited or limited access area classification under section 62(1) of the CALM Act (Section 22 *Visitor experience*).

Vegetation corridors

Linkages with other reserves and areas of remnant vegetation are important to provide fauna with migratory routes, access to other resources such as seasonally variable food and breeding populations, and escape and re-colonisation routes, particularly in the face of large bushfires and potential long-term impacts of climate change (Section 26 *Involving the community*, Section 11 *Climate*, Section 14 *Biogeography* and Section 21 *Fire*).

Riparian zones also provide key corridors for small mammal and bird dispersal, in addition to protecting and maintaining river and wetland systems. While riparian vegetation along the longer rivers in the planning area such as Pallinup and Kalgan rivers is moderately to severely modified, many of the smaller coastal rivers such as Waychinicup and Angove rivers, have riparian vegetation that is largely unmodified (Storer *et al.* 2011).

Granite outcrops

Isolated granite outcrops occur in most of the coastal parks near Albany and are also a major feature of many of the coastal islands. Granite outcrops provide a suite of unique habitats and conditions not found in the wider landscape (such as rock crevices, rock pools and moist, sheltered environments). Granite outcrops often have diverse and distinctive assemblages of plants, animals and other life forms, and high levels of endemism and rarity because of specific conditions of soil, moisture, shelter/refuge and biological isolation (Yates *et al.* 2003b). For example, the threatened Albany banksia grows in granite fissures and deeper soil around the edges of outcrops. Specific threats to granite outcrop communities include introduced weeds, grazing by feral animals, *Phytophthora Dieback*, aerial canker, human disturbances and inappropriate fire regimes. Granite outcrops can provide better protection (refuge) to fire intolerant species and communities than surrounding forests (as fires are less frequent, patchier and are usually less intense because of the structure and patchiness of the vegetation, Section 21 *Fire*), and will provide refugial opportunities for species under the influence of a drying climate (Schut *et al.* 2014).

Management objective

To identify, protect and conserve native animals and habitats.

Management actions

1. Identify native animals that may need special protection, and implement appropriate strategies to minimise the impact from threats.
2. Assess and, where necessary, propose statutory protection for species of conservation significance.
3. Assess all proposed operations and developments for potential impacts on native animals, particularly species of conservation significance.
4. Develop, revise and/or implement recovery, translocation and reintroduction plans for species of conservation significance consistent with priorities established by recovery teams and nature conservation plans.
5. Gather baseline data on populations of threatened and other conservation significant fauna, determine habitat requirements and monitor for population fluctuations.
6. Establish the population status of the New Zealand fur seal by monitoring breeding and haul out sites.
7. Control access to islands that are haul-out and/or breeding sites for seals or important seabird sites under section 62(1) of the CALM Act as necessary.
8. Promote the conservation of native fauna and habitats, particularly threatened and other significant fauna and wetland, granite outcrop and island habitats, through information, interpretation and education products and programs.

Key performance indicator

Performance measure	Target	Reporting
Conservation status of threatened fauna species	No decline in the conservation status of threatened fauna species	Every five years, or as per recovery plans if applicable

17. Ecological communities

Threatened ecological communities

At the State level, there are no threatened ecological communities (TECs) within the planning area. However, the ‘*Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia*’ TEC, which occurs in the planning area, is gazetted under the EPBC Act as ‘endangered’. This TEC consists of predominantly obligate seeding proteaceous shrubland and heath (kwongkan) and mallee heath on sandplain, duplex sand/clay and gravels overlying Eocene sediments, quartzite, schist, Yilgarn and Albany Fraser granite and greenstone ranges, and is confined to the South West Botanical Province. Its flora is characterised by high species diversity and a high degree of endemism. For EPBC Act referral, assessment and compliance purposes, the TEC is limited to patches that meet certain key diagnostic characteristics and condition thresholds.

The ‘*Subtropical and Temperate Coastal Saltmarsh*’ TEC occurs within Gull Rock National Park and several proposed reserves in the planning area (Appendix 2), and is gazetted under the EPBC Act as ‘vulnerable’. This TEC is restricted to coastal areas under regular or intermittent tidal influence, and consists mainly of salt-tolerant vegetation (halophytes) including grasses, herbs, sedges, rushes and shrubs generally to less than 0.5m in height. The TEC is also important habitat for a wide range of invertebrates and low-tide and high-tide visitors such as prawns, fish and birds. This TEC is vulnerable to several threats including altered hydrological regimes, acid sulfate soils, invasive species, inappropriate fire regimes and unauthorised recreation.

The ‘conservation advice’³¹ for both these TECs list priority conservation actions including recovery, threat abatement, research and monitoring priorities (TSSC 2013, 2014). While the Australian Government’s Threatened Species Scientific Committee (TSSC) does not recommend a specific recovery plan for the ‘*Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia*’ TEC (TSSC 2014), it does recommend a specific recovery plan for the ‘*Subtropical and Temperate Coastal Saltmarsh*’ TEC (TSSC 2013).

These TECs are also recognised in WA as priority ecological communities³² (PECs).

Priority ecological communities

Eighteen PECs also occur in the planning area:

- scarlet banksia shrubland/Albany blackbutt (*Eucalyptus staeri*)/sheoak open woodland (Community 14a) (Sandiford and Barrett 2010) – Priority 1
- *Astartea scoparia* swamp thicket – Priority 1
- mosaic of Albany blackbutt mallee-heath found on lateritic ridges and *Lambertia inermis* subsp. *inermis* scrub-heath on seasonally-waterlogged laterite – Priority 1
- swamp banksia or *boongura* (*Banksia littoralis*) woodland/grey honeymyrtle (*Melaleuca incana*) shrubland – Priority 1
- scarlet banksia shrubland/*Melaleuca striata*/*Leucopogon flavescens* heath – Priority 1
- *Melaleuca striata*/*Banksia* spp. coastal heath – Priority 1
- Green Range granite hill heath and woodland community – Priority 1
- Cheynes 1 tree mallee – Priority 1

³¹ The Australian Government provides information on species and communities listed under the EPBC Act through its *Species Profile and Threats Database* (SPRAT), including the TSSC’s ‘conservation advice’ (see www.environment.gov.au/cgi-bin/sprat/public/sprat.pl).

³² Priority ecological communities are ecological communities with insufficient information available to be considered a threatened ecological community, or which are rare but not currently threatened (see www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities).

- Cheynes 2 open tree mallee – Priority 1
- red swamp banksia (*Banksia occidentalis*)/*Kunzea clavata* shrubland – Priority 1
- coastal grey honeymyrtle/*Taxandria juniperina* shrubland/closed forest – Priority 1
- *Melaleuca spathulata*/mohan (*Melaleuca viminea*) swamp heath – Priority 1
- tallerack (*Eucalyptus pleurocarpa*) mallee-heath on seasonally inundated soils – Priority 2
- Albany blackbutt mallee-heath on deep sand – Priority 2
- flat-topped yate woodlands in seasonally-inundated clay basins (South Coast) – Priority 3(iii)
- Proteaceae dominated Kwongkan shrublands of the Southeast Coastal Floristic Province of Western Australia – Priority 3(iii)
- subtropical and temperate coastal saltmarsh – Priority 3(iii)
- *Taxandria spathulata* heath – Priority 4(i).

Nine of these PECs (mosaic of Albany blackbutt mallee-heath, scarlet banksia shrubland/*Melaleuca striata*/*Leucopogon flavescens* heath, scarlet banksia shrubland/Albany blackbutt/sheoak open woodland, *Melaleuca striata*/*Banksia* spp. coastal heath, Cheynes 1 tree mallee, Cheynes 2 open tree mallee, tallerack mallee-heath on seasonally inundated soils, and Albany blackbutt mallee-heath on deep sand, *Taxandria spathulata* heath) are components of the ‘*Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia*’ TEC.

Management objective

To identify, protect and conserve ecological communities of conservation significance.

Management actions

1. Identify, describe and map ecological communities that may need special protection, and implement appropriate strategies to minimise the impact from threats.
2. Assess and, where necessary, propose statutory protection for ecological communities of conservation significance.
3. Assess all proposed operations and developments for potential impacts on ecological communities of conservation significance.
4. Monitor species composition and habitat parameters in known threatened and at risk (including priority) ecological communities.
5. Implement relevant conservation actions listed in the ‘conservation advice’ for the ‘*Proteaceae dominated Kwongkan shrublands of the Southeast Coastal Floristic Province of Western Australia*’ (TSSC 2014) and ‘*Subtropical and Temperate Coastal Saltmarsh*’ TECs (TSSC 2013).

18. Weeds

Weeds can have significant impacts on natural ecosystems including competition with and displacement of native species, prevention of seedling recruitment, alteration to geomorphological processes, alteration of hydrological cycle, changes to soil nutrient status, alteration of fire regimes, changes to the abundance of native fauna, and genetic changes. Weeds may also impact on cultural, social, economic, scientific and aesthetic values. Weed invasion can be influenced by people, vehicles and machinery, animals and birds, surface water flow and wind, and is of most threat in areas that have been disturbed or degraded (such as by fire), particularly roadsides and small remnants.

There are 119 species of introduced vascular plants, non-native to WA, recorded in the planning area that are considered to be weeds. Most weed species from the 33 plant families represented are from the Poaceae (grasses



Melaleuca striata/*Banksia* spp. coastal heath Priority 1 ecological community in Gull Rock National Park, with *Banksia coccinea* in the foreground. Photo – Sarah Barrett/DBCA

– 26 species), Fabaceae (18 species) and Asteraceae (14 species) families. One hundred and four species occur in existing reserves and 31 species occur in proposed reserves. Most of the weed species in the planning area occur in national parks (74 species) and nature reserves (50 species), with fewer species occurring in other reserves. Weeds are ‘widespread/throughout’ Torndirrup and West Cape Howe national parks and island nature reserves, with high to severe’ impacts in inland nature reserves (Conservation Commission 2010).

While many of WA’s 2,562 islands, islets and rocks are unaffected by the key threatening processes causing decline of mainland biodiversity, weeds on some islands are a significant issue (Conservation Commission 2009). Islands in the Albany area with the most weed species recorded were Bald (29 species), Green (26 species), Breaksea (19 species), Mistaken (19 species), Eclipse (16 species), Gull Rock (16 species) and Michaelmas (16 species) islands, which reflect their susceptibility to weed infestations because of their proximity to the mainland, their size and/or their historic human use (Lohr and Keighery 2014, Section 10 *Other cultural heritage*). Lohr and Keighery (2014) suggest that weeds that pose the greatest threat to the integrity of island ecosystems in the planning area include pig’s ear (*Cotyledon orbiculata*), sea spurge (*Euphorbia paralias*), tree mallow (*Malva arborea*), arum lily, and several annual grasses.

The department manages weeds in accordance with the department’s [Corporate Policy Statement No. 14: Weeds management](#). The department applies the regionally-based [Weed Prioritisation Process](#), which involves the prioritisation of weed species by departmental region through:

- a ‘species-led’ approach that assesses the invasiveness, impacts, potential and current distribution and feasibility of control of weeds
- an ‘asset-protection-based’ approach that identifies high value biodiversity assets, the weeds that pose a threat to these assets and the sites where control will have the greatest biodiversity benefit and cost effectiveness
- a range of 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](#).

Some of the local priority weeds for active management include gorse, arum lily, Sydney golden wattle, taylorina, tree fern (*Cyathea cooperi*), blackberry (*Rubus spp.*), Victorian tea tree, pampas grass (*Cortaderia selloana*) and dolichus pea (*Dipogon lignosus*). The regional rankings are revised biennially and the process will continue to be adapted and used to help the department to make more accurate decisions for local management of weeds. As priorities will continue to periodically change in response to the *Weed Prioritisation Process*, it is important to develop and maintain surveillance and mapping/recording systems for monitoring weeds (Key Finding 6 in Conservation Commission 2010), and develop and maintain a weed plan to guide the prioritising and allocation of available resources. On islands, it will be important to maintain the integrity of natural barriers to weed dispersal through biosecurity protocols and enforcement to minimise new weed introductions to the islands and decrease future costs associated with active management of established populations (Lohr and Keighery 2014). Research is continuing into a decision support system for prioritising and implementing biosecurity on WA’s islands (Parks and Wildlife 2014b, Lohr 2015).

Although the BAM Act preserves the department’s right to decide priorities and the level of control according to the availability of resources, the department will adopt a ‘good neighbour’ approach to the management of weeds and will also give a priority to treatment of weeds adjoining private land where landowners are active in weed control within private property. The department views weed control as a partnership, and works wherever possible with the community, and especially neighbours to department-managed land, to share the control burden and optimise the benefits from weed control works that are undertaken.

Management objective

To minimise the impact of weeds on key values.

Management actions

1. Maintain surveillance and recording systems for weeds in the planning area, and ensure that information is up-to-date and maintained in a register, including details of distribution, history and effectiveness of control and relevant biological information such as invasiveness, distribution and environmental impact.
2. Liaise and work collaboratively with relevant agencies, land managers and community groups to facilitate effective, coordinated management of weeds in the planning area and surrounding areas, including identifying and preparing incursion plans for priority species, and facilitating knowledge transfer, awareness raising and capacity building.

3. Identify the relative importance of areas for protection, and operational controls to minimise the risk of spread and impacts from priority weeds already present, including eradicating new populations before they spread.
4. Develop and implement a weed control plan that prioritises the control of weeds based on ‘species-led’ and ‘asset-protection-based’ approaches and in accordance with relevant legislation, policies and guidelines, species characteristics and impacts, regional and local priorities, and resources available.
5. Limit the opportunity for weeds to be introduced and established by:
 - a. applying appropriate hygiene practices to machinery entering the planning area
 - b. minimising disturbance of soil during management activities
 - c. restricting the importation of soil to only those sources with strict soil quarantine.
6. Monitor, review and continuously improve the effectiveness and applicability of weed management techniques and strategies and implement adaptive management as required.
7. Develop, implement, monitor and review weed biosecurity procedures for islands as priorities and resources allow.

Key performance indicator

Performance measure	Target	Reporting
A control plan that prioritises the control of weeds based on ‘species-led’ and ‘asset-protection-based’ approaches and other management considerations	A weed control plan is developed and implemented	Every five years

19. Introduced and other problem animals

Introduced animals

Introduced animals can have significant impacts on natural ecosystems, through direct effects such as predation, habitat destruction, competition for food and territory or generally through environmental degradation by selective grazing and the spread of weeds and diseases. The most common and significant introduced animals in the planning area are the red fox, cat, rabbit and feral honeybee (Gilfillan *et al.* 2009). Other introduced animals recorded in the planning area include the [declared pests](#) the feral goat (*Capra hircus*), feral pig (*Sus scrofa*), dingo or *twert* (*Canis lupus dingo*) and starling (*Sturnus vulgaris*), as well as the house mouse (*Mus musculus*), black rat (*Rattus rattus*) and eastern gambusia (*Gambusia holbrooki*). The management of invasive animals is guided by the department’s [Corporate Policy Statement No. 12: Management of pest animals](#), and impacts by foxes, cats, rabbits, feral pigs and goats are key threatening processes under the EPBC Act and are covered by [Threat Abatement Plans](#).

Foxes and cats are widespread throughout the South Coast Region (Gilfillan *et al.* 2009). The fox has been implicated as a significant cause of the local extinction of several threatened species from the planning area such as the woylie, malleefowl and numbat (Abbott 2008), and is a major threat to most of the remaining critical weight range mammals and ground-dwelling birds in the planning area. Two Peoples Bay (CALM 1995a) and Mount Manypeaks nature reserves and Waychinicup National Park are priority areas for predator management and, along with West Cape Howe, Torndirrup (Bald Head) and Gull Rock national parks, are [aerially and ground baited](#) to control introduced predators under the department’s *Western Shield* fauna conservation program (Millar *et al.* 2012). Baiting occurs up to four times a year for foxes and once a year for feral cats (with *Eradicat*®), and the program includes fauna monitoring to assess fauna recovery.

The collaborative *South Coast Integrated Fauna Recovery Project*, established in 2009, aims to develop effective cat control techniques which can be used in conjunction with existing fox control, to provide integrated feral predator control for high value fauna conservation reserves in the South Coast Region. Result from cameras and collared animals indicate at least a 50 per cent control of cats in the 2012 and 2013 baiting campaigns. Maintaining complex vegetation cover can reduce predation rates of small prey species from feral cat predation (McGregor *et al.* 2015), and so consideration should be given to baiting for feral predators following bushfire events. Bald Island is a key strategic location in the recovery of Gilbert’s potoroo and noisy scrub-birds, and given that it is currently free from introduced predators such as cats, foxes and rats, it is important that biosecurity measures such as quarantine and surveillance are implemented.



Foxes have the capacity to take medium-sized wetland birds such as the purple swamphen (*Porphyrio porphyrio*), and are a threat to the rarer bitterns in South Coast wetlands. Photo – Alan Clarke/DBCA

Rabbits, which occur throughout much of the planning area, and feral honeybees have the potential to alter habitat attributes and/or occupy habitat making it unavailable or unsuitable for native fauna. Rabbits also increase grazing pressure on native vegetation and can increase soil disturbance through burrow establishment. Rabbits also occur on some of the islands (Abbott 1978a, b; Cochrane *et al.* 2010). Overgrazing by native fauna of periodically prescribed burnt areas can impact re-growing vegetation (CALM 1995b). Feral goats and pigs are also a potential threat to Torndirrup National Park and reserves in the Pallinup River corridor. Cattle regularly disturb Angove Lake in Two Peoples Bay Nature Reserve, and occasionally disturb the riparian vegetation around Lake Gardner (Parks and Wildlife 2014a).

The eastern gambusia has been recorded in Lake Powell Nature Reserve and Lake William in West Cape Howe National Park (Jaensch 1992), and within the Goodga and Angove river systems (Morgan *et al.* 2016). The eastern gambusia as well as the rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*) and redfin perch (*Perca fluviatilis*) are all potentially significant threats to the threatened western trout minnow (Mitchell and Newell 2008).

Problem native animals

Some [native animals](#), such as little corellas, ducks, red-capped parrot or *djayop/djal-yup* (*Purpureicephalus spurius*), western grey kangaroo or *yongka* (*Macropus fuliginosus*) and emu or *wej/waitch/ki-yun-bur-re* (*Dromaius novaehollandiae*), can have significant social and economic impacts on local communities, local agricultural production and visitors to the planning area. Where native species are causing damage to surrounding private land values, landholders can undertake appropriate control measures by applying to the department for a ‘damage licence’ under the Wildlife Conservation Act.

The jarrah leaf miner (*Perthida glyphopa*), marri spitfire (*Perga* sp.), gum leaf skeletoniser (*Uraba lugens*), Helena gum moth (*Opodiphthera helena*) and the bulls-eye borer (*Phoracantha acanthocera*) can often impact jarrah and marri, and the lerp (*Cardiospina* sp.) can affect yate. While there are no economically feasible methods of controlling these native insect pests, which tend to multiply and then decrease in cycles, they do not appear to be a serious threat to the long-term maintenance of biodiversity in healthy and robust ecosystems. Forest and woodland diebacks have been associated with chronic insect herbivory (along with drought, successional changes and fungal pathogens), and insects can be frequently isolated from stressed trees. However, the actual role of insects in decline syndromes is poorly understood, and it is likely that their incidence and severity will increase due to stresses imposed by climate change.

Management objective

To minimise the impact of introduced and other problem animals on key values.

Management actions

1. Maintain surveillance and recording systems for introduced and other problem animals in the planning area, and ensure that information is up-to-date and maintained in a register, including details of distribution, history and effectiveness of control and relevant biological information such as invasiveness, distribution and environmental impact.
2. Liaise and work collaboratively with relevant agencies, land managers and community groups to facilitate effective, coordinated management of introduced and other problem animals in the planning area and surrounding areas, including identifying and preparing incursion plans for priority species, and facilitating knowledge transfer, awareness raising and capacity building.
3. Identify the relative importance of areas for protection, and operational controls to minimise the risk of spread and impacts from priority introduced and other problem animals already present, including eradicating new populations before they spread.
4. Develop, implement and periodically review and revise a control plan for introduced and other problem animals that prioritises species based on their invasiveness, ecological impact, current and potential distribution and feasibility of control and in accordance with relevant legislation, policies and guidelines, particularly focusing on feral predator populations in Mount Manypeaks and Two Peoples Bay nature reserves and Waychinicup National Park.
5. Continue to implement, monitor and revise the *Western Shield* introduced predator control program and the *South Coast Integrated Fauna Recovery Project*, including ongoing trial and monitoring of *Eradicat*®.
6. Develop, implement, monitor and review introduced animal biosecurity procedures for islands as priorities and resources allow, particularly for Bald Island.

Key performance indicator

Performance measure	Target	Reporting
A control plan that prioritises the control of introduced and other problem animals based on their invasiveness, ecological impact, current and potential distribution, and feasibility of control	An introduced and other problem animal control plan is developed and implemented	Every five years

20. Diseases

Phytophthora Dieback

One of the most significant threats to maintaining the natural values of the planning area is Phytophthora Dieback (mostly *P. cinnamomi*). More than 40 per cent of plant species are susceptible to Phytophthora Dieback in south-west WA, including many species from the Proteaceae, Fabaceae, Ericaceae and Myrtaceae families, which together dominate many plant communities of the South Coast Region (CALM 1992a, South Coast NRM 2009). *P. cinnamomi* kills susceptible plants (Shearer *et al.* 2004) and can irreversibly change the composition of many plant and animal communities (Shearer *et al.* 2009, Wilson *et al.* 1994) including jarrah forest and woodlands, flats and swamps, *Banksia* shrublands and proteaceous heaths. *P. cinnamomi* infestation (strongly related to vegetation type, the presence of watercourses and other water gaining sites, and access) is most common where human activities have taken place in the absence of an effective hygiene regime. [Phytophthora Dieback is widespread](#) in the South Coast Region (Gilfillan *et al.* 2009), and is particularly prevalent in Gull Rock National Park and Two Peoples Bay Nature Reserve.

Managing Phytophthora Dieback is a high priority for the department. 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 for managing Phytophthora Dieback. *P. cinnamomi* is a key threatening process under the EPBC Act and is covered by a [Threat Abatement Plan](#). Management of *P. cinnamomi* within the planning area will focus on (i) significant uninfested areas (that is, areas likely to remain uninfested by the autonomous spread of the pathogen in the medium term), (ii) areas that are already infested but with significant conservation values or high visual amenity, and (iii) ways to reduce the rate of spread and the incidence of initiation of new centres of infestation. Uninfested areas may be particularly important for the long-term survival of some species and the maintenance of biodiversity, particularly in the face of other landscape-scale threatening processes. Several areas are included in the *State Phytophthora Dieback Management and Investment Framework* top 100 priority protection areas including Millbrook Nature Reserve (South Coast NRM 2014). Reserves where high levels of recreational activity occur are at risk of rapid spread, particularly where vehicle-based recreation is common. Areas at risk from bio-physical and/or human introduction and spread need to be

determined and the preferred management strategy identified to minimise the spread/risk. Thresholds can then be set based on capacity and feasibility of risk management. The *State Phytophthora Dieback Management and Investment Framework* (South Coast NRM 2014) provides the basis for a strategic Phytophthora Dieback response within the region.

Monitoring and mapping/records management is an important strategy in managing Phytophthora Dieback in the planning area (Parks and Wildlife 2015, Key Findings 3, 7 and 8 in Conservation Commission 2010). Some [mapping of dieback](#) in the planning area has been done at various scales and resolutions. However, specific site mapping is resource intensive and is usually only undertaken for high priority areas/sites. Department standard practice is to consider disease hygiene practices (including preparation of hygiene plans) as part of on-ground works to prevent the introduction and/or spread of diseases. However, the department will continue to improve Phytophthora Dieback monitoring and record management.

Other plant diseases

First identified at Cheyne Beach east of Albany (CALM 1992a), a group of common aerially-dispersed canker-causing fungi including *Cryptodiaporthe melanocraspeda*, *Botryosphaeria* spp., and *Diplodina* spp. have had and continue to have a significant impact on proteaceous shrublands on the South Coast causing significant population decline (for example, scarlet banksia at Cheyne Beach, and Albany banksia at Gull Rock and Torndirrup national parks [Barrett *et al.* 2009, Wills and Keighery 1994, Gilfillan *et al.* 2009, Cochrane *et al.* 2011]). *Neofusicoccum australe*, *N. macroclavatum*, and *Cryptodiaporthe melanocraspeda*, along with the new species *Luteocirrhus shearii* which is an emerging threat, are forming a disease complex that is having an increasing impact across many proteaceous species in the region (Crane and Burgess 2013) and which may be associated with stress induced by climate change. The endemic soil-borne fungus *Armillaria luteobubalina* is also present in the planning area (CALM 1995a, 1995b). [Myrtle rust](#) (*Puccinia psidii sensu lato*), although not present in WA, is a potential threat that could significantly affect many plants in the Myrtaceae family, and have serious ecological and economic impacts on south-west forests and ecosystems.

Hygiene control programs are implemented and reviewed annually, specifically for dieback and *Armillaria* management.

Animal diseases

Animal diseases have been implicated as a significant cause of the local extinction of the brush-tailed phascogale, woylie, western barred bandicoot and banded hare-wallaby, and decline of the quokka, Gilbert's potoroo and western ringtail possum (Abbott 2008). However, animal diseases are not a significant factor in the recovery of threatened species in the planning area (Gilfillan *et al.* 2009), although the introduced cestode *Ligula intestinalis* is a significant threat to the endangered western trout minnow (Mitchell and Newell 2008). The cestode does not kill individuals, but causes deformities that reduce mobility, increasing the minnow's vulnerability to bird predation. There is no known control or eradication method for the parasite.

Several parasites occur in Gilbert's potoroo, including the piroplasm *Theileria gilberti* n. sp. (Lee *et al.* 2009), *Trypanosoma copemani* (which also occurs in other marsupials such as the quokka [(Botero *et al.* 2013)]) and *Microfilaria* (Austen *et al.* 2009). No obvious clinical signs have been exhibited by either Gilbert's potoroo or the quokka. Parasitic infections have most likely co-evolved with their hosts and therefore probably prove little or no health risk to the Gilbert's potoroo and quokka (Austen *et al.* 2009).

Some frog species are also vulnerable to *Chytridiomycosis* caused by the amphibian chytrid fungus *Batrachochytrium dendrobatidis* (Aplin and Kirkpatrick 2001), including slender tree frog (*Litoria adelaidensis*), motorbike frog (*L. moorei*), western banjo frog (*Limnodynastes dorsalis*) and moaning frog (*Heleioporus eyrei*). The fungus occurs most often in waterbodies or in soil, and frogs that spend more time in or near the water may be more susceptible to the disease. The infection of amphibians with chytrid fungus is a key threatening process under the EPBC Act, and a revised Threat Abatement Plan has been developed (Commonwealth of Australia 2006). *Chytridiomycosis/B. dendrobatidis* is listed as a notifiable disease in Australia's [National List of Reportable Diseases of Aquatic Animals](#), and the WA Museum (as part of its *Frog Watch* program) encourages people to report observations of sick or dead frogs or major changes in frog numbers. The presence of the fungi may not be evident in the environment or the frogs and therefore [hygiene protocols](#)³³ to control disease in frogs must be adhered to when handling, transporting or relocating tadpoles or frogs.

³³ Also see *Pest Note – Frogs* at www.dpaw.wa.gov.au/plants-and-animals/animals/living-with-wildlife.

Diseases can be exposed to, and spread within, animal populations and transferred to and from humans through the transportation, trapping and handling of wildlife. Researchers and other department staff regularly conduct biological surveys, fauna monitoring programs, captive breeding programs and translocations, particularly for Gilbert’s potoroo and endangered ground-dwelling birds. While there is growing knowledge about specific diseases in wildlife, there is still limited understanding of transmission processes and disease specific precautions against infection and disease transmission. The department’s [Standard Operating Procedure 16.2 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 objective

To minimise the impact and spread of plant and animal diseases.

Management actions

1. Maintain surveillance and recording systems, including where appropriate remote sensing, for monitoring diseases and syndromes that are known to have a significant impact on key values.
2. Work collaboratively with other agencies and land managers, as appropriate, to identify priority diseases and syndromes using risk-based procedures for determining their relative importance.
3. Work collaboratively with other agencies and land managers, as appropriate, to prepare incursion plans for identified causal agents that are not yet present.
4. Use planning procedures to identify the relative importance of areas for protection, and operational controls to minimise the risk of spread and impacts from priority diseases and syndromes already present.
5. Develop, implement and periodically review and revise a control plan for plant and animal diseases (particularly Phytophthora Dieback and aerial canker) that prioritises diseases based on their risk of introduction into uninfested areas, susceptibility of species and ecological impact, current and potential distribution and feasibility of control, and in accordance with relevant legislation, policies and guidelines.
6. Encourage the coordinated involvement of government, industry, the community and other land managers in addressing control, including through facilitating knowledge transfer, awareness raising and capacity building.
7. Develop, implement and record appropriate hygiene measures for management operations and proposed development, including hygiene management plans before commencing any operation that involves soil or plant material movement.
8. Identify, evaluate and, where practical, implement effective and efficient measures for the maintenance and/or restoration of significant Phytophthora Dieback infested areas, including:
 - a. treating priority sites of threatened species and communities with appropriate fungicide treatments
 - b. rehabilitating badly affected areas using appropriate local dieback resistant species.

Key performance indicator

Performance measure	Target	Reporting
The proportion of operations undertaken with an approved Phytophthora Dieback hygiene management plan	No planned operations with the potential to move soil are undertaken without an approved Phytophthora Dieback hygiene management plan	Annually

21. Fire

Fire is an important disturbance factor that has influenced, and continues to influence, the landscape and biodiversity of the planning area. Noongar people used fire to flush animals from their hiding places, to enable easier walking through country, to facilitate future hunting/gathering, and to care for the land (Abbott 2003).

It (the procurement of game) is done by setting fire to the underwood and grass, which, being dry, is rapidly burnt. The manner in which these burning are performed is as follows. With a kind of torch made of the dry leaves of the grass tree, they set fire to the sides of the cover by which the game is enclosed and cannot escape. The hunters, concealed by the smoke, stand in the paths most frequented by the animals, and with facility spear them as they pass by. The violence of the fire is frequently very great, and extends over many miles of country; but this is generally guarded against by their burning it in consecutive portions (Nind 1831).

However, the landscape is no longer what it was before European settlement when Noongar people were carrying out traditional burning. The landscape is fragmented, and numerous fire sensitive assets, such as towns and settlements, built and community infrastructure, farmlands, threatened flora and fauna, and invasive species, are

embedded in a very fire-prone environment. Burn objectives, or reasons for burning today, are not necessarily the same reasons Noongar people and European settlers burnt in the past because the community requires and expects a degree of protection of these values from bushfires, and so burning is undertaken to mitigate the bushfire threat or to enhance conservation values.

The department's [management of fire](#) today, including prescribed fire and bushfire prevention and suppression, is also 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](#) and the *Code of Practice for Fire Management* (DEC 2008a), and risk management principles. The *Emergency Management Act 2005* sets out the emergency management arrangements for the State, requiring that several emergency response plans be maintained. The response plan for bushfire is [Westplan 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 No. 1 Fire management](#) also provides guidance on fire management.

Fire in many parts of the State is less frequent and often at a higher intensity extending over larger areas and resulting in a coarse grain mosaic of fire footprints across the landscape. Several large bushfires, some caused by lightning strikes, have burnt large parts of the planning area, including the 4,500ha fire in 2004 that burnt through the Mount Manypeaks area (Comer and Burbidge 2006), the 1,300ha fire in 2012 that burnt into Two Peoples Bay Nature Reserve, and the two fires in November 2015 that burnt 1,139ha in Two Peoples Bay Nature Reserve (Mt Gardner) and 607ha in Torndirrup National Park (Stony Hill). Bushfires in these areas have had significant impacts on threatened species, particularly the noisy scrub-bird and western whipbird.



The aftermath of the 2004 bushfire in Mt Manypeaks Nature Reserve and Waychinicup National Park looking towards Bald Island. Photo – Sarah Comer/DBCA

In the fragmented landscape of the planning area, the challenge is to devise and implement fire management that affords an acceptable level of protection to human life and property values, and conserves and maintains biodiversity and ecological processes. To meet these objectives, fire management strategies will aim to:

- manage for community protection by reducing the risk that bushfire presents to life and community assets on and next to the department-managed lands and other lands (Section 26 *Involving the community*) through prescribed burning, fire prevention and fire suppression measures
- manage for biodiversity conservation by implementing ecologically appropriate fire regimes to an extent and frequency commensurate with the life strategies of the extant biota and to create and maintain a spatial and temporal fire history mosaic at the landscape and local scale
- develop an informed and supportive partnership with relevant stakeholders through effective community engagement in the planning and management of fire
- increase knowledge through fire research, operational experience, monitoring and evaluation, and adapt management accordingly.

Managing for community protection

In the flammable environments along the Albany coast bushfires may periodically occur, and the department must consider the risk to human life and damage to a range of community and other values. Increasingly, people and facilities are located closer to or within forested and coastal areas, exposing them to the risk of bushfire. The impact of bushfires can be moderated by minimising the chance that they occur, minimising the potential for them to spread, minimising the size of fires by detecting and suppressing them when they are small, and by making assets less vulnerable. The department uses a risk management process to collate and present information to fire managers so they can make informed decisions on how and where to minimise the risk of bushfire impacts, including where and when to undertake prescribed burning, where to locate strategic fire access, where to invest in community education and awareness programs.

Prescribed burning is an important strategy for bushfire mitigation, and the department undertakes some fuel reduction burning to reduce the severity of bushfires and in turn provide protection of community assets. In some cases, planned burns to achieve community protection can be undertaken by applying prescribed burns for biodiversity conservation. Implementing fire regimes that vary the season, fire intensity, scale and intervals between fire to create a mosaic of fuel age classes (a patchiness of burnt and unburnt areas) across reserves will in turn minimise the movement of bushfire through extensive areas of land. Roads and tracks provide safe access for fire fighting vehicles and allow effective fire containment. Strategic access is built and maintained as resources allow. However, in some cases other complementary mitigation strategies such as mechanical fuel management may be more appropriate to ensure an adequate level of protection.

The way in which the department responds to bushfires occurring on department-managed lands involves an assessment of several factors including the values at risk, the prevailing and forecast weather and the availability of resources. In suppressing bushfires, the primary objective is to protect human life, and then protect property and other values. The responsibility for controlling and extinguishing bushfires lies with LGAs and the fire control officers appointed by them under the *Bush Fires Act 1954*. Although this authority may be exercised by an authorised department officer when the fire is burning in or near forest or Crown lands managed by the department, it is normal practice in the planning area to remain under the authority of the local Chief Bush Fire Control Officer, although this situation varies on a case by case basis. The department's approach is to work closely with adjacent landholders, LGAs, local bush fire brigades, Department of Fire and Emergency Services (DFES) and other emergency services personnel to detect, implement pre-suppression actions and suppress bushfires, particularly within areas of high priority. The department generally only assumes control of bushfire operations in cases where the department is the major resource provider or where significant values are threatened and the department's incident management experience could add value. Bushfire mitigation measures will be applied in a way that does not compromise natural and other values, but where life and community asset protection coincides with high biodiversity values and it is not possible to achieve multiple objectives, priority will be given to the protection of life and community assets. In protecting natural and other values the department will consider such things as the risk of introducing dieback and weeds through using machinery and vehicles that have not been cleaned.

Recreation use associated with the coast is seasonally high in the warmer months. Many visitors to the coastal parks and reserves, as well as the department-managed infrastructure in these areas, are potentially at risk from bushfires. Increased visitor numbers also potentially increase the risk of bushfire. Particular assets in the planning area of high value that should be considered in fire management planning include neighbours and adjacent highly populated rural and semi-rural areas near Albany, arterial roads and utilities (power and water), habitat of the threatened Gilbert's potoroo and ground-dwelling birds (such as the noisy scrub-bird), and high-value department-managed recreation infrastructure.

Managing for biodiversity conservation

The interaction of the natural environment (vegetation, climate and landform), local land use and the spatial arrangement of fire sensitive values can influence the objectives set and outcomes for fire management. Dividing lands managed by the department and other lands into Fire Management Areas (FMA) with similar environmental, land use and fire management objectives (and where fire interacts with the environment in a relatively consistent manner), provides an opportunity to plan and monitor those fire management objectives more effectively. Fire management for biodiversity conservation in the planning area is to be based on the application of appropriate fire regimes within each FMA. The planning area encompasses four FMAs (fire management outcomes for each FMA are outlined in Appendix 3):

- Albany Coastal FMA – contains heaths, mallee heaths, coastal dune scrub and open peppermint and *Allocasuarina* woodlands of the coastal areas. Areas within this FMA include Gull Rock, Hassell, Torndirrup, Waychinicup and West Cape Howe national parks, Two Peoples Bay, Mount Manypeaks, Basil Road, Mettler Lake, Tinkeleup, Cheyne Road, Mt Mason, West Mt Mason, Lake Powell and Marbelup nature reserves, and the Cape Riche proposed reserves
- Mixed Low Forest FMA – contains low mixed jarrah/marri woodlands in the west and open woodlands inland from the coast. Areas within this FMA include Down Road, Bakers Junction, Lake Pleasant View, Pallinup, Mill Brook, Phillips Brook, North Sister, South Sister, White Lake, Takenup Road, Tennessee North, Sleeman Creek and Blue Gum Creek nature reserves and some of the Pallinup River proposed reserves
- Fitzgerald River-Ravensthorpe Range FMA – contains scrub heath, mallee-heath, mallee, woodlands on greenstone, and the Yate and York Gums on alluvial soils of the Fitzgerald River National Park, its adjoining inland and coastal reserves and the Ravensthorpe Range. Areas within this FMA include the lower Pallinup River to Mt Groper proposed reserves
- South Coast Islands FMA – consists of islands with a variety of vegetation types (Section 15 *Native plants and plant communities*), often with a unique suite of biota many of which are the last remnants of fauna once common on the mainland. Fire occurs infrequently on the islands, and is usually caused by lightning.

Implementing ecologically appropriate fire regimes across the FMAs will be based on:

- **vital attributes and life histories of threatened species and communities**
Protecting threatened species and ecological communities from large, intense bushfires and using planned fire to maintain habitat quality and to regenerate threatened plants, is fundamental to the ongoing conservation of these species. Understanding the vital attributes and life histories (that is, the critical physical characteristics of plants and animals that determine their ability to survive different fire intervals) of threatened species is particularly important, although specific knowledge of fire requirements for many species is incomplete. Threatened species that have specific fire regime requirements include the noisy scrub-bird and Gilbert's potoroo that need long-unburnt dense shrub vegetation (Courtenay and Friend 2004, Parks and Wildlife 2014a). Specific fire management guidelines have been prepared to accommodate the needs of the noisy scrub-bird, quokka, tammar wallaby, western ringtail possum and black cockatoos. Recovery plans for some threatened species may also contain relevant fire management strategies for the protection of these threatened species.

Prescribed fire will be excluded from long unburnt areas of vegetation on Mt Gardner in Two Peoples Bay Nature Reserve for the life of this plan, unless research and monitoring into the effect of changes in vegetation on the noisy scrub-bird and other species of conservation significance indicates that habitat is becoming unfavourable. If habitat is becoming unfavourable because of fire exclusion, a carefully considered and managed prescribed burning program for specific areas may be initiated for habitat management purposes, if recommended by relevant threatened species recovery teams.

'Fire exclusion' (or 'No planned fire') areas within West Cape Howe National Park and Two Peoples Bay Nature Reserve, established under previous management plans (CALM 1995a, 1995b), will no longer apply. These areas will be managed under the prescribed burn planning process to protect threatened species and ecological communities from bushfires and maintain and/or regenerate critical habitat.

- **vital attributes and life histories of fire regime specific species and communities**
While many species and communities are resilient to a range of fire regimes, some depend on a specific combination of fire interval, frequency, season and intensity for their persistence. For plants, these are species or communities 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), such as Albany banksia and feather-leaved banksia. For animals, these are usually species that have specific habitat requirements (such as a spatial mosaic of time since fire ranging from long unburnt to recently burnt, or specific vegetation structure requirements that are influenced by fire), are sedentary and unable to seek refuge, are susceptible to predation, are poor dispersers or have low reproductive rates, and these may be especially vulnerable to inappropriate fire regimes (Yates *et al.* 2003a). Fire regime specific species and communities are typically associated with less flammable parts of the landscape. Fire sensitive systems are vulnerable to long term loss of species diversity, vegetation structure and habitat value because of too frequent, intense or extensive fire or inappropriate season of fire. In the planning area, these primarily include vegetation systems dominated by serotinous obligate seeder species such as mallet woodlands, shrublands, granite communities, wetlands and riparian areas, peat and organic soils, cryptogam communities, and systems with refugial fauna and

other short-range endemic species (Barrett *et al.* 2009). Knowledge of the vital attributes and life histories of fire regime specific species and communities can inform how and when to use fire at landscape scales to protect or appropriately manage these communities. Specific fire management guidelines have been prepared to protect and conserve granite outcrops, organic soils, geophytes and the honey possum or *noolbenger/ngoolboongoor* (*Tarsipes rostratus*).

- **maintaining strategic low-fuel areas**

These areas, where fuels will be reduced or modified by prescribed burning, slashing, scrub-rolling and other methods, will improve management capability in minimising bushfire impacts on the noisy scrub-bird, western bristlebird, western whipbird and Gilbert's potoroo habitat and other priority values. They will also continue to be located in areas that provide protection to, or reduce the impact of bushfires on, neighbours and community assets and infrastructure. The location, area, frequency and season for reducing fuel will depend on the values and the risk of fire detrimentally affecting such values and species, and will continue to be developed and planned through the prescribed burn planning process. A low-fuel fuel-reduced area within Two Peoples Bay Nature Reserve will continue to be maintained across the isthmus between Mount Gardner and the lakes to minimise the likelihood of a single fire affecting the entire habitat of species of conservation significance (CALM 1995a). The buffer, with a width of between 400–600m, will include the Sinker Reef track (modified as necessary).



Prescribed burning under mild conditions reduces flammable fuels in Two Peoples Bay Nature Reserve. Photo – DBCA

- **establishing and maintaining a fire-induced fine-grained mosaic of vegetation seral stages (time since fire) across the landscape**

A mosaic of vegetation and habitats representing a range of fire intervals, intensities, seasons and scales, provides habitat heterogeneity of different ages, which benefits biodiversity at landscape scales (Burrows 2008). Planned fire will be used at local and landscape scales in flammable vegetation types to implement and maintain a mosaic of vegetation seral stages compatible with the fire regime requirements of the biota in these types, and to protect life and community assets, fire regime specific biota and ecosystems (woodlands, wetlands and rock outcrops) from the deleterious impacts of bushfire.

Community engagement

Fire management in the planning area needs to be approached from a broader integrated land management perspective to achieve management objectives (Section 26 *Involving the community*). With increasing exposure of people and facilities to the risk of bushfire, there is a need to work collaboratively with key stakeholders in identifying and implementing complementary cross tenure fire management strategies. LGAs, DFES, utility managers and private landholders have a shared responsibility with the department to mitigate the impacts of bushfire. Ongoing liaison and engagement with neighbours, local and wider communities, organisations and agencies is vital and will continue to:

- facilitate the effective, coordinated management of fire in the landscape
- help in minimising adverse impacts of inappropriate fire on key values
- help the community understand the role and effects of fire, the application of planned fire and fire suppression operations.

The department will continue to make its [planned burn programs](#) publicly available, and department officers will continue to regularly participate in shire, brigade and bushfire advisory committee meetings and Local Emergency Management Committee processes, as far as resources allow.

The traditional use of fire is an important part of Noongar culture, and cultural burning is a sustainable way of looking after country and cultural heritage values. Noongar people wish to be involved in the planning, implementation and training of fire management using both traditional and Western knowledge. The department will work with Noongar 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, including cooperative management arrangements under the SWNTS (Section 9 *Noongar cultural heritage*).

Increasing knowledge and adaptive management

Understanding fire regimes, biota and their response to fire is one of the most important requirements for fire management in the planning area. Ongoing assessment and collection of data is essential if management is to be flexible and responsive to changes in biota and fire regimes across dynamic landscapes. Specific fire-related research (see *Research and monitoring*) during the life of the plan should investigate:

- fire induced mosaics
- population and seed bank dynamics of key functional plant taxa in relation to fire
- chronosequence (space-for-time) studies to investigate the effect of fire regime on community species composition and structure
- the effect of fire regime including patch size and fire history diversity on the habitat and population dynamics of key fauna species
- leaf litter ecology and fungal diversity and in relation to fire regime
- fuel load (biomass), flammability and risk of ignition in priority South Coast systems in relation to time since fire.

The interactions between fire and other types of disturbance and habitat modification including weeds, disease, grazing, fragmentation and climate change can be very significant (Hobbs 2003, Hobbs and Yates 2003), and require consideration during fire management planning and operations. Fire in *P. cinnamomi* infested communities has the potential to increase both the severity and extent of disease in native plant communities, and impinge on the regeneration capabilities of susceptible species (Moore *et al.* 2014). Any soil movement during fire management and suppression activities may result in the introduction or spread of soil-borne pathogens such as *P. cinnamomi*, therefore strict disease hygiene is essential (Section 20 *Diseases*). The timing and location of fire may enhance or mitigate weed invasion, depending on the resilience of the existing community, the fire regime and weed traits (Barrett *et al.* 2009, Hobbs 2003). More research into the role of fire in the ecosystem and post-fire impacts of disturbances is needed.

Fire management within the plan area may benefit from advances in technology or from new knowledge gained through research, monitoring and experience. In these instances, fire regimes may be reviewed to incorporate new findings. Adopting an adaptive fire management approach rather than a regimented approach creates opportunities in the future to change management options selected. Strategies made today may change as new data is collected, knowledge obtained, and as the state of the system changes (for example, as bushfires occur and change the state of the system).

Management objectives

- To prevent fire from affecting human life and community assets.
- To protect populations of threatened species from inappropriate fire.
- To protect biodiversity and natural values at the landscape scale from inappropriate fire, and maintain biodiversity and natural values through the use of appropriate fire.

Management actions

1. Manage fire through implementation of the prescribed burn planning process and consistent with legislative, policy and community responsibilities, Appendix 3 and relevant recovery plans for threatened species.
2. Apply prescribed fire and/or other fuel management techniques of the appropriate scale, intensity, frequency and season to the vegetation type in strategic locations to limit the potential for fires to run without intersecting low fuel areas.
3. Develop and use specific fire management guidelines and vital attributes/life histories to protect and conserve fire regime specific species and ecosystems.
4. Establish and maintain a fire-induced fine-grained mosaic of vegetation seral stages (time since fire) (see vegetation types in Appendix 3) to protect life and community/department assets, fire regime specific biota and ecosystems, particularly threatened species and woodlands, from high intensity bushfire.
5. Maintain the fuel-reduced area at low fuel loads within the Two Peoples Bay Nature Reserve across the isthmus between Mount Gardner and the lakes.
6. Effectively mitigate fire risks through:
 - a. construction and maintenance of a strategic fire access network of roads, tracks and firebreaks
 - b. maintenance of, and where possible improvement in, the department's fire management capability
 - c. maintenance of an effective fire detection and reporting system
 - d. incorporation of appropriate fire risk assessment and mitigation works into all proposed operations
 - e. closure to visitors of Two Peoples Bay Nature Reserve on days of 'extreme' or greater fire danger ratings, Waychinicup National Park on days of 'catastrophic' fire danger rating, or when a reserve is threatened by bushfire or in other emergencies as appropriate
 - f. conducting fire suppression actions on all unplanned fires occurring on or near department-managed land to a degree appropriate to the risk.
7. Unless deemed necessary for ongoing management requirements, promptly rehabilitate firebreaks and other disturbances built during bushfire suppression.
8. Work closely with DFES, LGAs, local bush fire brigades and volunteers, neighbouring land managers, plantation industry groups, other authorities, Noongar people and the community to encourage cooperative and compatible fire management arrangements and ensure appropriate community protection from fire.
9. Investigate, and if appropriate establish, a fire management working group for the planning area in consultation with the City of Albany and other relevant organisations (particularly covering the key reserves such as Gull Rock, West Cape Howe, Waychinicup and Torndirrup national parks and Two Peoples Bay Nature Reserve) to facilitate community engagement in fire management.
10. Monitor fire impacts on key values, vegetation and habitat.
11. Use adaptive management approaches and undertake research and monitoring to improve understanding of the role of fire in shaping and maintaining the biota and ecosystems, specifically the impacts on fauna and fire sensitive plant communities and species (Barrett *et al.* 2009) and the use of low intensity fires at shorter intervals, and integrate fire research and fire response monitoring into fire management practices.
12. Develop specific strategies for fire management in Waychinicup National Park and Mount Manypeaks Nature Reserve, including re-introducing planned fire to Mount Manypeaks Nature Reserve through the prescribed burn planning process.
13. Limit the impact of high intensity bushfire on the mature karri forest in West Cape Howe National Park during the life of the plan to promote the development of old-growth forest characteristics.
14. Limit the impact of fire on wetlands, lake fringes and granitic uplands.

Key performance indicators

Performance measure	Target	Reporting
The impact of bushfire on human life or community assets	No loss of human life or community assets, or serious injury attributable to the department's fire management	Annually
Fire management outcomes for fire management areas and vegetation types in Appendix 3	Fire management outcomes are achieved	Every five years



Strategic objective

A key strategic objective of this plan is to provide for recreation, tourism and community use for the appreciation of the area's landscape, natural and cultural heritage values (Section 4 Management direction). 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 within the planning area.

22. Visitor experience

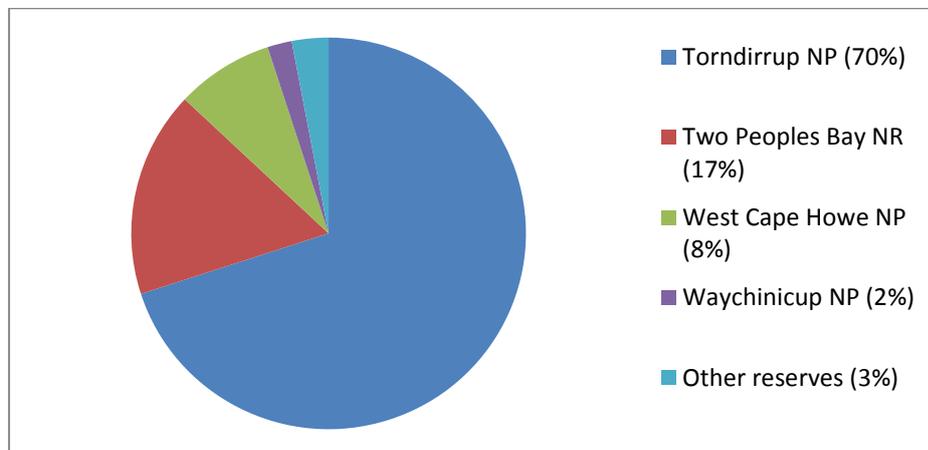
Regional recreational context

Recreation within the planning area mainly occurs along the coastal strip, and the major focus for visitor use is at Torndirrup, West Cape Howe, Gull Rock and Waychincup national parks and Two Peoples Bay Nature Reserve. While most recreation sites in the planning area are associated with access to beaches and coastal inlets, and much of the activity at these sites is water-based, these coastal parks and reserves also provide:

- spectacular scenic destinations
- a rustic, remote and wild sense of place
- unique and varied landscapes
- opportunities for numerous nature-based recreation activities and multi-user groups
- unique natural experiences.

Consequently, the number of visitors to these popular coastal parks and reserves is high. In 2013–14, Torndirrup National Park was the sixth highest visited park/reserve in the State with about 431,528 visits, and the most visited reserve in the planning area (Figure 1). 'The Gap' and 'Natural Bridge' sites within this park attracted about 209,587 visits alone. In comparison, Two Peoples Bay Nature Reserve received about 107,000 visits, Waychincup National Park received about 14,500 visits and West Cape Howe National Park received about 49,134 visits. Some day-use recreation also occurs in the inland nature reserves.

Figure 1. Visitation to the planning area in 2013–2014





Visitors enjoying the views at the spectacular and highly popular new lookout and facilities at The Gap in Torndirrup National Park. Photo – DBCA

While trends appear to be relatively steady for most parks and reserves, visits to Two Peoples Bay Nature Reserve appear to be consistently increasing since 2001–02. The natural environment is a key factor that motivates people to consider a visit to the region, and the parks within the planning area play a key role in fostering tourism (GSDC 2015). Nature or experiential tourism is the fastest growing segment of the international tourism market (GSDC 2015), and given that several parks located close to Albany have popular recreation sites, including the world-class lookouts at ‘The Gap’ and ‘Natural Bridge’ in Torndirrup National Park (which add significant value to nature-based tourism in the Albany area), there is potential for increased visitation to and pressures on the planning area. The challenge for managers is preserving the key values and nature-based recreation and tourism experiences, while providing for the possibility of increased visitation.

The *South Coast Region Regional Management Plan* (CALM 1992a) grouped reserves by the types of visitor use to which each is best suited, and identified Torndirrup National Park as having the more intensive day-use, and Gull Rock, West Cape Howe and Waychinicup national parks being more activity-based. The conservation of natural values, especially threatened species, is the primary visitor management goal for Two Peoples Bay Nature Reserve, although recreation is allowed where it does not conflict with this primary goal and the reserve category (Section 5 *Legislative and policy framework*). This is consistent with current visitation levels at these sites and will remain the intent of this plan, although the relatively new Gull Rock National Park will be more of a focus for recreation activities during the life of the plan.

Visitor planning

Planning for visitor use is needed to manage recreational development criteria of visitor risk, environmental impacts, social benefit, equity, public demand and potential economic benefit. In particular, high visitation in specific areas, unmanaged visitor use and unauthorised recreational use have the potential to lead to impacts such as the loss of vegetation, introduction and spread of weeds and disease, localised soil compaction and erosion problems, habitat destruction, fauna disturbance, braiding of tracks around difficult areas and increased fire risk. Sensitive sites in the planning area include coastal vegetation, wetlands and riparian areas, exposed bluffs, and areas containing threatened fauna. There are several tools for managing visitor impacts and use ranging from planning frameworks, site management, and direct and indirect regulation of use, including visitor management settings and detailed recreation planning.

Recreation settings are the result of the combination of the biophysical, social and managerial attributes of a place in which recreation takes place, and recreation opportunities are specific combinations of recreation activities in particular settings (SRQ 2003). People obtain varying experiences and degrees of satisfaction from combinations of activities and settings, and the provision of a wide diversity of settings will ensure more visitors

find a recreation setting to match their recreational preference (SRQ 2003). However, recreation setting diversity is reduced by recreation succession³⁴ (SRQ 2003).

‘Visitor management (recreation) settings’ proposed for the planning area are based on the ‘Recreation Opportunity Spectrum’ developed by (Clark and Stankey 1979) and guide the department in providing a specified range of recreation opportunities in an area, while limiting unintended incremental development and minimising visitor impacts (Maps 2–6, Appendix 4). However, visitor management settings are not static (that is, many of the determining attributes are subject to change and modification), and changes to settings should be sensitive to changing community values and needs (SRQ 2003). In addition to the settings shown in Maps 2–6, existing and proposed reserves across the remainder of the planning area are proposed to have a ‘natural’ setting, except Eclipse and Breaksea islands which will have a ‘natural-recreation’ setting.

A recreation site hierarchy (Appendix 4) is another tool used in conjunction with the visitor management settings to provide a controlled site by site mechanism (at the more localised level) to cap the level of development within the planning area and maintain a diversity of experiences within a setting.

More detailed precinct, master plan or site planning may be needed before the development of recreation sites to manage more specific visitor use issues. Recreation master plans detailing the access, facilities, activities and their development, and interpretation are needed for West Cape Howe, Torndirrup, Waychinicup and Gull Rock national parks, Two Peoples Bay Nature Reserve and Mt Martin Botanical Reserve as a priority.

Changes in recreational development criteria may require adjustments to recreation planning, settings, sites and activities and the way visitor impacts are managed using these tools during the life of the plan.

Some parts of Two Peoples Bay Nature Reserve were gazetted as ‘prohibited area’ and ‘limited access area’ in 1981 in accordance with the Wildlife Conservation Act (Government Gazette No. 90 of 4 December 1981 pages 4986 and 4987, Map 5), which remain in force under section 62 of the CALM Act. Although previous plans for Two Peoples Bay Nature Reserve (CALM 1995a) and West Cape Howe National Park (CALM 1995b) proposed specific zoning for these reserves, this is unable to be achieved under the CALM Act (Key Finding 4 in Conservation Commission 2010). In addition, the classified areas provided for under the CALM Act provide an effective means of managing people, uses and activities, and will remain in place. A permit system requires walkers to apply for access, which is only granted under strict conditions to ensure appropriate use. Classification of a limited access area (under section 62[1][c] of the CALM Act) or plant disease management area (under section 62[1][f] of the CALM Act) may be considered across Mount Manypeaks if/when the proposed reserve 29883 is vested with the Commission (Appendix 2), to improve the protection of threatened fauna in this area.

Visitor information, interpretation and education

The provision of a consistent and accurate information, interpretation and education program by both the department and other providers is important in achieving effective communication with the community and the desired outcomes of this management plan. With the high number of visitors to the area, particularly Torndirrup National Park and Two Peoples Bay Nature Reserve, it is important to continue to provide information and education about the values and management of the parks and reserves. Raising community awareness, appreciation and understanding of values fosters a sense of community ownership, engenders support for management and encourages appropriate behaviour.

Information

The department provides a variety of information on the planning area (such as details of facilities, available activities, features, access and regulations) through a range of means including pre-visit information on the department’s [Explore Parks WA](#) and [ParkStayWA](#) websites and at department offices, as well as park brochures, signage, information bays at the main entry points to several parks, smartphone ‘apps’ (for example, [Alltrails](#) guides for Torndirrup and West Cape Howe national parks), and information provided by commercial tourism operators and department staff.

³⁴ As the recreational use of natural areas increases, attributes can change until the character of the place has been modified to a point where it no longer has the attributes that originally attracted people to the area. As a consequence, the initial visitors are displaced by visitors that are more tolerant of the changed attributes, with the process continuing until a uniform high level of services and facilities is provided in the natural area.

Interpretation

Interpretation explains natural and cultural features and management activities to enrich visitor experiences and includes on-site signs, information shelters, brochures, and guided interpretative activities. The visitor centre at Two Peoples Bay Nature Reserve (built in 1999) is a key interpretive site in the planning area and plays an important role in promoting conservation messages, particularly about the conservation of threatened species. Other interpretive sites also occur at various locations within Gull Rock, Torndirrup, Waychinicup and West Cape Howe national parks. Tourism WA (2010) suggest that more interpretation around key attractions in national parks, such as Torndirrup National Park, is a priority for improving educational experiences for visitors to the region. Primary interpretive themes will be used to guide interpretation within reserves and at recreation sites across the planning area, and include:

- *Landscapes and seascapes*
- *Ecology* (islands and fire)
- *Biodiversity* (threatened flora and fauna species, ecological communities and restricted habitats)
- *People* (Noongar heritage, early explorers and maritime heritage)
- *Altered Landscapes* (catchment management, remnant bushland and the *South Coast Macro Corridor Network*, weeds and introduced animals, fire and *Phytophthora Dieback*).



The visitors centre in Two Peoples Bay Nature Reserve.
Photo – Paul Roberts/DBCA

Education

Education programs including presentations and organised field activities are targeted at specific user groups to facilitate learning and foster greater awareness, appreciation and understanding of the area's key values. The planning area provides a base for a range of education programs for schools, and the department often liaises with local schools.

Visitor safety

The parks and reserves of the *Albany coast* can present specific risks to the safety of visitors, including:

- waves/swells and slips/falls from rocks, cliff edges and overhangs – the Torndirrup coastline is notorious for serious accidents and deaths because of people slipping or being washed onto rocks or into the ocean by unexpected big waves, gusting winds or extra-large swells (Clews 1999). [Rock fishing](#) is particularly risky, especially at Salmon Holes and Casey's Beach
- bad weather – seasonal weather extremes or dramatic changes in conditions can increase the risk of dehydration, heat exhaustion and hypothermia
- isolation and disorientation – much of the planning area is relatively remote from emergency services, often difficult to access by emergency vehicles and has variable access to communication. Visitors becoming injured, lost or stranded in remote areas may face significant delays in being rescued
- bushfire – many parts of the planning area are prone to bushfires during the summer months, and sites that are relatively inaccessible increase the risks to the safety of visitors.

In addition to a genuine concern for visitor welfare, the department has a moral and legal responsibility to consider the personal safety and welfare of visitors to department-managed land and waters. Risks to visitors are managed through a visitor risk management program that is guided by the department's [Corporate Policy Statement No. 53: Visitor risk management](#). The department has put considerable effort into ensuring visitors have adequate information about the conditions and risks before their visit, as well as providing signage to highlight risks. The department encourages visitors to use appropriate behaviour while undertaking recreational activities that involve risk. The seriousness of many visitor risks can be reduced through attention to personal safety (such as the acknowledgment by visitors of the risks and their appropriate behavior, registration of trip details with friends or family, and personal floatation devices), appropriate design and/or maintenance of facilities, and provision of information about risks and how to avoid them. The department also works closely with the State Emergency Service, WA Police, St John Ambulance and volunteer fire brigades in managing visitor risk within the planning area.

Visual landscape

The *Albany coast* is highly valued for its natural landscapes and remote scenic quality (Section 3 *Key values and management issues*). The planning area stretches between the Scott Coastal Plain and Esperance Plains landscape character types (CALM 1994a). Significant visual landscape values include the distinctive vegetation (for example, karri forest at West Cape Howe, coastal heath vegetation, and strongly defined and contrasting patterns of coastal vegetation), landforms (for example, rock outcrops, cliffs and headlands, irregular coastline edges, islands and hills/peaks) and water forms (for example, estuaries, inlets, lakes, swamps and seasonal wetlands). The deep marine blues of the surrounding coastal waters contrast with white surf and golden beaches, while rock greys and vegetation greens are a striking mix (CALM 1995b).

The department's *Corporate Policy Statement No. 34: Visual Resource Management* provides guidance for ensuring that all land uses and waters managed by the department are planned and carried out in ways that sustain the beauty of the natural environment. Visual resource management needs to ensure that roads, walk tracks, fire breaks and trails, utility corridors, signs and recreation infrastructure are designed and located to be in harmony with and minimise visual impacts on the natural environment, and that the potential impact on landscape values from land use proposals on adjacent lands are evaluated.

Management objective

To promote community awareness, understanding, appreciation and enjoyment of key values through the planning and provision of a range of safe and minimal-impact nature-based recreation and tourism opportunities that is based on visitor demand and trends.

Management actions

1. Provide and maintain a range of recreation opportunities consistent with the CALM Regulations 2002, department policy, adequate protection and maintenance of key values, CALM Act section 62 classification, proposed management settings, recreational development criteria, site capability, department standards, and the rights and enjoyment of other visitors.
2. Ensure a regional and complementary perspective is taken in developing recreational opportunities including the consideration of opportunities next to the planning area.
3. Prioritise, undertake and implement recreation planning for selected reserves, as resources allow, ensuring:
 - a. stakeholder engagement in recreation planning, as appropriate
 - b. consideration of sensitive biodiversity and heritage information
 - c. identification of visitor activity profile, areas suitable for activities, visitor risks, and management and facilities needed to support activities
 - d. consideration of City of Albany plans.
4. Monitor visitor numbers, satisfaction and demand at key locations and the levels of change and impact of visitor use on recreation areas and facilities, and control recreation in liaison with users where impact becomes significant or unacceptable through appropriate visitor management techniques.
5. Identify and provide appropriate information, interpretation and education opportunities for visitors to increase their knowledge, appreciation and understanding of key values and management issues including:
 - a. implementing park patrols, enforcement and other appropriate measures where needed consistent with the CALM Act and CALM Regulations 2002
 - b. encouraging appropriate visitor behaviour
 - c. promoting an appreciation of cultural heritage in the reserves
 - d. maintaining and producing up-to-date, high quality and informative products to promote community knowledge of reserves.
6. Implement a visitor risk management program consistent with legislation and department policy, and undertake appropriate remedial action as necessary.
7. Liaise with relevant emergency agencies and organisations in responding to safety incidents, including the development of appropriate response plans.
8. Seek to identify, sensitively manage and minimise degradation of visual landscape values, particularly along access corridors, tourist destinations, lookout points and prominent natural features (for example, coastal areas and islands) consistent with department policy and standards.
9. Liaise with agencies, organisations and adjacent landowners on land use proposals located on adjacent lands to minimise the potential impact on landscape values.
10. Consider gazetting a proposed plant disease management area or limited access area across Mount Manypeaks under section 62 of the CALM Act if/when the proposed reserve 29883 is vested with the Commission.

23. Visitor access

Public access to the reserves is mostly by vehicle, although some areas are accessible via walk and other trails and boats (Section 24 *Visitor activities*). Access roads and tracks available for public use in the planning area, including those managed by the department, are shown in Maps 2–6.

Vehicle access

Most vehicle access to the main recreation sites of the planning area is via roads and tracks managed by the department, although some access is via local government roads. Most access roads and tracks within the planning area are to beach destinations where picnicking, sightseeing, swimming, fishing and bushwalking are the main activities.

The department seeks to maintain the level of vehicle access at present levels and standards across the planning area (in terms of access points and two-wheel drive versus four-wheel drive access, see Maps 2–6). Access will mainly be promoted to the national parks and conservation parks (when created, see Appendix 2), which will maintain a range of visitor experiences and options across the planning area. Road upgrades for safety reasons and for the prevention of the introduction and spread of *Phytophthora Dieback* are supported. The department will continue to plan strategic road access to meet current and future needs (including the maintenance of a range of visitor experiences and options) and identify areas requiring road improvements, road closures or signage.

State and local government roads

The City of Albany manages several dedicated public roads³⁵ that lie in Crown land road reserves within the boundaries of the planning area including part Shelley Beach Road, Frenchman Bay Road, The Gap Road, Blowholes Road, Gull Rock Road, Ledge Point Road, Two Peoples Bay Road and Cheyne Road.

Main Roads WA's (MRWA) *Roads 2030 Regional Strategies for Significant Local Government Roads – Great Southern Region* (MRWA 2013) proposes upgrades for several roads (such as Frenchman Bay, Two Peoples Bay and Cheyne roads) that may impact upon the planning area by increasing visitation. Liaison with the City of Albany will be important to manage impacts that may arise from road upgrades.

Some existing roads and/or Crown road reserves may not be best located to satisfy access requirements, may be unnecessary, may no longer be needed, or may need to be realigned to match the formed road or road reserve. The location of these should be rationalised through consultation with local authorities, MRWA, other bodies (such as DWER) and private property owners. Some current two-wheel drive roads in Gull Rock National Park are on dedicated public roads, which are creating management conflicts, and the possibility of incorporating these into Gull Rock National Park will be investigated in consultation with the City of Albany. The Two Peoples Bay Road is not aligned to the road reserve at the entrance to the Two Peoples Bay Nature Reserve (CALM 1995a). The unused road reserve adjoining the western boundary of proposed reserve 24991 has also been recommended to be added to the reserve (CALM 1995a).

Department-managed roads and tracks

Improvements to access in the planning area will occur during the life of the plan subject to priorities and resources, particularly for rationalisation of four-wheel drive tracks in West Cape Howe National Park and upgrade of selected access in Waychinicup, Gull Rock and Torndirrup national parks, Two People Bay Nature Reserve and Mt Martin reserve.

In some places within West Cape Howe, Gull Rock, Torndirrup and Waychinicup national parks, several or a combination of factors, such as soils, vegetation, topography, weather, inappropriate vehicle access, increased recreation use (unauthorised camping and driving off designated tracks) and resource management constraints, has resulted in significant environmental degradation such as erosion, soil compaction and disturbed habitat (Key Finding 5 in Conservation Commission 2010). More detailed precinct, master plan or site planning for specific reserves, areas or sites will progressively address more specific visitor use issues (Section 22 *Visitor experience*) and allow environmental degradation to be controlled (through a variety of techniques for managing visitor impacts) and rehabilitated/restored. Sensitive and fragile sites that may be affected by vehicle movement will

³⁵ 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”.

also be identified to ensure any road construction or maintenance does not impact on these areas. Used rubber matting (CALM 1994b) that is no longer needed for access to some coastal areas may pose a fire and contamination risk and should be removed from parks and reserves promptly.

Management access

Tracks used for management purposes only are required for operations such as feral animal baiting, fire management, flora and fauna monitoring, weed control and/or for evacuation purposes. Other public access may also be temporarily, permanently or seasonally closed to the public for management purposes, or because of the risk of degradation of natural and cultural values or to visitor safety. Management access tracks will be signposted and/or physically closed by a gate, drain or natural barrier. Access tracks that are no longer needed for management purposes will be closed and rehabilitated to deter unauthorised use.

Boat access

The only boat launching facility in the planning area is at Two Peoples Bay Nature Reserve at the southern end of Two Peoples Bay Beach. Two small boat landing areas also occur in Mt Martin reserve at Voyager Park and Johnson's Cove, which are accessed by boats from Emu Point.

Many islands in the Albany area have steep rocky shores and landing is often difficult. While visitation to the islands is generally very low, islands may have access restricted if there is the potential for impacts on their natural or other values (Section 16 *Native animals and habitats*, Section 18 *Weeds*). Development of a biosecurity protocol for island conservation reserves including access restrictions, procedures for regular surveillance and monitoring, response to incursions and public education has been suggested (Conservation Commission 2009, Lohr and Keighery 2014).

Boat access by the Australian Maritime Safety Authority and WA Police to Eclipse Island may be required occasionally to service infrastructure (Section 30 *Utilities and services*).

Management objective

To provide and maintain safe and effective access that facilitates visitor appreciation of, and minimises significant adverse impact on natural, cultural, socio-economic and management values.

Management actions

1. Provide and maintain safe and appropriate strategic road and track access (Maps 2–6) for management and public use consistent with protection of key values and department standards.
2. Not allow vehicles driving off dedicated roads and roads and tracks contained within lands managed by the department, except with Region or District Manager approval.
3. As needed, temporarily, permanently or seasonally close management access roads or tracks to the public, subject to Region or District Manager approval.
4. Ensure that Crown road reserves are best located to protect the natural and landscape values and meet public access needs, and negotiate with appropriate authorities to re-align or cancel unnecessary or unused road reserves adding them to the planning area, particularly within Gull Rock National Park.
5. Where appropriate, close, rationalise, rehabilitate or re-design access that is poorly located, in poor condition, poses a risk to visitor safety, difficult to maintain, unsuitable for recreation and conservation purposes, no longer needed or where there is an adverse and unacceptable impact on the environment, including:
 - a. re-design access and the parking facilities at Shelley Beach (West Cape Howe National Park).
 - b. rationalise and rehabilitate tracks in the south-western area of West Cape Howe and Gull Rock national parks.
6. Liaise with MRWA, LGAs and other stakeholders to ensure the appropriate management and alignment of regional roads, road reserves, other access and road development to, and through, the planning area.
7. Liaise with four-wheel drive clubs and associations to promote responsible recreational use.
8. Promptly remove and dispose of used rubber matting that is no longer needed for coastal access.
9. Develop, review and implement a biosecurity protocol for island conservation reserves.

24. Visitor activities

The Albany coast is valued for its diversity of recreational experiences and opportunities (Section 3 *Key values and management issues*). The remote and natural feel, together with the geological features, of West Cape Howe National Park provide opportunities for adventure activities. Torndirrup National Park is close to Albany and, while being relatively natural, contains the well-known and spectacular key visitor destination sites of the ‘The Gap’ and ‘Natural Bridge’. Gull Rock National Park, also close to Albany, is a popular area for beach-goers, adventure and nature appreciation activities. Two Peoples Bay Nature Reserve is a relatively remote and natural area, but provides day-use access to scenic beaches, picnic areas, boat launching and birdwatching, and is one of the five hotspots for adventure activities (birdwatching) in WA national parks. In Waychinicup National Park the scenic inlet at the Waychinicup River mouth is a good location for basic camping and nature-based activities such as fishing, kayaking and swimming. While many visitor activities occur in the planning area, the main activities are discussed below.

Unauthorised visitor access and behaviour such as driving off designated tracks, informal camping and campfires, and overcrowding at popular recreation sites during peak periods can impact on a range of values including other visitors (Section 3 *Key values and management issues*). The plan proposes to mitigate these management issues by designating areas for some specific activities, and providing a range of opportunities through specific park planning and development. Appendix 4 provides guidance on the recreation/visitor experiences that are supported for each management setting.

Day-use

Torndirrup, Gull Rock and West Cape Howe national parks and Two Peoples Bay Nature Reserve are all located close to Albany, and provide a range of day-use recreation sites and opportunities for visitors seeking picnicking, beach, adventure and nature appreciation activities (Maps 2–6).

Future management of these sites will largely continue to consolidate and/or expand existing sites and activities, rather than develop new sites. However, new day-use sites may be developed in Gull Rock National Park at Ledge Beach (with a low-level of infrastructure sophistication such as a picnic area, ablutions and car parks), at Gull Rock point (lookout), above Casey’s Beach (two-wheel drive road access and lookout to viewing area), and a possible site east of Johnson’s Cove.

‘The Gap’ and ‘Natural Bridge’ in Torndirrup National Park have been significantly upgraded with new lookouts over the spectacular and dramatic coastline, paths connecting the carpark to the lookouts, a gathering area with interpretive signage, and a small picnic area, which makes this already popular attraction a world-class facility. Day use areas at Salmon Holes, Blowholes, and in Two Peoples Bay Nature Reserve may also be upgraded subject to priorities and resources.

Management facilities at park/reserve entrances may be developed, where appropriate, including:

- Gull Rock National Park in the area west of Gull Rock Road (north of Ledge Beach Road)
- West Cape Howe National Park east of Shelley Beach Road in the approximate location of the existing interpretation shelter
- Torndirrup National Park along and to the west of Frenchman Bay Road
- Two Peoples Bay Nature Reserve, including the management and staff accommodation complex
- Waychinicup National Park to the west of Cheyne Road.

Bushwalking

A key feature of the coastal parks and reserves in the Albany coast is the walk trails. The iconic Bibbulmun Track³⁶, one of the world’s top 20 [epic hikes](#), passes through West Cape Howe and Torndirrup national parks and provides bushwalking, camping (at the West Cape Howe camp site), sightseeing and nature appreciation opportunities. Torndirrup National Park contains the Isthmus Hill/Bald Head, Stony Hill/Peak Head and Blowholes walk trails, which are used consistently throughout the year (with some minor seasonal variation in usage patterns). Extensive walk trails also exist in the Mt Martin reserve from Ledge Beach to Voyager Park. Two Peoples Bay Nature Reserve contains the *Baie des deux Peuples* (or ‘Bay of Two Nations’) heritage trail,

³⁶ See www.bibbulmuntrack.org.au/, trailswa.com.au/ and parks.dpaw.wa.gov.au/know/bibbulmun-track.

named after the bay by a French expedition led by Nicholas Baudin in celebration of meeting an American sealing brig in the bay in 1803.



Bushwalking in challenging terrain is a popular activity in coastal reserves. Photo – DBCA

Albany District will review the existing trail network condition and recommend works for closure, renovation or new experiences during the life of the plan. Walk trails may be developed, maintained or upgraded in the parks, particularly in West Cape Howe National Park (network of trails in association with the Bibbulmun Track, and also between Shelley Beach and the lookout), Voyagers Park/Mt Martin reserves (a city to park walk trail incorporating a ferry crossing) and in Torndirrup National Park (Stony Hill). The 'Kinjarling Trail' is a proposed cultural heritage trail combining Noongar and colonial history linking several heritage sites around Albany. Walk trails and associated facilities may be developed as part of, or that link in with, the 'Kinjarling Trail', in association with community stakeholders such as local Noongar people, City of Albany and Albany Maritime Foundation.

Cycling

Cycling is becoming an increasingly popular recreational activity in the area, particularly with establishment of the iconic [Munda Biddi](#) cycling trail. Cycling (mountain bike) trails may be developed in Gull Rock National Park and Mount Martin reserve, subject to further consideration of environmental, cultural and visitor safety issues.

Domestic animals

Although many visitors enjoy experiencing natural areas with their domestic animals (dogs and horses), these animals are not allowed in nature reserves and are not usually allowed in national parks or conservation parks. Horses can introduce and spread weeds and *Phytophthora Dieback*, trample or browse native vegetation, cause soil erosion, siltation or fouling of watercourses, and disturb wildlife. Dogs can also disturb wildlife and other visitors, and are also susceptible to taking poisoned fox baits in areas that are baited for the control of foxes. However, there are exceptions including guide dogs and dogs needed for emergency search and rescue and management purposes, and where under the CALM Regulations dogs or horses are allowed in 'designated areas' where environmental and social impacts can be managed and kept to acceptable limits.

A bridal trail occurs in Torndirrup National Park near Little Grove. Two areas will be investigated for designating as areas for horseriding:

- an area at the northern entrance in Gull Rock National Park between Gull Rock and Ledge Beach roads, a management track and Oyster Harbour (exclusive of areas that may contain the ‘*Subtropical and Temperate Coastal Saltmarsh*’ TEC)
- a strip along Ledge Beach in Gull Rock National Park from the end of Ledge Beach Road.

There are currently no areas designated for dogs in the planning area. However, three areas will be investigated for designating as areas for dogs:

- a strip along Ledge Beach in Gull Rock National Park from the end of Ledge Beach Road
- at the recreation sites of two small boat landing areas in Mt Martin reserve at Voyager Park and Johnson’s Cove.

Consideration may be given to the designation of further areas where dogs and horseriding are allowed, managed in accordance with CALM Regulations and departmental policy.

Gull Rock National Park is baited for foxes under the *Western Shield* aerial 1080 baiting program (Section 19 *Introduced and other problem animals*), so bait-free buffers should be considered around sites that are designated for dogs.

Hang gliding and paragliding

One of the premier sites for hang gliding in WA is near Shelley Beach in [West Cape Howe National Park](#) (Herford 1990, CALM 1992a), and there are also several other sites in the planning area that are used by or are of interest to hang gliders.

Under the [Civil Aviation Regulations 1988](#), hang gliders and paragliders are regarded as aircraft, and the CALM Regulations require lawful authority for aircraft to launch, land or make a touch down on department-managed land (regulation 65). To facilitate this, the mechanisms in the CALM Regulations will be used to grant general lawful authority for hang gliding and paragliding in the Shelley Beach area. Hang gliding and paragliding will also be allowed at Casey’s Beach, Ledge Point, Herald Point and Ben Dearg Beach in Gull Rock National Park, Bamboos in Waychinicup National Park and Isthmus Hill in Torndirrup National Park subject to obtaining lawful authority from the Region/District Manager before hang gliding or paragliding at these sites. These sites will be maintained as unmodified sites, and further investigation and consideration will be given to how lawful authority will be granted in the future.

Motorised recreation

Many visitors to the area’s parks and reserves are attracted to the isolation, peaceful bush settings, scenic driving opportunities and sense of freedom associated with travelling on roads and tracks that, by virtue of the more difficult access, are less visited and offer a different and more challenging experience. Typically, these tracks include scenic viewpoints, rugged landscapes and picturesque settings, and West Cape Howe and Gull Rock national parks provide many of these opportunities. Four-wheel driving or adventure motorcycling is a popular way of accessing and enjoying the parks, but will not in itself provide access to every experience in the parks. Motorised recreation can physically damage the environment by causing erosion, spreading *Phytophthora Dieback*, damaging vegetation and disturbing fauna, and can also be incompatible with other recreation groups and activities that require peace and solitude in natural environments (for example, motorised recreation is not allowed on the Bibbulmun Track) (Section 23 *Visitor access*).

Licensed vehicles are allowed on public roads on lands managed by the department, and normal road and traffic laws apply. Driving along roads and tracks closed to the public, or where there are no tracks, is not allowed. Vehicles registered under the *Control of Vehicles (Off-road Areas) Act 1978* and unregistered off-road vehicles (for example, all-terrain vehicles, off-road motorbikes and dune buggies) are not allowed. Management tracks are not maintained for public use. Competitive car rallies and other motor sports are not allowed in national parks or nature reserves in the Region.

Rock climbing and abseiling

Rock climbing

The cliffs of West Cape Howe National Park are widely considered to offer the best rock climbing in WA and are [nationally renowned](#) (CALM 1995b). Rock climbing also occurs in Waychinicup and Torndirrup national parks. Height, aspect and quality of the climbs are all seen as exceptional by climbers who use cliffs around West Cape Howe as well as on the coast north of Shelley Beach to Forsyth Bluff. Access to climbing spots is mainly by four-wheel drive vehicle, although some groups walk in. Access for casualty evacuation may be required in the event of an accident. Although not a common issue, non-climbing spectators on cliff tops can pose a danger to climbers if they dislodge material or tamper with anchor points (CALM 1995b).

Rock climbing is allowed throughout the planning area, subject to the maintenance of conservation values, safety standards, the rights and enjoyment of other visitors, or where specific restrictions may be required. The [Climbers' Association of WA](#) (CAWA) and the department discourage climbing from The Gap and Natural Bridge areas (especially on public holidays and long weekends), and bolting at The Gap, Natural Bridge, Blowholes and all areas within or between any of these locations, Stony Hill boulders, and any location within the Two Peoples Bay Nature Reserve. Climbing and bolting should adhere to CAWA's [Code of Conduct and Code of Bolting and New Route Development](#)³⁷.

Abseiling

While abseiling is a technique that may be used by rock climbers to descend rock faces only when essential to undertake their primary activity of rock climbing, it may also be a distinct recreational activity unassociated with rock climbing. Abseiling occurs at the Amphitheatre in Torndirrup National Park, but there are few sites primarily used for 'recreational abseiling' in the planning area. Under regulation 33 of the CALM Regulations, abseiling cannot occur on department-managed land without lawful authority, except in an 'abseiling area', which is an area declared under regulation 6(1)(a) to be a designated area for the purposes of regulation 33, or an area designated by sign as an abseiling area. Lawful authority from the Region/District Manager for this activity will be required for all areas within the planning area, and designated areas may be investigated and considered during the life of the plan.

Water-based activities

Recreational fishing in the planning area is allowed on lands managed by the department under conditions established by the *Fish Resources Management Act 1994*, unless restricted or not allowed under a management plan. The Moates Lake System in Two Peoples Bay Nature Reserve is a nationally important wetland and meets one Ramsar criterion for listing as a wetland of International Importance (Section 13 *Hydrology*). The system supports significant populations of the endangered Australasian bittern and western trout minnow, and seven birds that use the lakes are listed under international treaties (Section 5 *Legislative and policy framework* and Section 16 *Native animals and habitats*). The western trout minnow recovery plan (Mitchell and Newell 2008) identifies recreational fishing in the Angove and Goodga catchments as a significant threat through greatly increasing the risk of invasive fish species being introduced into the waterways. Therefore, recreational fishing will not be allowed in Moates and Gardner lakes by gazetting these lakes as restricted areas under the CALM Regulations.

A range of other water-based activities also occur including swimming, boating, diving and surfing. Popular [swimming areas](#) include Ledge Beach, Two Peoples Bay Beach, Little Beach and Shelley Beach. Popular surfing areas include Misery Beach, Salmon Holes, Cable Beach and Dingo Beach. Popular diving spots include Michaelmas Island (east and west) and Middle Rock/Herald Reef. A boat launch exists in Two Peoples Bay Nature Reserve at the southern end of Two Peoples Bay Beach. Voyagers Park, Mt Martin and Gull Rock National Park are accessed by boats from Emu Point and via walk trails from Voyagers Park. A canoe launch facility at the inlet in Waychinicup National Park will be investigated and may be developed. No gazetted boating or water ski areas occur on reserves within the planning area, although several [coastal and inland gazetted boating and water ski areas](#) occur nearby. Water skiing is not allowed outside of gazetted water ski zones, and jetskiing is not allowed except when used in place of a boat to tow water skiers in gazetted water ski zones.

³⁷ See also the department's [Corporate Policy Statement No. 18: Recreation, Tourism and Visitor Services](#).

Visitor accommodation

The only built accommodation for the public in the planning area is the Bibbulmun Track hut within West Cape Howe National Park (Map 7, Section 24 *Visitor activities – Bushwalking*). There is limited provision for built accommodation in the planning area, as many of the coastal parks and reserves are close to Albany and many visitor accommodation options are provided outside of the reserves by private enterprise or local government such as hotel accommodation, caravan parks, cabins, chalets and campgrounds.



Little Beach, with its turquoise waters, is a popular recreation site with visitors in Two Peoples Bay National Park.
Photo – Lee Hollingsworth/DBCA

Visitor accommodation in the planning area is mainly catered for through the provision of camping facilities. Areas designated for camping are restricted to the Waychinicup Inlet (Waychinicup National Park) and Shelley Beach (West Cape Howe National Park). Additional areas for designated or remote camping will be investigated in Gull Rock National Park, in proposed reserves (if/when they are managed by the department), and as part of customary activities (Section 9 *Noongar cultural heritage*), and may be considered in other areas if appropriate.

Visitation to recreation sites in the planning area generates waste, including human waste. Inappropriate waste disposal from recreation sites or from boats can pollute the environment within and next to the planning area. Visitors are encouraged to take their rubbish with them when they leave, and pick up any rubbish they may find on the coast. Toilet systems vary across the planning area from sealed vaults to hybrid and leach septic systems.

Campfires and firewood collection have detrimental effects on the natural environment, including loss of vegetation cover, soil compaction and the accumulation of ash. Hot ash and coals from beach campfires can be a visitor risk, and campfire escapes can cause bushfires. Campfires (ground fires or fires in containers) are not allowed on conservation reserves in the planning area, either on the beach or in camping areas, except where lawful authority is given by the department or fire rings are provided for public use. The department encourages visitors to bring portable gas stoves.

Management objective

To provide a range of recreational activities and facilities appropriate to the environment and management settings that facilitates visitor enjoyment and appreciation of key values.

Management actions

1. Provide and maintain a range of recreation activities and facilities consistent with relevant legislation, department policies and guidelines, appropriate management settings (Maps 2–6), protection and maintenance of key values, recreational development criteria, site capability, safety standards, and the rights and enjoyment of other visitors, and in liaison with key stakeholders such as the City of Albany and peak recreational bodies.
2. Monitor the impacts of, and demand for, recreational activities, and manage activities where impacts become significant or unacceptable.
3. Investigate and where appropriate designate areas for recreation activities under the CALM Act and Regulations during the life of the plan, subject to strategy 1, including:
 - a. horseriding in Torndirrup and Gull Rock national parks
 - b. dogs in Gull Rock National Park and Mt Martin and Voyager Park reserves.
4. Not allow recreational fishing at Moates and Gardner lakes by gazetting these lakes as restricted areas under the CALM Regulations.
5. Subject to strategy 3 above, not allow domestic animals in the planning area, except guide dogs and dogs needed for emergency search and rescue and management purposes.
6. Allow hang-gliding and paragliding in the Shelley Beach area in West Cape Howe National Park under the CALM Regulations; and allow hang-gliding and paragliding at Casey's Beach, Ledge Point, Herald Point and Ben Dearg Beach in Gull Rock National Park, Bamboos in Waychinicup National Park and Isthmus Hill in Torndirrup National Park subject to obtaining lawful authority from the Region/District Manager to undertake these activities.
7. Allow rock climbing across the planning area, monitor rock climbing sites for degradation and visitor safety, restrict activities where there is an unacceptable risk to the environment, cultural values or visitor safety, and work cooperatively with CAWA in the provision of rock climbing and the promotion of the CAWA *Code of Conduct* and *Code of Bolting and New Route Development*.
8. Allow abseiling within the planning area subject to obtaining lawful authority from the Region/District Manager to undertake this activity, and investigate and consider designating areas during the life of the plan.
9. Do not allow the use of campfires on conservation reserves, except where lawful authority is given by the department or fire rings are provided for public use.

Key performance indicator

Performance measure	Target	Reporting
The number and range of visitor opportunities within the planning area	The number and range of visitor opportunities is maintained or increased consistent with the plan and/or department policy during the life of the plan	Every five years

25. Commercial operations and tourism

Commercial concessions³⁸ can help meet the rising demand for high quality recreation and tourism opportunities, facilities and services, while ensuring that the department meets the costs of managing the natural environment. There are no leases within the planning area for recreation or tourism purposes at the start of the planning period. While there are 103 commercial tourism operators that are licensed to conduct recreational activities in parks and reserves in the region at the start of the planning period, the number of operators that run tours or activities in the area may be much less. Public private partnerships and commercial opportunities will be explored for Breaksea Island during the life of the plan. The department's *Corporate Policy Statement No. 18: Recreation, Tourism and Visitor Services* and [Commercial Operator Handbook](#) provide guidance on approval of and conditions for commercial operations, and [Corporate Policy Statement No. 55: Commercial Filming](#) provides guidance on commercial filming. Commercial filming on lands and waters managed by the department is supported as it can promote community awareness, understanding and support for nature conservation, land management and

³⁸ A commercial concession is a right granted by way of a lease (which allows a lessee to occupy land) or licence (which allows a licensee to enter and use land) under appropriate conditions for an area of land or water managed by the department.

cultural and heritage significance. Commercial filming may require a licence or lawful authority to ensure wildlife and natural values are protected and safety aspects are considered.

Management objective

To extend the range of services, facilities and experiences available through the involvement of private enterprise, consistent with other management objectives and the protection of key values.

Management actions

1. Evaluate and grant proposals for licences, commercial tourism leases and event opportunities in accordance with department policy.
2. Ensure all commercial operations operate under a lease, licence or permit agreement with appropriate conditions.
3. Review licence and lease conditions to include requirements, where deemed necessary, to provide information to enable impact assessment of the tourism activity.
4. Monitor the level and impact of operator use to ensure it is sustainable including compliance with licence and lease conditions.
5. Seek sources of potential income (commercial opportunities, sponsorship, merchandising and product development, concessions).

26. Involving the community

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, Noongar people, visitors, tour operators and other community stakeholders is essential for the successful implementation of the management plan.

Public participation is a core component of the preparation of this management plan. The department has consulted widely with local stakeholders through workshops, presentations and other public participation opportunities. Meetings have been held with the City of Albany, the Albany Coastal Reserves Advisory Committee, representatives of Noongar groups and special interest groups to explore how best to conserve natural and cultural values, promote and manage recreation and maintain the unique experiential qualities in the reserves. The contribution of Noongar people to the preparation of this plan is especially recognised.

Volunteer activities not only increase the department's capabilities and skills base, but also foster communication links and understanding with the community. The department maintains a volunteer database, and many volunteers have contributed to a variety of management activities such as threatened species surveys and monitoring, weed control, the campground host program and helping rangers. Volunteers play a crucial role in the recovery of threatened species through involvement in recovery teams, in survey and monitoring, in raising community awareness and in raising support funds for recovery actions, such as the Albany-based Gilbert's Potoroo Action Group. Valuable help is received from wildlife carers who rehabilitate injured fauna. Volunteers and emergency services personnel have also been involved in search, rescue and recovery operations. Visitors to the planning area are encouraged to respect camp sites, facilities and other visitors, report damage and provide feedback on the condition of sites/facilities.

The department informs, consults and involves the public on many aspects of planning and operational activities, including annual burn programs, feral predator baiting and threatened species survey activities.

Management objective

To promote community involvement and support in planning and management.

Management actions

1. Provide opportunities for community groups to be involved in management of the planning area.
2. Work together with Noongar people to preserve cultural heritage, conserve the environment and enrich cross-cultural awareness.
3. Support volunteer involvement in departmental programs, and maintain records of the number of registered volunteers and the amount of volunteer hours contributed.
4. Identify and promote the use of camp hosts.



Threatened flora recovery team members and volunteers surveying for the endangered *Caladenia granitora* in Waychinicup National Park. Photo – Sarah Barrett/DBCA

Off-reserve management and partnerships

Off-reserve management

Setting aside and managing areas in the conservation reserve system will not, of itself, ensure that all biodiversity conservation objectives are met, and conservation measures need to be applied to other lands across the landscape to achieve successful biodiversity conservation (Commonwealth of Australia 2010b). Off-reserve conservation complements management of the reserve system through the protection and management of natural values directly, such as rare or under-represented species or ecological communities, and indirectly, such as waterways or other habitats that may link to or enhance nearby conservation reserves (Section 14 *Biogeography*).

The *South Coast Macro Corridor Network* (Wilkins *et al.* 2006) is a bioregional, landscape-scale approach to connectivity that recognises the important role that remnant vegetation plays in the development of corridors between existing protected areas, and helps in achieving long-term outcomes for biodiversity conservation in the region, particularly for threatened fauna. The major potential vegetation corridors (or ‘macro corridors’) in the planning area are (i) the Coastal Corridor, which consists of three parts including links from Forest to Two Peoples Bay Nature Reserve and Two Peoples Bay Nature Reserve to Fitzgerald River National Park, (ii) Hassell National Park Corridor, (iii) Kalgan River (*Kalkanap*) Corridor, (iv) Marbellup Link, and (v) Pallinup River Corridor (Wilkins *et al.* 2006). The project has mapped vegetation to assess regional scale linkages between major areas of native vegetation and examined the potential to improve this network of corridors for dispersal, re-colonisation and gene flow between populations. Conservation measures off-reserve (below), as well as proposed conservation reserves (Section 14 *Biogeography*, Appendix 2), will contribute to the protection and enhancement of these corridors.

Several incentive programs operate in WA to help people protect and manage remnant vegetation on private property (Government of Western Australia 2009). Many properties in the planning area are covered by covenant and voluntary management schemes such as the department’s [nature conservation covenant](#) and [Land for Wildlife](#) scheme, and covenants with the [Department of Primary Industries and Regional Development](#) (DPIRD) and National Trust [WA]. Properties under covenant schemes enhance biodiversity conservation across the planning area (through habitat provision and connection), and also receive support and advice.

Broad-scale revegetation across the landscape using perennial species can also create new habitat, increase remnant size and help link or connect remnant vegetation (Section 16 *Native animals and habitats*). Creating new habitat can benefit animal populations by improving dispersal and movement between remnants (by providing increased cover from predators) and helping to restore ecosystem function (for example, achieve a

hydrological balance) to protect remnants from external impacts. Increasing remnant size (thereby buffering and shifting edge effects out of the remnant) can be achieved by fencing remnant bushland and planting around remnants. Commercial hardwood plantations that have been/are being planted in the Albany hinterland (Section 13 *Hydrology*), together with local landholder and landcare revegetation, provide habitat ‘stepping stones’ and buffer adjacent conservation reserves, in addition to a range of other benefits.

Maintaining biodiversity and natural values requires recognition and support for private landowners and other managers to protect the conservation values on the land they manage, and in many cases partnerships between private landowners, government and other agencies are essential for the long-term protection of WA's unique natural values.

Liaison and partnerships

Management objectives for this plan cannot be achieved in isolation as various land tenures (for example, private property, City of Albany reserves, UCL and other Crown reserves) adjoin department-managed lands. Invasive species, catchment management, threatened species and fire management issues need to be approached from a broader, integrated land management perspective to achieve management objectives. Managers and owners of nearby land are encouraged to manage their land in a way that is sympathetic with, and complementary to, management of the planning area, such as low grazing pressures, native pastures, leaving dead trees and fallen timber, reduced fertiliser use, maintenance of paddock trees, and preservation of creeks and wetlands (Dunlop and Brown 2008). Ongoing liaison with neighbours, local communities and agencies will be required to facilitate the effective, coordinated management of cross boundary issues and to 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.

Many threatened fauna (such as the chuditch, *djimaalap* [noisy scrub-bird] and *carratch* [forest red-tailed black cockatoo]) are highly mobile and often travel across tenures (often occur outside of department-managed lands) in search of food, shelter or social interaction. Liaison with landholders will be important in implementing recovery actions for these species, particularly in increasing awareness about threatened species and their conservation and providing information on actions that landholders can undertake to help in their recovery.

As well as neighbouring landholders, the department liaises with several levels of government. The department liaises with the relevant Australian Government department responsible for migratory species and threatened plants and animals listed under the EPBC Act. Several State Government agencies have responsibilities for, or provide advice on, land use practices near the planning area such as declared invasive species (DPIRD) and water resources (DWER). Liaison with the City of Albany and the shires of Jerramungup and Plantagenet is particularly important given:

- many reserves are vested with and managed by LGAs, many of which are next to or near lands managed by the department
- LGAs broadly represent the views of local communities within their constituencies
- LGAs are able to encourage planning and land management practices that complement management of the reserves through a range of planning instruments (for example, town planning schemes and local planning strategies)
- 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
- LGAs share responsibilities in the provision and maintenance of the public road network.

[South Coast NRM](#) help deliver, in partnership with state governments, local shires, Indigenous groups, industry bodies, land managers, farmers, landcare groups and communities, the Australian Government’s [National Landcare Programme](#), which contributes significantly towards the management of the planning area. The department also liaises with a range of community organisations, universities and volunteer groups. Implementation of the Gilbert’s Potoroo Recovery Plan involves (or has involved) collaborative arrangements with South Coast NRM, universities (Murdoch, Edith Cowan, University of WA and Adelaide universities), the Royal Zoological Society of South Australia, the Foundation for Australia’s Most Endangered Species (FAME), private sponsors and the Albany-based Gilbert’s Potoroo Action Group to implement conservation actions.

The department may enter into a memorandum of understanding (MOU) 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.

Management objective

To establish and maintain good working relationships with neighbours and partners.

Management actions

1. Liaise with, encourage and engage neighbouring landowners and managers, LGAs, relevant agencies, conservation groups and other stakeholders to facilitate off-reserve conservation and the effective, coordinated management of cross-boundary issues consistent with the department's *Corporate Policy Statement No. 65: Good Neighbour Policy*.
2. Work with relevant neighbours and land managers to protect and conserve wider catchment values.
3. Develop a MOU with the Water Corporation for the management of biodiversity within the Angove Water Catchment.
4. Use the *South Coast Macro Corridor* connectivity information and Biodiversity Prioritisation Framework in consultation with stakeholders in the delivery of covenant and voluntary management schemes, the provision of advice to the community, management programs, and/or land acquisition for the conservation reserve system.



Managing economic and resource values

Strategic objective

A key strategic objective of this plan is to *provide for sustainable resource use* (Section 4 *Management direction*).

27. Mineral and petroleum exploration and development

Minerals and petroleum

Parks and reserves within the planning area, as well as several proposed reserves, have known mineral deposits and widespread potential³⁹ for a range of minerals including iron ore, spongolite, titanium-zircon sands, base metals, gold and limestone, and have been (and continue to be) subject to mineral exploration and development. While there are three live tenements⁴⁰ across reserves within the planning area for exploration by Cable Sands (WA) Pty Ltd over part of Hassell National Park and Grange Resources Ltd over Ledge Point/Cape Riche and Mount Gibson Mining Limited over Cheyne Bay, the number and the status of tenements will change with time⁴¹. The Commission's [Position Statement No. 3 Mining in lands vested in the Conservation Commission of Western Australia](#) provides guidance on mining activities.

Mining in WA is administered under the *Mining Act 1978* (Mining Act) by DMIRS. Under section 24 of the Mining Act, mining proposals and activities in reserves require the consent of the Minister for Mines and the recommendations or concurrence (depending on the type of reserve) of the Minister responsible for the reserve (currently the Minister for Environment). Access to reserves for petroleum exploration and development requires the recommendations of the Minister for Environment under section 15A of the *Petroleum and Geothermal Energy Resources Act 1967*. The department provides the administrative support to the Minister for Environment relative to the Minister's statutory functions under the Mining Act and *Petroleum Act 1936*.

Under section 38 of the *Environmental Protection Act 1986*, exploration and development proposals that may cause significant impact on and risks to key values will be referred to DWER for assessment. Developments that may have a significant impact on matters of national significance may also be referred to the Australian Government Minister for the Environment (or equivalent) for assessment under the EPBC Act.

Basic raw materials

Basic raw materials (BRM) including gravel, sand and limestone 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. This may occur for activities such as building and maintenance of roads and recreational sites and walk trails. Proposals for BRM extraction within the planning area should be consistent with the Commission's [Position Statement No. 12 Basic Raw Materials: state government and local government access to lands vested in the Conservation Commission under the Conservation and Land Management Act 1984](#).

³⁹ See DMIRS's [GeoVIEW.WA](#) online database.

⁴⁰ Under the *Mining Act 1978*, a tenement is a prospecting licence, exploration licence, retention licence, mining lease, general purpose lease or a miscellaneous licence granted or acquired under this Act or by virtue of the repealed Act.

⁴¹ See DMIRS's [GeoVIEW.WA](#) online database.

Contaminated sites

Several sites in the planning area have been listed as [contaminated sites](#) under the *Contaminated Sites Act 2003*, subject to Contaminated Sites Regulations 2006, including:

- yard fuel spill (Torndirrup National Park)
- Little/Big Grove rubbish tip (Torndirrup National Park) – which was closed years ago
- Eclipse Island Lighthouse Buildings – asbestos from asbestos sheeting.

Management objective

To minimise impacts of mineral and petroleum exploration and development, including basic raw material extraction and development activities, on the key values.

Management actions

1. Review and advise Government (including the Commission or equivalent statutory body) on the effect of resource development proposals on the conservation values and integrity of the conservation reserve system relative to the planning area.
2. Refer or recommend referral of exploration or development proposals with the potential to impact significantly on the values of the planning area to DWER for consideration of assessment under the *Environmental Protection Act 1986*.
3. Make exploration or development proponents aware 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.
4. 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.
5. 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, be identified, and suitably address, mitigate and offset the impacts of approved developments and activities during project implementation as appropriate.
6. Within available resources, opportunistically monitor and report to the Commission and relevant government regulatory departments on environmental performance and compliance with regulatory requirements during the implementation of approved developments and activities.
7. Ensure that all areas in which mining activity occurs and other degraded or disturbed areas (including contaminated sites) are rehabilitated according to the approval conditions of the proposal as well as departmental rehabilitation standards and guidelines.
8. Rehabilitate disused gravel pits in accordance with departmental guidelines.
9. Ensure that all mineral and petroleum operations and basic raw material extraction adhere to departmental and Commission policies, position statements and disease hygiene practices.

28. Water resources

Groundwater makes up the bulk (about 80 per cent) of the *Lower Great Southern Towns' Water Supply Scheme*, which provides drinking water to Albany, Kendenup, Mount Barker, Narrikup and Porongurup (DoW 2010). The Albany Groundwater Area is the only major supply of fresh groundwater in the region, and while most private wells draw from the unconfined Tamala Limestone aquifer, public water supply wells draw from both the unconfined Tamala Limestone aquifer and confined Werillup Formation aquifers (Section 13 *Hydrology*). Within the Albany Groundwater Area, several production and monitoring bores are located within Torndirrup National Park (WRC 2001). Alternative drinking water supplies in the region are scarce, although there is potential for non-potable groundwater sources (DoW 2010).

The responsibility for the regulation, protection and management of water resources in the planning area 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*⁴². These areas, referred to as public drinking water source areas (PDWSA), may have constraints placed on land use, development, public access and land/water-based activities. Three PDWSAs occur in the planning area: Marbellup Brook Catchment Area, South Coast Water Reserve and Limeburners Creek Catchment. Drinking Water Source Protection Reports (DWSPR) establish the level of protection needed within PDWSAs, and all three of these have DWSPRs (WRC 2001, DoW

⁴² Water resources management legislation in WA is under review and may change during the life of this plan (see www.water.wa.gov.au/legislation/water/water-resource-management-legislation).

2007). Conservation reserves within these PDWSAs (Down Road and Marbellup nature reserves in the case of Marbellup Brook Catchment Area, and part Torndirrup National Park in the case of South Coast Water Reserve and Limeburners Creek Catchment) have Priority 1 protection. Guidance on the type of land uses appropriate within these priority areas is provided by DWER's Operational Policy 13 – *Recreation within public drinking water source areas on Crown land* (DoW 2012), Water Quality Protection Note No. 25: *Land Use compatibility tables for public drinking water source areas* (DoW 2016) and DWSPRs. 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 Albany groundwater area and Marbellup Brook Water Reserve are proclaimed areas under the *Rights in Water and Irrigation Act 1914* and a licence may be required to take water and construct a bore in these areas.

DWER and the Water Corporation need access to public drinking water source areas to conduct investigations into alternate water supplies, for surveillance and enforcement, asset maintenance and water monitoring. The department uses watering points and rainwater tanks in various places across the planning area for fire control and other purposes, and these will continue to be maintained.

Management objective

To minimise the impacts of water resource use on key values.

Management actions

1. Manage PDWSAs in the planning area to promote the conservation of water (quantity and quality), including liaising with DWER to ensure that recreation and other land uses are in accordance with DWSPRs and other relevant policy/guidance.
2. Assess, and where appropriate comment on, the impact of proposals for use of water resources (including Water Removal Permits under the CALM Act), refer proposals likely to have a significant impact on the environment to the relevant State/Commonwealth authority for formal assessment, and provide conditional approvals as appropriate.
3. Liaise with DWER and other relevant stakeholders and where appropriate monitor water resource use to ensure development proposals and subsequent establishment, operation and maintenance are in accordance with conditions of approval.
4. Maintain water supply within the planning area for rangers, fire management and recreational use, as needed.

29. Use of plants and animals

Wildflowers

Commercial flora harvesting includes the taking of seed, leaves, nuts, fruit and flowers, and while all native flora in WA is protected, licences can be obtained from the department under the Wildlife Conservation Act to pick wildflowers or other flora (except declared rare flora, for which a special Ministerial permit is needed) on Crown lands or taken from private property for sale:

- commercial purposes licence – which allows the taking of protected flora from Crown land
- commercial production licence – which allows the sale of protected flora taken on private land
- scientific or prescribed purposes licence – which is issued to people intending to take native plants, but not to sell them.

The department's [Corporate Policy Statement No. 37: *Management of wildlife utilisation*](#) provides guidance for the commercial harvesting of protected flora. The commercial picking of wildflowers is allowed on timber reserves, but not on national parks or nature reserves. Issues relating to wildflower picking include the introduction and spread of *Phytophthora Dieback*, unsustainable levels of harvest, and reduction in genetic diversity through depletion of seed stock. Close management and monitoring is important to regulate the industry while minimising environmental impacts.

Forest produce and firewood

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 works⁴³, and (iii) the taking or removal of exotic trees (for example, Pinus and eastern states eucalypt species trial plots), honey, beeswax or pollen (by apiary site permit). Under section 33(1)(cb) of the CALM Act, forest produce⁴⁴ obtained through the carrying out of necessary operations⁴⁵ (on nature reserves) or compatible operations⁴⁶ (on national parks or conservation parks) 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.

Firewood collection on Crown land is only allowed under a *Commercial Purposes Licence* (under the Wildlife Conservation Act) with the manager's permission, or from gazetted 'public firewood areas' in State forest and timber reserves. In the South Coast Region, [firewood collection](#) is not allowed on conservation reserves, and is only allowed from State forest and timber reserves under the conditions of a fee payable permit issued by the department. The department sets no restrictions on the collection of firewood from private property, provided the firewood is not sold. Collection of firewood is not allowed on days when a total fire ban is in place or when there is a forecast fire danger rating of 'very high' or greater because of the potential of fires starting from chainsaws.

Beekeeping

In 1834 the first bees imported into WA were landed at Albany (Hassell 1918), and since then beekeeping has flourished into a small but significant industry in WA. Apiarists are increasingly dependent on lands managed by the department, with almost half of all apiary sites on Crown land occurring on conservation reserves. However, honey bees may pose a risk to visitors and affect natural values (competition for tree hollows, competition for floral resources such as pollen and nectar, and seed set of native and introduced plant species). The department's *Corporate Policy Statement No. 41: Beekeeping on Crown land* provides general guidance for the management of beekeeping on Crown land including conservation reserves.

There are nine apiary sites within the planning area: two sites within nature reserves (Mettler Lake Nature Reserve 26894 and Pallinup Nature Reserve 28687), and seven sites within proposed reserves (Table 1). The department assesses whether access for beekeeping is either retained at the current level, increased, decreased or phased out using environmental and management criteria, including previous historic apiary use. Any proposed renewal, transference, cancellation, relocation or addition of apiary sites will be subject to an apiary assessment of the suitability for beekeeping.

Table 1. Apiary sites within the planning area.

Reserve (number)	Apiary site number	Apiary site status
Mettler Lake Nature Reserve (26894)	4577	current
Pallinup Nature Reserve (28687)	4107	not-to-be-reissued
14987 ¹	5586	vacant
31240 ¹	5570	vacant
	6003	vacant
	6004	vacant
43087 ¹	5754	vacant
	5755	not-to-be-reissued
	6002	vacant

¹ = proposed reserve (Appendix 2).

⁴³ Section 99A(2) of the CALM Act defines essential works as including works that are needed to establish or re-establish access to land or to provide fire containment lines.

⁴⁴ 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.

⁴⁵ Within the meaning in section 33A(1) of the CALM Act, activities conducted by the department that are necessary for the preservation or protection of persons, property, land, waters, flora or fauna, or for the preparation of a management plan.

⁴⁶ Within the meaning in section 33A(2) of the CALM Act, activities conducted by the department that are approved by the Minister for Environment as being compatible with the purposes for which the park or management area is managed under the CALM Act.

Commercial fishing

DPIRD manages [commercial fishing](#). However, the department has responsibility for the conservation and protection of wildlife under the Wildlife Conservation Act, and can manage access by fishers on lands and waters managed by the department including for parking or transporting their vehicles, boats, fishing gear or produce. However, there may be conflict at times between fishers and other visitors, for example at the small boat launching area in Two Peoples Bay Nature Reserve, and the development and implementation of special arrangements in such cases will minimise conflict and maintain safety. The department's [Corporate Policy Statement No. 39: Access for commercial fishing](#) provides guidance on this activity.

Native animals

Under the CALM Act, the department is responsible for the regulation of commercial gain associated with protected fauna in WA on all private property and Crown lands. For the management of native fauna for commercial gain (such as western grey kangaroos and emus), the Wildlife Conservation Act stipulates a comprehensive system of licensing. The department administers the taking, farming, killing, processing, transport and sale of fauna in accordance with [appropriate licences](#). These licences allow for the taking of all but Declared Rare Fauna (for which a special permit is needed). Damage licences are issued for designated species of native fauna on a non-commercial basis (Section 19 *Introduced and other problem animals*).

Management objective

To minimise the impacts of the use of plants and animals on key values.

Management actions

1. Manage the taking and public or commercial use of plants and animals in accordance with relevant legislation, policies and guidelines.
2. Liaise with key stakeholders and relevant community groups to ensure the most efficient use of resources/sites and minimal impact upon department-managed lands and other land users.
3. Monitor operations to ensure compliance with licensing conditions, and where necessary make recommendations on management according to impact on natural values.
4. Allow the taking or removal of forest produce, with conditions if necessary, in accordance with a licence issued by the Director General for:
 - a. removal of exotic plants
 - b. removal for therapeutic, scientific or horticultural purposes
 - c. essential works
 - d. salvage from areas used for mining activities.
5. Manage apiary sites and beekeeping on department-managed lands in accordance with department policy and guidelines, and by:
 - a. considering the maintenance, renewal, transference or cancellation of existing apiary sites, subject to an apiary assessment of the suitability of existing individual sites for beekeeping undertaken before sites are renewed or considered for re-occupation
 - b. considering requests for new sites or relocation of sites, subject to an apiary assessment of the suitability of reserves for beekeeping.

30. Utilities and services

The location of utilities is sometimes requested on or through conservation reserves so that electricity, gas, telephone and radio communications, fibre optic cable, water, rail and other services can be provided to surrounding or nearby communities. The construction and maintenance of these sites/corridors, as with access routes, can result in soil erosion, introduction or spread of weeds and disease, reduced scenic quality, direct impacts on significant plant and animal species, and issues for managing visitor access.

There are five leases in the planning area (Table 2).

Transmission lines, Telstra service lines and water pipelines traverse numerous parts of the planning area, including the Mount Barker–Albany 132kV powerline that passes through Down Road Nature Reserve. Utility providers need permission from the District Manager for access and the conditions of entry and operation for the maintenance of infrastructure (including during emergencies).

Table 2. Leases within the planning area.

Lease number	Purpose	Location
2282	Silent Sentry Safety Devices (Nathan Drew Memorial Trust)	Torndirrup National Park (Salmon Holes, The Gap, Natural Bridge, Blowholes, Cave Point and Cable Beach)
2338/100	Marine aid to navigation (Australian Maritime Safety Authority)	Eclipse Island
2339/100	Marine aid to navigation (Australian Maritime Safety Authority)	Eclipse Island
2395/100	Lighthouse/local user terminal (Australian Maritime Safety Authority)	Torndirrup National Park (Cave Point)
2406/100	Radio communications (WA Police)	Eclipse Island

Management objective

To minimise the impact of utilities and services on key values.

Management actions

1. Recommend any new utilities or services be located within existing utility corridors and/or off conservation reserves.
2. Liaise with providers to ensure that the operation and maintenance of utility and services are in accordance with departmental lease conditions including:
 - a. the responsible management of environmental issues, particularly bushfire prevention and the introduction and/or spread of weeds, problem animals and disease (particularly *Phytophthora Dieback*)
 - b. the removal of infrastructure (except if the department considers it to have cultural heritage value) and rehabilitation of land, if utilities and services are no longer required.
3. Where necessary, amend utility corridors to fit actual alignment of utilities, or excise land containing utility and service infrastructure and reserve these areas as CALM Act section 5(1)(h) reserves, or vest in another appropriate authority.



Strategic objective

A key strategic objective of this plan is *to improve the knowledge, understanding and appreciation of key values, aid performance assessment and provide a scientific basis for improving and adapting future management to achieve best practices* (Section 4 Management direction).

31. Research and monitoring requirements

Research and monitoring are essential components of management, and are required to successfully implement this management plan. They can lead to a better understanding of the values and pressures of the planning area, increase knowledge, 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. Surveys or inventories identify the resources and assets, and research develops an understanding of the processes affecting them. The monitoring and evaluation of management actions against research results provides for the gradual improvement of management practices. Survey, research and monitoring are all linked and should be integrated.

Management should use up-to-date and sound knowledge to develop practices aimed at meeting specific management objectives. Ongoing monitoring, regular evaluation of management practices and outcomes, and research are critical to assess management effectiveness and allow for adaptive management so that management in the region can continuously improve.

Research and monitoring projects should give priority to areas where:

- the quality of base data is the poorest
- understanding of the effect of management actions is poorest
- there have been unanticipated changes in factors affecting the parks and reserves, such as access or adjacent land uses
- the rates of resource or social change are the highest.

The planning area is, and will continue to be, an important focus for ecological research given the presence of many threatened animals such as Gilbert's potoroo and ground-dwelling birds, and the extent and impact of threatening processes. Long term ecological research in Two Peoples Bay Nature Reserve during the past 50 years provides important background and baseline information for continuing research (CALM 1995a). A research facility in this reserve provides scientists with the opportunity to monitor and undertake valuable research on threatened fauna and other natural values and pressures in the area.

Broad direction for research and monitoring in the planning area is provided by the department's [Science and conservation strategic plan and research activity reports](#), McKenzie *et al.* (2003), Gilfillan *et al.* (2009), Barrett *et al.* (2009) and recovery plans, wildlife management plans and recovery teams. Major projects in the area that may continue through the life of this plan include:

- biological values
 - a. research and recovery actions for Gilbert's potoroo, dibbler, chuditch, south coast threatened birds and critically endangered flora
 - b. the adequacy of ecological and genetic resources for the persistence of species and communities
 - c. ecological water requirements for groundwater dependant ecosystems to determine threshold parameters for maintaining a suitable condition
 - d. inventory surveys of identified areas
 - e. where appropriate, identifying and establishing baseline data to monitor impact of climate change

- invasive species
 - a. the distribution and impact of invasive species, particularly cats and foxes, and landscape interactions with native animals
 - b. post fire impacts of invasive species and predation (for example, rabbits, foxes, weeds, among others)
- disease
 - a. a comparison of plant canker disease impact and climatic variables in Proteaceae on the south coast of WA and evaluation of selected fungicides as a management tool for canker control in the Declared Rare Flora Albany banksia and round-leaf honeysuckle (*Lambertia orbifolia*)
 - b. monitoring of the effectiveness of phosphite application techniques in *Phytophthora Dieback* infestations in national parks of the south coast of WA
- fire (Section 21 *Fire*, Barrett *et al.* 2009)
- cultural heritage – archaeological and ethnological surveys of Noongar and other cultural heritage
- recreation and tourism – social research to increase current knowledge of profiles of visitors, the level of use of recreation sites, patterns of usage and visitor perceptions for future management
- successful rehabilitation techniques.

Management objective

To increase the understanding of natural, cultural and socio-economic values and provide a basis for implementing, assessing, adapting and improving management.

Management actions

1. Develop and implement an integrated program of survey, research and monitoring, consistent with department policies, guidelines, resources and priorities, that facilitates management (with a focus on key values and pressures), establishes baseline information, and meets key performance indicators.
2. Assess, collate and incorporate research and monitoring findings into operational management, performance assessment against the objectives of the management plan, and interpretive and/or educational material, and adapt future management where appropriate.
3. Encourage and support volunteers, educational institutions and other organisations where their research and monitoring contributes directly to department strategies or the implementation and assessment of this management plan.
4. Ensure relevant information gained through survey, research, monitoring and experience is appropriately stored (through libraries and databases), made available to the region and districts, and updated.
5. Ensure research proposals are assessed and specify conditions under which work may be carried out, adverse impacts on key values are minimised, and results are to be disseminated.
6. Support, facilitate and encourage more research and surveys, and liaise and work with industry users to increase knowledge of key values.
7. Undertake social research and monitoring where appropriate, consistent with the department’s social research program, including numbers of visitors, recreational usage, and visitor impacts, expectations, perceptions and preferences of facilities and management activities.
8. Develop an adaptive biodiversity monitoring framework, including establishing a monitoring program and database.



Volunteers and staff collecting seed from the critically endangered Albany or granite banksia (*Banksia verticillata*) in Torndirrup National Park following a November 2015 bushfire. Photo – Sarah Barrett/DBCA



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 www.dpaw.wa.gov.au/about-us/36-policies-and-legislation and www.conservation.wa.gov.au/position-statements.aspx.

- Abbott, I. (1978a) Breaksea Island, King George Sound, Western Australia. Seabird islands, No. 55. *Corella*, **2(2)**: 24-25.
- Abbott, I. (1978b) Michaelmas Island, King George Sound, Western Australia. Seabird islands, No. 56. *Corella*, **2(2)**: 26-27.
- Abbott, I. (1981) Vegetation maps of four large islands near Albany, Western Australia. *Western Australian Herbarium Research Notes*, **5**: 5-18.
- Abbott, I. (1983) Aboriginal names for plant species in south-western Australia. Technical Paper No. 5. Forests Department of Western Australia. 28p.
- Abbott, I. (1996) Lewin's rail. *Landscape*, **11(4)**: 7.
- Abbott, I. (2001) Aboriginal names of mammal species in south-west Western Australia. *CALMScience*, **3(4)**: 433-486.
- Abbott, I. (2003) Aboriginal fire regimes in south-west Western Australia: evidence from historical documents. In Abbott, I. and Burrows, N. (ed.) *Fire in ecosystems of the south-west of Western Australia: impacts and management*. Backhuys Publishers, Leiden: 119-146.
- Abbott, I. (2006) The islands of Western Australia: changes over time in human use. *Early days*, **12(6)**: 635-653.
- Abbott, I. (2008) Historical perspectives of the ecology of some conspicuous vertebrate species in south-west Western Australia. *Conservation Science Western Australia*, **6(3)**: 1-214.
- Abbott, I. (2009) Aboriginal names of bird species in south-west Western Australia, with suggestions for their adoption into common usage. *Conservation Science W. Aust.*, **7(2)**: 213-278.
- Aplin, K. and Kirkpatrick, P. (2001) In pursuit of the frog fungus. *Landscape*, **16(3)**: 10-16.
- Armstrong, P. (1985) Charles Darwin in Western Australia: a young scientist's perception of an environment. University of Western Australia Press, Nedlands, Western Australia. Available from test.darwin-online.org.uk/converted/Ancillary/1985_Armstrong_WesternAustralia_A587/1985_Armstrong_WesternAustralia_A587.html.
- Armstrong, P. (2015) Charles Darwin's Indian Ocean experience. *Journal of the Royal Society of Western Australia*, **98(1)**: 1-8.
- Austen, J.M., Jefferies, R., Friend, J.A., Ryan, U., Adams, P. and Reid, S.A. (2009) Morphological and molecular characterization of *Trypanosoma copemani* n.sp. (*Trypanosomatidae*) isolated from Gilbert's potoroo (*Potorous gilbertii*) and quokka (*Setonix brachyurus*). *Parasitology*, **136**: 783-792.
- Bamford, M., Watkins, D., Bancroft, W., Tischler, G. and Wahl, J. (2008) Migratory shorebirds of the East Asian-Australasian Flyway: population estimates and internationally important sites. Wetlands International.

Available from www.environment.gov.au/system/files/resources/782eb5-6bdd-4a41-9759-b60273b52021/files/shorebirds-east-asia.pdf.

Barrett, S., Comer, S., McQuoid, N., Porter, M., Tiller, C. and Utber, D. (2009) *Identification and Conservation of Fire Sensitive Ecosystems and Species of the South Coast Natural Resources Management Region*. Department of Conservation and Land Management, South Coast Region, WA.

Bates, D. (1938) *The Passing of the Aborigines: A lifetime spent among the natives of Australia*. John Murray, London.

Bates, D. (1985) *The Native Tribes of Western Australia*. I. White (Ed.). National Library of Australia, Canberra.

Beard, J.S. (1972) *The vegetation of the Newdegate and Bremer Bay areas, Western Australia*. Map and Explanatory Memoir, 1:250,000 Series. Vegetation Survey of Western Australia.

Beard, J.S. (1979) *The vegetation of the Albany and Mt. Barker Areas, Western Australia*. Map and Explanatory Memoir, 1:250,000 Series. Vegetation Survey of Western Australia.

Beard, J.S. (1980) A new phytogeographic map of Western Australia. *Western Australia Herbarium Research Notes* 3: 37-58.

Beard, J.S., Beeston, G.R., Harvey, J.M., Hopkins, A.J.M. and Shepherd, D.P. (2013) The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition. *Conservation Science W. Aust.*, **9(1)**: 1-152.

Beard, J.S., Chapman, A.R. and Gioia, P. (2000) Species richness and endemism in the West Australian flora. *Journal of Biogeography*, **27(6)**: 1257-1268.

Botero, A., Thompson, C.K., Peacock, C.S., Clode, P.L., Nicholls, P.K., Wayne, A.F., Lymbery, A.J. and Thompson, R.C.A. (2013) Trypanosomes genetic diversity, polyparasitism and the population decline of the critically endangered Australian marsupial, the brush tailed bettong or woylie (*Bettongia penicillata*). *International Journal for Parasitology: Parasites and Wildlife*, **2**: 77-89.

Burbidge, A.A. and McKenzie, N.L. (1989) Patterns in the modern decline of Western Australia's vertebrate fauna: causes and conservation implications. *Biological Conservation*, **50**: 143-198.

Burrows, N.D. (2008) Linking fire ecology and fire management in south-west Australian forest landscapes. *Forest Ecology and Management*, **255**: 2394-2406.

Burrows, N. and Wardell-Johnson, G. (2003) Fire and plant interactions in forested ecosystems of southwest Western Australia. In Abbott, I. and Burrows, N. (ed.) *Fire in ecosystems of the south-west of Western Australia: impacts and management*. Backhuys Publishers, Leiden: 225-268.

Cale, D.J., Halse, S.A. and Walker, C.D. (2004) Wetland monitoring in the Wheatbelt of south-west Western Australia: site descriptions, waterbird, aquatic invertebrate and groundwater data. *Conservation Science Western Australia*, **5(1)**: 20-135.

CALM (1992a) *South Coast Region Regional Management Plan*. Department of Conservation and Land Management. Available from www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/south_coast.pdf.

CALM (1994a) *Reading the Remote. Landscape Characters of Western Australia*. Department of Conservation and Land Management, Perth, Western Australia.

CALM (1994b) Belting West Cape Howe. *Landscape*, **9(4)**: 6.

CALM (1995a) *Two Peoples Bay Nature Reserve Management Plan 1995–2005*. Department of Conservation and Land Management, Kensington. Available from www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/two_peoples_bay.pdf.

- CALM (1995b) *West Cape Howe National Park Management Plan 1995–2005*. Department of Conservation and Land Management, Kensington. Available from www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/west_cape_howe.pdf.
- Clark, R.N. and Stankey, G.H. (1979) *The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research*. General Technical Report PNW-98 December 1979. Pacific Northwest Forest and Range Experiment Station. U.S. Department of Agriculture, Forest Service.
- Clarke, A.G., Lane, J.A.K. and Jaensch, R.P. (2011) *Surveys of waterbirds in selected wetlands of south-western Australia in spring-summer 2009-10, with further assessment of changes in habitat and waterbird usage over 2-3 decades*. Report for WA Department of Environment and Conservation.
- Clews, M. (1999) Balancing act: reducing visitor risk without spoiling the fun. *Landscape*, **15**(2): 23-27.
- Cochrane, A. (2009) Two Peoples Bay Nature Reserve. *Landscape*, **24**(3): 32-38.
- Cochrane, A., Barrett, S., Crane, C., Dunne, C., Hartley, R. and Freebury, G. (2011) Last chance to see: banksia of the south coast of Western Australia. *Landscape*, **26**(4): 17-22.
- Cochrane, A., Comer, S., Collins, P., Pridham, J. and Tiller, C. (2010) Michaelmas Island, King George Sound. *Landscape*, **26**(2): 59-61.
- Comer, S. and Burbidge, A. (2006) Manypeaks: rising from the ashes. *Landscape*, **22**(1): 51-55.
- Commonwealth of Australia (2010a) *Australia's Biodiversity Conservation Strategy 2010-2030*. Natural Resource Management Ministerial Council, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from www.environment.gov.au/biodiversity/publications/australias-biodiversity-conservation-strategy.
- Commonwealth of Australia (2010b) *Australia's Strategy for the National Reserve System 2009-2030*. Environment Australia, Canberra. Available from www.environment.gov.au/land/nrs/publications/strategy-national-reserve-system.
- Conservation Commission (2009) *Status performance assessment: Biodiversity conservation on Western Australian islands, Phase 1*. Conservation Commission of Western Australia, Perth. Available from www.conservation.wa.gov.au/media/8611/islands%20spa%20-%20may%2013th%202009%20-%20final.pdf.
- Conservation Commission (2010) *Albany parks performance assessment*. Conservation Reserve Management Plan Performance Assessment CRMPPA 01/10. Conservation Commission of Western Australia, Perth. Available from www.conservation.wa.gov.au/media/8974/albany%20parks%20performance%20assessment%20report%209th%20august_final.pdf.
- Conservation Commission (2012) *Performance assessment policy: Guidelines for assessing the management of conservation reserves, forest management plans and biodiversity in WA*. Conservation Commission of Western Australia, Perth. Available from www.conservation.wa.gov.au/performance-assessments/performance-assessments.aspx.
- Conservation Commission (2013) *Forest Management Plan 2014-2023*. Conservation Commission of Western Australia. Available from www.conservation.wa.gov.au/management-planning/management-plans/forest-management-plan-2014-2023.aspx.
- Cook, B.A., Janicke, G. and Maughan, J. (2008) *Ecological values of waterways in the South Coast Region, Western Australia*. Report No CENRM079, Centre of Excellence in Natural Resource Management, University of Western Australia. Report prepared for the Department of Water. Available from www.rivercare.southcoastwa.org.au/activities/ecolvals/ecological.html.
- Copp, I. (2001) *Geology and landforms of the South-west*. Bush book. Department of Conservation and Land Management, Kensington, Western Australia.

- Courtenay, J. and Friend, T. (2004) *Gilbert's potoroo (Potorous gilbertii) recovery plan*. Western Australian Wildlife Management Program No. 32. Department of Conservation and Land Management. Available from www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/197-approved-recovery-plans.
- Cowling, R.M., Witkowski, E.T.F., Milewski, A.V. and Newbey, K.R. (1994) Taxonomic, edaphic and biological aspects of narrow plant endemism on matched sites in mediterranean South Africa and Australia. *Journal of Biogeography*, **21**: 651-664.
- Crane, C. and Burgess, T.I. (2013) *Luteocirrhus shearii* gen. sp. nov. (*Diaporthales, Cryphonectriaceae*) pathogenic to *Proteaceae* in the South Western Australian Floristic Region. *IMA Fungus* **4**(1): 111-121.
- DAA (2013) *Aboriginal Heritage Due Diligence Guidelines*. Department of Aboriginal Affairs and Department of the Premier and Cabinet. 26pp. Available from www.daa.wa.gov.au/heritage/land-use.
- DEC (2008) *Code of practice for fire management*. Department of Environment and Conservation. Available from www.dpaw.wa.gov.au/management/fire.
- DoW (2007) *Marbellup Brook Catchment Area Drinking Water Source Protection Plan*. Department of Water, Water Resource Protection Series report no. 67. Available from www.water.wa.gov.au/urban-water/drinking-water/drinking-water-source-protection-reports.
- DoW (2010a) *The effects of climate change on streamflow in south-west Western Australia – projections for 2050*. Surface water hydrology series report no. HY34, Government of Western Australia, Perth. Available from www.water.wa.gov.au/data/assets/pdf_file/0004/1759/95412.pdf.
- DoW (2010b) *Lower Great Southern Water Resource Development Strategy*. Department of Water, Perth, Western Australia. Available from www.water.wa.gov.au/data/assets/pdf_file/0011/5051/93588.pdf.
- DoW (2012) *Operational Policy No. 13: Recreation within public drinking water source areas on Crown land*. Department of Water, Perth. Available from www.water.wa.gov.au/urban-water/drinking-water.
- DoW (2014) *Great Southern Regional Water Supply Strategy: A long-term outlook of water demand and supply*. Report no. 2, regional water supply strategy series. Department of Water, Western Australia.
- DoW (2016) *Land use compatibility tables for public drinking water source areas*. Water Quality Protection Note No. 25. Department of Water, Western Australia. Available from www.water.wa.gov.au/data/assets/pdf_file/0014/1733/12441.pdf.
- Dunlop, M. and Brown, P.R. (2008) *Implications of climate change for Australia's National Reserve System: A preliminary assessment*. CSIRO Sustainable Ecosystems, report to the Department of Climate Change and the Department of Environment, Water, Heritage and the Arts, Canberra. Available from www.environment.gov.au/climate-change/adaptation/publications/national-reserve-system.
- EPA (2008) *Environmental guidance for planning and development*. Guidance Statement No. 33. Environmental Protection Authority, Western Australia. Available from www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/GS33-270508.pdf.
- Fitzsimons, I.C.W. and Buchan, C. (2005) Geology of the western Albany–Fraser Orogen, Western Australia — a field guide. *Western Australia Geological Survey*, Record 2005/11, 32p.
- Framenau, V.W., Moir, M.L. and Harvey, M.S. (2008) Terrestrial invertebrates of the South Coast NRM region of Western Australia: short-range endemics in Gondwanan relictual habitats. Western Australian Museum.
- Friend, J.A. (2011) *Is Gilbert's potoroo still the world's rarest marsupial?* Newsletter of the Australian Mammal Society. P.63.
- Friend, T., Hill, S. and Button, T. (2005) Bald Island getaway for Gilbert's potoroos. *Landscape*, **21**(1): 48-54.
- Garnett, S. (1992) *The action plan for Australian birds*. Australian National Parks and Wildlife Service, Canberra.

- Gibbs, M. (2010) *The shore whalers of Western Australia: Historical archaeology of a maritime frontier*. Studies in Australasian Historical Archaeology 2. Sydney University Press in association with Australasian Society for Historical Archaeology. University of Sydney, N.S.W.
- Gilfillan, S. (2002) *South Coast Invertebrate Refugia Project*. Report to the Department of Conservation and Land Management, South Coast Region. 100p.
- Gilfillan, S., Mitchell, P., Newell, J., Danks, A. and Comer, S. (2009) *South Coast Threatened Species and Ecological Communities Strategic Management Plan*, Department of Environment and Conservation, Albany.
- Goode, B., Irvine, C., Harris, J. and Thomas, M. (2005) *'Kinjarling' the place of rain. The City of Albany and Department of Indigenous Affairs Aboriginal heritage survey*. A report prepared for the City of Albany and Department of Indigenous Affairs. City of Albany, Western Australia. 215p.
- Government of Western Australia (2009) *Biodiversity Incentive Programs in Western Australia*. Department of Environment and Conservation. Available from www.dpaw.wa.gov.au/images/documents/conservation-management/off-road-conservation/biodiversity_incentive_programs_2009.pdf.
- Government of Western Australia (2010) *Oceans of opportunity: A proposed strategic framework for marine waters of Western Australia's South Coast*. Report to the Minister for Environment. Government of Western Australia.
- Government of Western Australia (2014) *2014 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full report)*. WA Department of Parks and Wildlife, Perth. Available from catalogue.data.wa.gov.au/dataset/dpaw-statewide-vegetation-statistics.
- GSDC (2015) *Great Southern Regional Investment Blueprint*. Great Southern Development Commission, Albany. Available from www.gsdc.wa.gov.au/our-activities/strategic-planning/blueprint/.
- Hassell, A.Y. (1918) *Early memories of Albany: Settlement and progress*. Albany Advertiser, 14 August 1918.
- HCWA and TWA (2006) *A Heritage Tourism Strategy for Western Australia*. Available from www.heritage.wa.gov.au/about-us/education-research-events/heritage-tourism.
- Herford, I. (1990) Cape crusaders. *Landscape*, **5**(3): 6.
- Hobbs, R.J. (2003) *How fire regimes interact with other forms of ecosystem disturbance and modification*. In *Fire in ecosystems of south-west Western Australia: Impacts and management*. I. Abbott and N. Burrows, Editors. Backhuys Publishers: Leiden. p. 421-436.
- Hobbs, D.A. and Yates, C.J. (2003) Turner Review No. 7. Impacts of ecosystem fragmentation on plant populations: generalising the idiosyncratic. *Australian Journal of Botany*, **51**: 471-488.
- Hopkins, A., Morgan, R. and Shepherd, D. (2000) *Bush and Biodiversity – A preliminary assessment of biodiversity values in the south west catchments natural resource management region*. Department of Conservation and Land Management and Agriculture Western Australia, Perth.
- Hopper, S.D. and Gioia, P. (2004) The southwest Australian floristic region: evolution and conservation of a global hot spot of biodiversity. *Annual Review of Ecology, Evolution, and Systematics*, **35**: 623-630.
- Hopper, S.D. and Gioia, P. (2005) *Scaling up-floristic hotspots and their uses for conservation*. Paper presented at the Advances in plant conservation biology: implications for flora management and restoration. Symposium, 24-27 October 2005, Perth, Western Australia.
- IOCI (2012) *Western Australia's weather and climate: A synthesis of Indian Ocean Climate Initiative Stage 3 research*. CSIRO and BoM, Australia. Available from www.ioci.org.au/publications/ioci-stage-3/cat_view/17-ioci-stage-3/23-reports.html.

- Jaensch, R.P. (1992) Fishes in wetlands of the south coast of Western Australia - Autumn 1992. Department of Conservation and Land Management, Perth.
- Jaensch, R. and Watkins, D. (1999) *Nomination of additional Ramsar wetlands in Western Australia*. Report by Wetlands International – Oceania to the Western Australian Department of Conservation and Land Management.
- Jaensch, R.P., Clarke, A.G. and Lane, J.A.K. (2009) *Surveys of waterbirds in selected wetlands of south-western Australia in spring-summer 2008-9, with an assessment of changes in habitat and waterbird usage over 2-3 decades*. Unpublished report by Wetlands International – Oceania, Brisbane, for the Western Australian Department of Environment and Conservation.
- Lane, J.A.K., Clarke, A.G. and Winchcombe, Y.C. (2013) *South West Wetlands Monitoring Program Report 1977 – 2011*. Department of Environment and Conservation.
- Lee, J.Y., Ryan, U.M., Jefferies, R., McInnes, L.M., Forshaw, D., Friend, J.A. and Irwin, P.J. (2009) *Theileria gilberti* n. sp. (Apicomplexa: Theileriidae) in the Gilbert's Potoroo (*Potorous gilbertii*). *J. Eukaryot. Microbiol.*, **56**(3): 290-295.
- Lohr, C. (2015) Decision support software for prioritising management actions on Western Australia's islands. Information Sheet 82/2015. Department of Parks and Wildlife. Available from www.dpaw.wa.gov.au/about-us/science-and-research/publications-resources/111-science-division-information-sheets.
- Lohr, M.T. and Keighery, G. (2014) The status and distribution of alien plants on the islands of the south coast of Western Australia. *Conservation Science W. Aust.*, **9**(2): 181-200.
- Malcolm, J.R., Canran, L., Neilson, P., Hansen, L. and Hannah, L. (2006) Global warming and extinctions of endemic species from biodiversity hotspots. *Conservation Biology*, **20**(2): 538-548.
- McGregor, H., Legge, S., Jones, M.E. and Johnson, C.N. (2015) Feral cats are better killers in open habitats, revealed by animal-borne video. *PLoS ONE*, **10**(8): e0133915. doi:10.1371/journal.pone.0133915.
- McKenzie, N.L., May, J.E. and McKenna, S. (2003) *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia*. Department of Conservation and Land Management, Perth. Available from www.dpaw.wa.gov.au/about-us/science-and-research/biological-surveys/117-a-biodiversity-audit-of-wa.
- Millar, A., Morris, K. and Asher, J. (2012) Western Shield: protecting our native fauna. *Landscape*, **27**(4): 9-16.
- Milne, R. (1992) *Up and Ings: Aboriginal place names of south western WA*. 65 pp.
- Mitchell, P. and Newell, J. (2008) *Western trout minnow (Galaxias truttaceus hesperius) recovery plan*. Western Australian Wildlife Management Program No. 47. Department of Environment and Conservation. 27p. Available from www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/197-approved-recovery-plans.
- Moore, N., Barrett, S., Howard, K., Craig, M.D., Bowen, B., Shearer, B. and Hardy, G. (2014) Time since fire and average fire interval are the best predictors of *Phytophthora cinnamomi* activity in heathlands of south-western Australia. *Australian Journal of Botany*, **62**: 587-593.
- Morgan, D.L., Beatty, S.J., Close, P.G., Allen, M.G., Unmack, P.J., Hammer, M.P. and Adams, M. (2016) Resolving the taxonomy, range and ecology of biogeographically isolated and critically endangered populations of an Australian freshwater galaxiid, *Galaxias truttaceus*. *Pacific Conservation Biology*, <http://dx.doi.org/10.1071/PC15043>.
- MPRWG (1994) *A representative marine reserve system for Western Australia*. Report of the Marine Parks and Reserves Selection Working Group, Department of Conservation and Land Management. Government of Western Australia, Perth.
- MRWA (2013) *Roads 2030: Regional Strategies for Significant Local Government Roads – Great Southern Region*. Main Roads Western Australia and Western Australia Local Government Association. Available from

walga.asn.au/Policy-Advice-and-Advocacy/Infrastructure/Roads/Roads-2030-Regional-Road-Development-Strategies.aspx.

Myers, J.S. (1990) Albany-Fraser Orogen. In 'Geology and mineral resources of Western Australia'. *Western Australia Geological Survey, Memoir 3*: 255-264.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B. and Kent, J. (2000) Biodiversity hotspots for conservation priorities. *Nature*, **403**: 853-8.

Nind, I.S. (1831) Description of the natives of King George's Sound (Swan River Colony) and adjoining country. *Journal of the Royal Geographical Society of London*, **1**: 21-51.

NRMMC (2004) *National Biodiversity and Climate Change Action Plan 2004–2007*. Natural Resource Management Ministerial Council, Australian Government, Department of the Environment and Heritage, Canberra, ACT. Available from www.environment.gov.au/biodiversity/publications/national-biodiversity-and-climate-change-action-plan-2004-2007.

Parks and Wildlife (2014a) *South Coast Threatened Birds Recovery Plan*. Western Australian Wildlife Management Program No. 44. Department of Parks and Wildlife, Perth, Western Australia. Available from www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/197-approved-recovery-plans.

Parks and Wildlife (2014b) *Science and Conservation Division annual research report 2013–14*. Department of Parks and Wildlife. Available from www.dpaw.wa.gov.au/about-us/science-and-research.

Robinson, C.J. and Coates, D.J. (1995) *Declared Rare and Poorly Known Flora in the Albany District*. Western Australian Wildlife Management Program No. 20. Published jointly by the Australian Nature Conservation Agency, Canberra ACT, and Department of Conservation and Land Management, Como WA. Available from www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants.

Sandiford, E.M. (1988) *Rugged mountains, jewelled sea: The South Coast Heritage Trail Network*. Department of Conservation and Land Management, Como, Western Australia. 48p.

Sandiford, E.M. and Barrett, S. (2010) *Albany regional Vegetation Survey, Extent Type and Status*. A project funded by the Western Australian Planning Commission, South Coast Natural Resource Management Inc. and City of Albany for the Department of Environment and Conservation. Unpublished report. Department of Environment and Conservation, Western Australia.

Schnoknecht, N.R., Tille, P. and Purdie, B. (2004) *Soil-Landscape Mapping in South-Western Australia*. Resource management technical report 280. Department of Agriculture, Western Australia. Available from researchlibrary.agric.wa.gov.au/rmtr/index.html.

Schut, A.G.T., Wardell-Johnson, G.W., Yates, C.J., Keppel, G., Baran, I., Franklin, S.E., Hopper, S.D., Van Niel, K.P., Mucina, L. and Byrne, M. (2014) Rapid characterisation of vegetation structure to predict refugia and climate change impacts across a global biodiversity hotspot. *PLoS ONE*, **9**(1): e82778. doi:10.1371/journal.pone.00.

Shaughnessy, P.D. (1999) *The action plan for Australian seals*. Environment Australia. Available from www.environment.gov.au/resource/action-plan-australian-seals.

Shearer, B.L., Crane, C.E. and Cochrane, A. (2004) Quantification of the susceptibility of the native flora of the South-West Botanical Province, Western Australia, to *Phytophthora cinnamomi*. *Australian Journal of Botany*, **52**: 435-443.

Shearer, B.L., Crane, C.E., Fairman, R.G. and Dunne, C.P. (2009) Ecosystem dynamics altered by pathogen-mediated changes following invasion of Banksia woodland and *Eucalyptus marginata* forest biomes of south-western Australia by *Phytophthora cinnamomi*. *Australasian Plant Pathology*, **38**: 417-436.

Smith, R.A. (1997) Hydrogeology of the Mount Barker–Albany 1:250,000 sheet: Western Australia. Water and Rivers Commission Hydrogeological Map Explanatory Notes Series, Report HM1, 28p. Available from www.water.wa.gov.au/data/assets/pdf_file/0016/4741/9707.pdf.

- South Coast NRM (2009) *Managing Phytophthora cinnamomi for biodiversity conservation in the South Coast NRM region of Australia. Phytophthora Dieback Management Plan for the South Coast Region 2010-2017*. Prepared for South Coast Natural Resource Management in Western Australia. Available from southcoastnrm.com.au/category/plans.
- South Coast NRM (2014) State Phytophthora Dieback Management and Investment. Report prepared for South Coast Natural Resource Management by GAIA Resources. Available from www.dieback.net.au/about/state-dieback-management-and-investment-framework.html.
- SRQ (2003) *Get active Queensland: Open space for sport and recreation. Planning Principles and Implementation Notes for Local Government. Final Report September 2003*. Sport and Recreation Queensland, Queensland. Available from www.nprsr.qld.gov.au/recreation/planning.html.
- Storer, T., White, G., Galvin, L., O'Neill, K., van Looij, E. and Kitsios, A. (2011) *The framework for the assessment of river and wetland health (FARWH) for flowing rivers of south-west Western Australia: project summary and results*. Water Science Technical Series, report no. 39, Department of Water, Western Australia. Available from www.water.wa.gov.au/_data/assets/pdf_file/0011/3107/100214.pdf.
- Storey, A.W., Halse, S.A. and Shiel, R.J. (1993) Aquatic invertebrate fauna of the Two Peoples Bay area, southwestern Australia. *Journal of the Royal Society of Western Australia*, **76**: 25-32.
- Taylor, P.J. (2015) Shorebirds on WA's South Coast 2015: snap-shot survey, analysis and recommendations for shorebird conservation across the WA South Coast for the period 2011 to 2015. Report prepared for Green Skills Inc. Available from www.greenskills.org.au/pub.html?projects.
- Tindale, N. (1974) *Aboriginal Tribes of Australia*. Australian National University Press, Canberra.
- Tourism WA (2010) *Australia's South West Tourism Development Priorities 2010–2015*. Tourism Western Australia, Perth.
- Tourism WA (2011) *Making a Difference: Aboriginal Tourism Strategy for Western Australia 2011-2015*. Tourism Western Australia, Perth. Available from parks.dpaw.wa.gov.au/sites/default/files/downloads/know/Making-a-Difference-final-web-version.pdf.
- TSSC (2013) *Conservation Advice for Subtropical and Temperate Coastal Salt marsh*. Threatened Species Scientific Committee, Canberra. Available from www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=118&status=Vulnerable.
- TSSC (2014) *Approved Conservation Advice for Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia*. Threatened Species Scientific Committee, Canberra. Available from www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=126&status=Endangered.
- Utber, D. and Newell, J. (2008) *Regional salinity hazard assessment on priority biodiversity assets*. Prepared on behalf of the South Coast NRM Inc. as part of the Biodiversity Inventory Program. Available from southcoastnrm.com.au/category/reports.
- Wardell-Johnson, G. and Horwitz, P. (1996) Conserving biodiversity and the recognition of heterogeneity in ancient landscapes: a case study from south-western Australia. *Forest Ecology and Management*, **85**: 219-238.
- Wilkins, P., Gilfillan, S., Watson, J. and Sanders, A. (2006) *The Western Australian South Coast Macro Corridor Network – a bioregional strategy for nature conservation*. Department of Conservation and Land Management (CALM) and South Coast Regional Initiative Planning Team (SCRIPT), Albany, Western Australia. Available from southcoastnrm.com.au/category/strategies.
- Wills, R.T. and Keighery, G.J. (1994) Ecological impact of plant disease on plant communities. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: Threats and Impacts in South-Western Australia*. Royal Society of Western Australia, Perth. 7p.

Wilson, B.A., Newell, G., Laidlaw, W.S. and Friend, G. (1994) Impact of plant diseases on faunal communities. In: Plant diseases in ecosystems: Threats and impacts in south-western Australia. *Journal of the Royal Society of Western Australia*, **77**: 139-143.

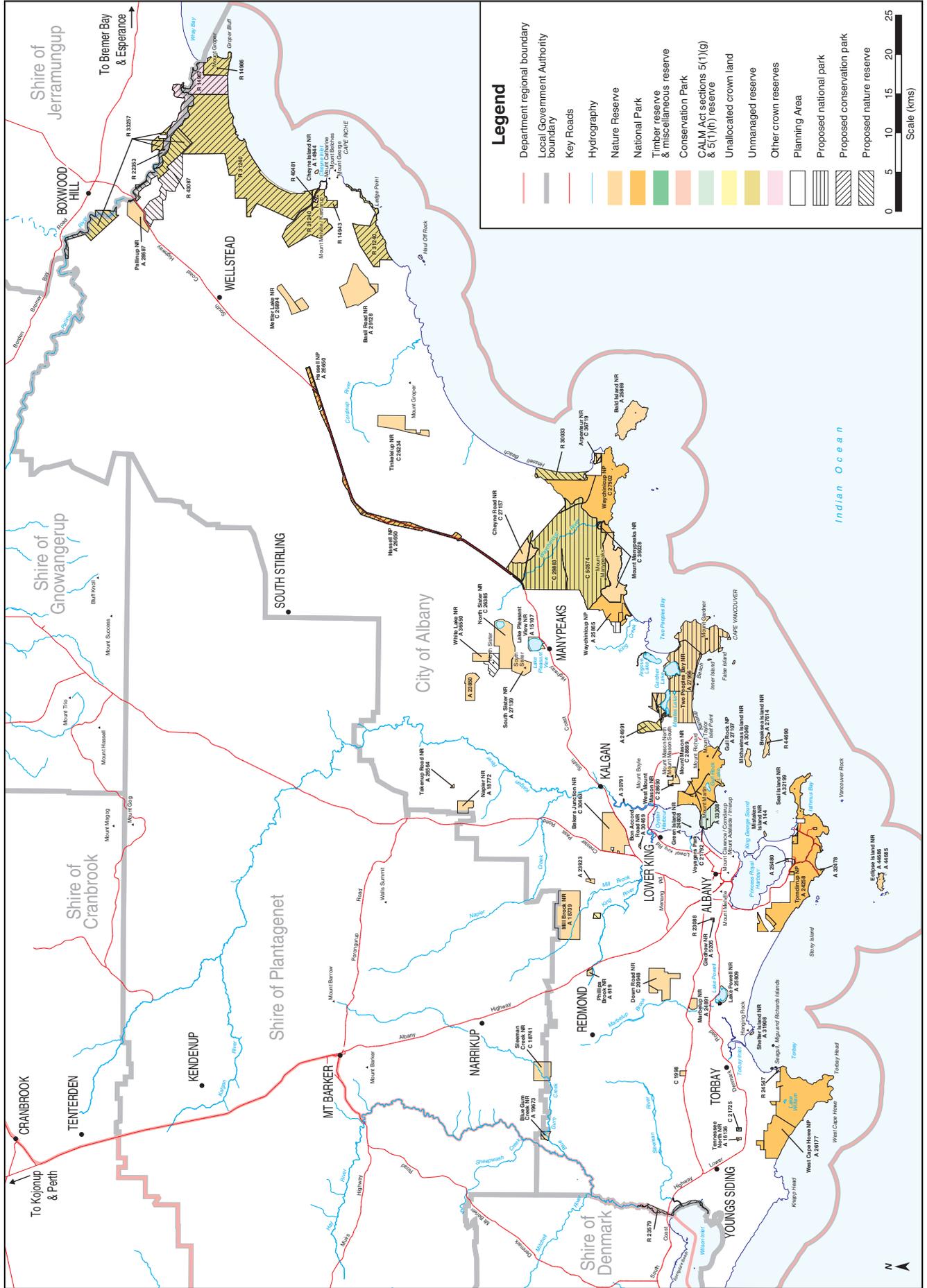
Worboys, G.L. (2012) *Conserving Australia's geoheritage*. Department of the Environment, Canberra. Available from www.environment.gov.au/system/files/pages/f4d5ba7d-e4eb-4ced-9c0e-104471634fbb/files/essay-conserving-worboys.pdf.

WRC (2001) *South Coast Water Reserve and Limeburners Creek Catchment Area Water Source Protection Plan: Albany Water Supply*. Water and Rivers Commission, Water Resource Protection Series No WRP 44. Available from www.water.wa.gov.au/data/assets/pdf_file/0019/5572/12131.pdf.

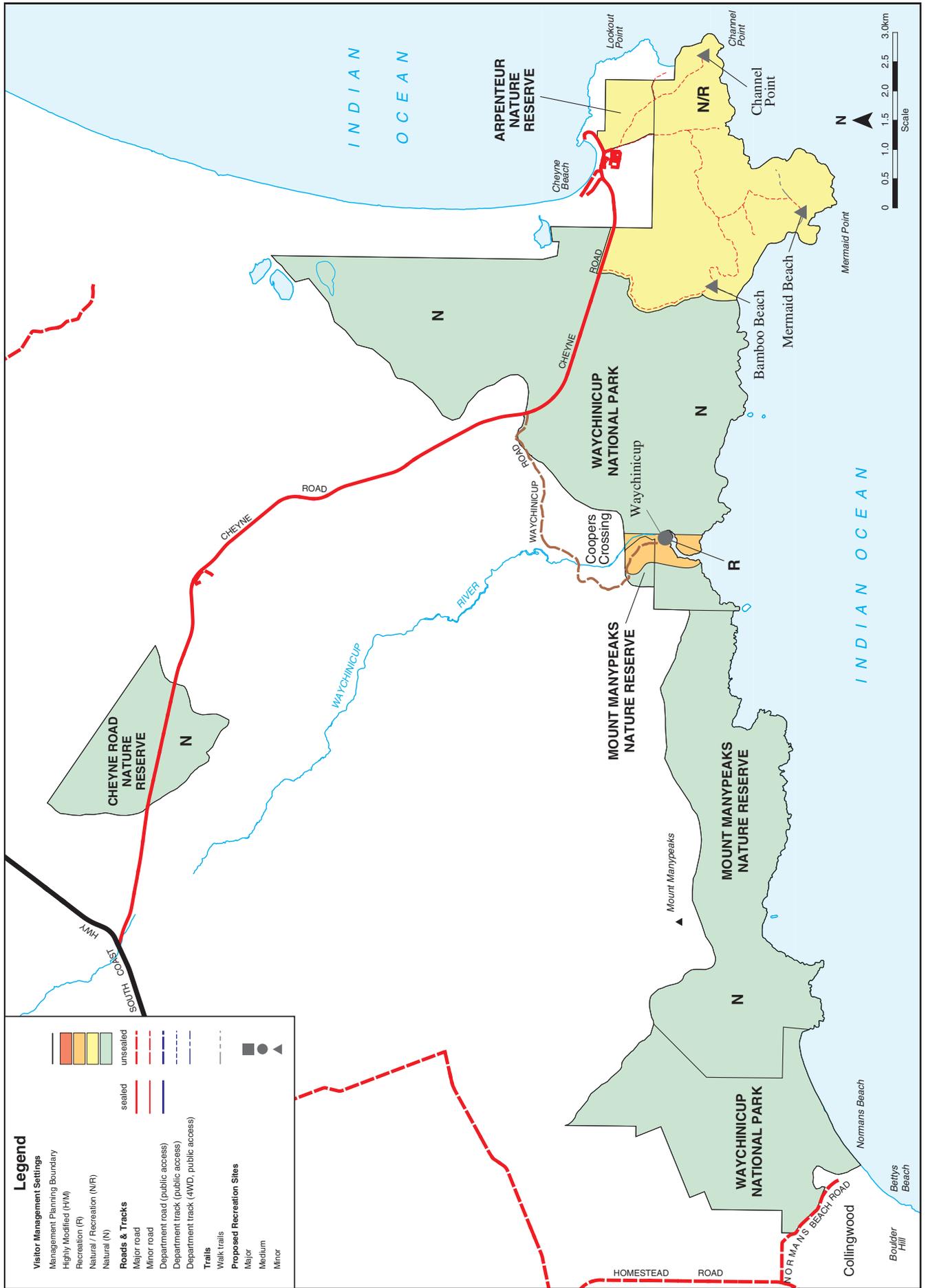
Yates, C.J., Abbott, I., Hopper, S.D. and Coates, D.J. (2003a) Fire as a determinant of rarity in the south-west Western Australian global biodiversity hotspot. In I. Abbott and N. Burrows (eds), *Fire in ecosystems of the south-west of Western Australia: impacts and management*, pp 395-420.

Yates, C.J., Hopper, S.D., Brown, A. and van Leeuwen, S. (2003b) Impact of two wildfires on endemic granite outcrop vegetation in Western Australia. *Journal of Vegetation Science*, **14**: 185-194.

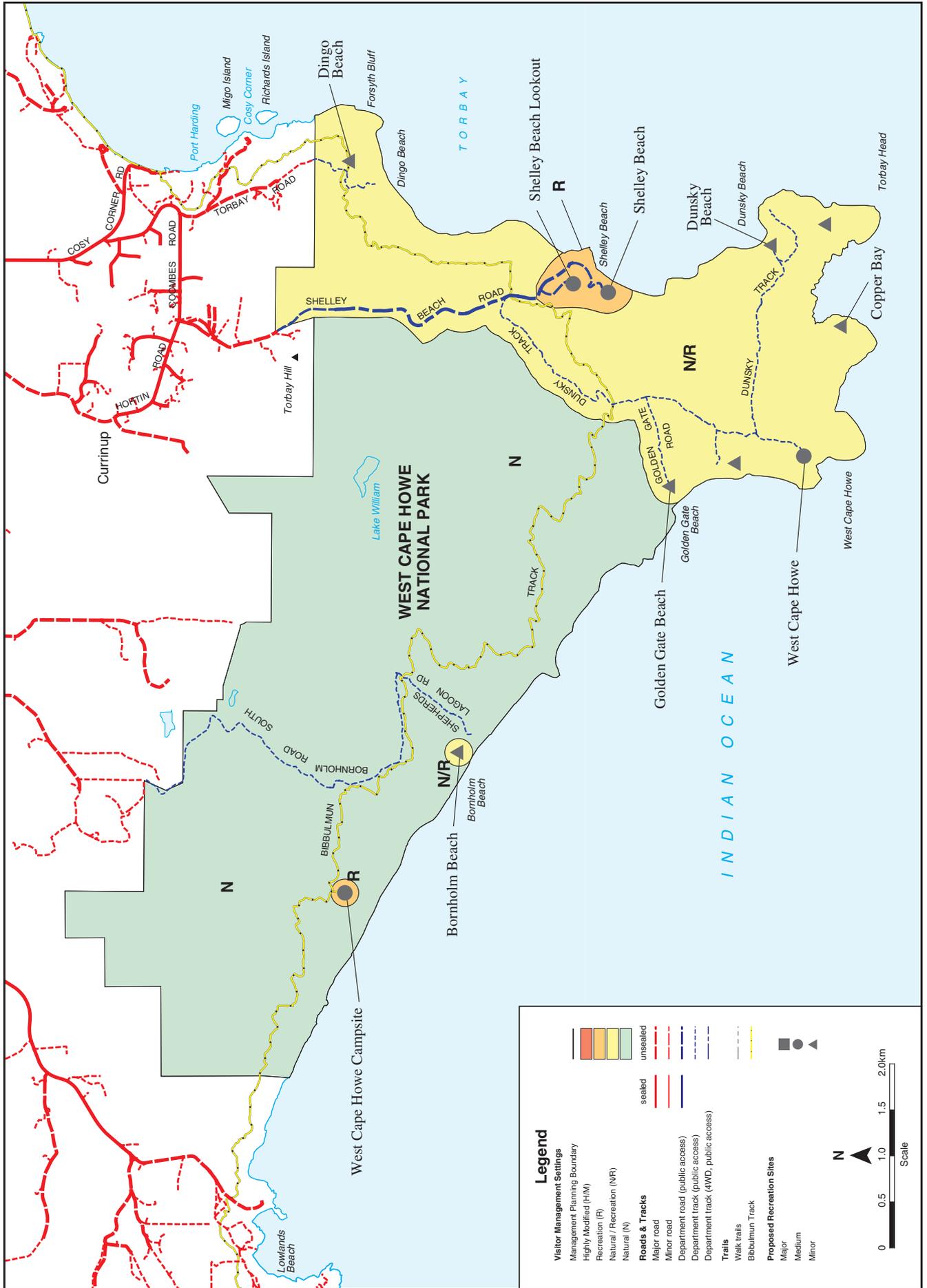
Map 1. Existing and proposed reserves



Map 5. Proposed settings, access and recreation sites for Waychinicup National Park and nearby reserves



Map 6. Proposed settings, access and recreation sites for West Cape Howe National Park





Appendix 1. Existing reserves within the planning area

Reserve name/category	Reserve no.	Class	Area ⁵ (ha)	Purpose	Gazettal date ²
Voyagers Park 5(1)(h) reserve ⁴	21792	A	4.0	recreation	17/12/1937
unnamed 5(1)(h) reserve (within R24258)	32478	C	0.4	conservation, navigation, communication, meteorology and survey	1/12/2000
Mt Martin 5(1)(h) reserve ⁴	33308	C	403.0	recreation and botanical garden	17/05/1994
unnamed 5(1)(h) reserve (within R44686)	44685	A	0.1	navigation, communication, meteorology, survey and conservation	1/12/2000
unnamed 5(1)(h) reserve (within R27614)	44690	A	0.1	navigation, communication, meteorology, survey and conservation	1/12/2000
unnamed 5(1)(h) reserve (within proposed R29883)	50574	C	0.0	conservation	14/05/2010
unnamed conservation park (next to R5205)	23088	C	6.8	conservation park	5/10/2006
Gull Rock National Park ³	27107	A	2,104.0	national park	23/02/2006
Hassell National Park	26650	A	1,264.6	national park	8/03/1963
Torndirrup National Park ⁴	24258	A	3,881.1	national park and recreation	9/09/1955
Torndirrup National Park	5225	C	54.1	national park	3/08/1973
Waychinicup ¹ National Park ³	27502	C	3,178.7	national park	23/03/1990
Waychinicup ¹ National Park ⁴	25865	A	803.8	national park	23/03/1990
West Cape Howe National Park ³	26177	A	3,605.2	national park	31/05/1985
Arpenteur ¹ Nature Reserve	36719	C	88.9	conservation of flora and fauna	4/07/1980
Bakers Junction Nature Reserve	30463	C	1,087.2	conservation of flora and fauna	11/11/1977
Bald Island Nature Reserve	25869	A	809.4	conservation of flora and fauna	3/03/1961
Basil Road Nature Reserve	29128	A	1,162.3	conservation of flora and fauna	23/03/1978
Blue Gum Creek Nature Reserve	19673	A	84.6	conservation of flora and fauna	13/07/1984
Bon Accord Road ¹ Nature Reserve	30469	A	10.4	conservation of flora and fauna	29/08/1980
Breaksea Island Nature Reserve ³	27614	A	104.2	conservation of flora and fauna	25/06/1965
Cheyne Island ¹ Nature Reserve ³	14944	A	20.2	conservation of flora and fauna	14/07/2000

Reserve name/category	Reserve no.	Class	Area ⁵ (ha)	Purpose	Gazettal date ²
Cheyne Road Nature Reserve	27157	C	367.5	conservation of flora and fauna	26/03/1964
Down Road ¹ Nature Reserve	20948	C	777.4	conservation of flora and fauna and water	19/01/1990
Eclipse Island ¹ Nature Reserve ³	44686	A	99.1	conservation of flora and fauna	1/12/2000
Gledhow Nature Reserve	5205	A	3.6	conservation of flora and fauna	2/08/1991
Green Island ¹ Nature Reserve ³	24808	A	2.4	conservation of flora and fauna	19/02/1988
Lake Pleasant View Nature Reserve	15107	A	267.1	water and conservation of flora and fauna	3/04/1959
Lake Powell Nature Reserve	25809	A	192.0	conservation of flora and fauna	2/12/1960
Marbelup Nature Reserve	24891	A	103.7	conservation of flora and fauna	3/05/1968
Mettler Lake Nature Reserve	26894	C	401.6	conservation of flora and fauna	15/07/1983
Gledhow Nature Reserve	5205	A	3.6	conservation of flora and fauna	2/08/1991
Green Island ¹ Nature Reserve ³	24808	A	2.4	conservation of flora and fauna	19/02/1988
Lake Pleasant View Nature Reserve	15107	A	267.1	water and conservation of flora and fauna	3/04/1959
Lake Powell Nature Reserve	25809	A	192.0	conservation of flora and fauna	2/12/1960
Marbelup Nature Reserve	24891	A	103.7	conservation of flora and fauna	3/05/1968
Mettler Lake Nature Reserve	26894	C	401.6	conservation of flora and fauna	15/07/1983
Michaelmas Island Nature Reserve ³	30049	A	91.9	conservation of flora and fauna	17/10/1969
Mill Brook Nature Reserve	18739	A	1,483.8	conservation of flora and fauna	25/11/1977
Mistaken Island Nature Reserve ³	144	A	11.8	conservation of flora and fauna	7/05/1971
Mount Manypeaks Nature Reserve ⁴	36028	C	1,328.1	conservation of flora and fauna	27/04/1979
Mount Mason ¹ Nature Reserve	28689	C	194.0	conservation of flora and fauna	23/09/1983
Napier ¹ Nature Reserve	18772	A	219.1	conservation of flora and fauna	15/07/1983
North Sister Nature Reserve	26385	C	1,007.7	conservation of flora and fauna	27/07/1962
Pallinup ¹ Nature Reserve	28687	A	424.6	conservation of flora and fauna	22/08/1986
Phillips Brook Nature Reserve	619	A	48.6	conservation of flora and fauna	13/07/1984
Seal Island Nature Reserve ³	32199	A	2.8	conservation of flora and fauna	10/08/1973
Shelter Island Nature Reserve ³	31908	A	10.0	conservation of flora and fauna	30/03/1973
Sleeman Creek Nature Reserve	18741	C	416.2	protection of flora	3/10/1924
South Sister Nature Reserve	27139	A	338.3	conservation of flora and fauna	4/03/1966
Takenup Road ¹ Nature Reserve	26564	A	9.8	conservation of flora and fauna	17/02/1984
Tennessee North ¹ Nature Reserve	16136	A	15.8	conservation of flora and fauna	8/05/1981
Tinkelelup Nature Reserve	26234	C	575.5	conservation of flora and fauna	30/05/1975

Reserve name/category	Reserve no.	Class	Area ⁵ (ha)	Purpose	Gazettal date ²
Two Peoples Bay Nature Reserve ³	27956	A	4,744.7	conservation of fauna	22/04/1966
unnamed nature reserve	1998	C	37.6	conservation of flora and fauna	1/06/1993
unnamed nature reserve	23850	A	362.9	conservation of flora and fauna	15/07/1994
unnamed nature reserve	23923	A	40.5	conservation of flora and fauna	2/08/1991
unnamed nature reserve	30791	A	2.7	conservation of flora and fauna	26/02/1971
West Mount Mason Nature Reserve	28690	A	8.8	conservation of flora	18/08/1967
White Lake ¹ Nature Reserve	36550	A	174.1	conservation of flora and fauna	14/03/1980
unnamed timber reserve	217/25	C	19.8	timber reserve	1/07/1983
unnamed miscellaneous reserve	46245	C	0.9	office premises	16/08/2000
TOTAL			32,457.5		

¹ = Name is unofficial. ² = Gazettal date for the current purpose. ³ = Gazetted to low-water mark. ⁴ = Gazetted to high-water mark. ⁵ = Rounded to one decimal place. Note: all reserves are vested in the Commission, except the miscellaneous reserve R46245 which is vested in the Executive Director of the department.

Appendix 2. Proposed reserves and changes to existing reserves

Many reserve proposals (for proposed reserves as well as for changes to existing reserves) come from, and are described within, the South Coast Regional Management Plan (CALM 1992a).

Proposed reserves

Reserve No.	Class	Name/Land Category	Current vesting	Current purpose	Proposed reserve type	Area (ha)	Comments
29883	C	un-named	unvested	Waychinicup River Catchment Area	national park	7,914	Proposal A23 – proposed addition to Waychinicup National Park (CALM 1992a). High priority for acquisition. Recreation includes bushwalking and possibly camping. Natural values include the threatened feather-leaved banksia, broad-leaf daviesia, Albany banksia, Manypeaks rush, mountain paper-heath, noisy scrub-bird, western bristle bird, Carnaby’s cockatoo, poorly reserved and extensively cleared ‘Low forest; jarrah and casuarina’, and poorly reserved and limited extent ‘Low forest; paperbark (<i>Melaleuca raphiophylla</i>)’. Forms part of the South Coast Macro Corridor.
33257	C	un-named	unvested	parklands and recreation, part UCL	nature reserve	2,062	Proposal J2 – proposed nature reserve (CALM 1992a). Natural values include the extensively cleared (vulnerable) and poorly reserved ‘Medium woodland; York gum’, poorly reserved ‘Medium woodland; York gum and yate’, dwarf spider orchid and forms part of the South Coast Macro Corridor.
24991	A	un-named (Goodga River)	unvested	water and national park (unvested, non-department)	nature reserve	286	Proposal A17a – proposed addition to Two Peoples Bay Nature Reserve (CALM 1992a). High priority for acquisition. Natural values include western trout minnow, Two Peoples Bay andersonia (CALM 1995a), scarlet banksia shrubland/Albany blackbutt/sheoak open woodland PEC and the poorly reserved ‘Low forest; jarrah, <i>Eucalyptus staeri</i> and <i>Allocasuarina fraseriana</i> ’. Transfer in process pending reserves bill action.
14986	A	un-named	unvested	parklands and recreation	conservation park	578	Proposal J4 – proposed conservation park (CALM 1992a). High priority for acquisition. Natural values include the threatened <i>Androcalva perlaria</i> , <i>Atelomastix culleni</i> , poorly reserved ‘Shrublands, dwarf scrub on granite (south coast)’ and forms part of the South Coast Macro Corridor. Boat harbour, Salmon and net leases.
22353	C		Shire of Jerramungup	recreation and camping	conservation park	857	Proposal J6 – proposed conservation park (CALM 1992a). High priority for acquisition. Natural values include the ‘Subtropical and Temperate Coastal Saltmarsh’ TEC. Boat harbour, Salmon and net leases.
14987	C		Shire of Jerramungup	recreation and camping	conservation park	1,106	Proposal J5 – proposed conservation park (CALM 1992a). High priority for acquisition. Natural values include several migratory birds such as red-necked stint, common sandpiper, common greenshank, eastern great egret and Pacific golden plover, the ‘Subtropical and Temperate Coastal Saltmarsh’ TEC, poorly reserved

							'Shrublands, dwarf scrub on granite (south coast)', and forms part of the South Coast Macro Corridor. Boat harbour, Salmon and net leases.
31240	C	un-named	unvested	government requirements	conservation park	9,944	Proposal A26/J8 – proposed conservation park (CALM 1992a). High priority for acquisition. Natural values include the poorly reserved 'Medium woodland; yate', the threatened <i>Verticordia helichrysantha</i> and malleefowl, and forms part of the South Coast Macro Corridor. Boat harbour, Salmon and net leases.
14943	A	un-named	unvested	parklands and recreation,	conservation park	421	Proposal A27 – proposed conservation park (CALM 1992a). High priority for acquisition. Natural values include the poorly reserved 'Medium woodland; yate', <i>Scaevola macrophylla</i> , and forms part of the South Coast Macro Corridor.
40481	C		City of Albany	rubbish disposal site			Surrounding Cape Riche Caravan Park, reserve 40481 contains a rubbish disposal site and acquisition should excise current rubbish disposal area.
43087	C	un-named	City of Albany	landscape protection	nature reserve	1,290	Moderate priority for acquisition. Natural values include malleefowl, priority flora, provides linkage to Pallinup Nature Reserve and forms part of the South Coast Macro Corridor.
30033	C	un-named		mining	national park	2,034	High priority for acquisition. Lies next to, and proposed addition to, Waychinicup National Park.
UCL		Morley Beach	unvested		conservation park	106	Adjoins Wilson Inlet. Important wader bird habitat. Nineteen species of migratory and 10 species of endemic shorebirds have been recorded at Morley Beach including the endangered lesser sand plover, the vulnerable greater sand plover and several other migratory birds such as sharp-tailed sandpiper, pectoral sandpiper, Pacific golden plover and marsh sandpiper. Also contains limited extent 'Low forest; teatree and casuarina' and 'Subtropical and Temperate Coastal Saltmarsh' TEC.
25480	C	un-named, Limeburners Gully	Minister for Water Resources	water supply	national park	42	Limeburners Gully, to be added to Torndirrup National Park for connectivity and habitat values (karri).
24547	A	un-named	City of Albany	camping and recreation	national park	32	Southern part addition to West Cape Howe National Park (with a boundary of Hartman's Road) to include the Torbay Bibbulmun Track hut and natural values.
UCL		Seagull, Migo and Richards islands	unvested		nature reserve	8	Proposal A3 – proposed nature reserves (CALM 1992a). Environmental Protection Authority Red Book recommendation 2.13.
UCL		Haul Off Rock	unvested		nature reserve	21	Most westerly breeding colony for the Australian sea-lion on the south coast, and one of six key long term survey sites for this species. Also, a significant breeding colony for the New Zealand fur-seal. All the Australian sea-lion and New Zealand fur-seal colonies in WA are in Class A or conservation reserves except Haul Off Rock, and this site is proposed as an addition to the conservation reserve system for both seal species (Shaughnessy 1999).
Lot 9 on DP 48018/UCL		un-named	unvested		nature reserve	49	Close to Mill Brook Nature Reserve. Natural values include the second largest population of Good's banksia known to occur, the poorly reserved 'Low forest; jarrah, <i>Eucalyptus staeri</i> and <i>Allocasuarina fraseriana</i> ' and scarlet banksia shrubland/Albany blackbutt/sheoak open woodland PEC.
Plantagenet loc 3777		Freehold, purchase			nature reserve		Proposed addition to Two Peoples Bay Nature Reserve. Natural values include the poorly reserved 'Low forest; jarrah, <i>Eucalyptus staeri</i> and <i>Allocasuarina fraseriana</i> '.

23579	A			camping and recreation	nature reserve	305	Proposed reserve along the Hay River. Natural values include providing catchment protection and habitat corridor values linking Redmond State Forest and Mount Lindesay National Park with Wilson Inlet, the limited extent 'Low forest; teatree and casuarina', and 'Melaleuca spathulata/Melaleuca viminea Swamp Heath' PEC (Priority 1).
Lot 2, Homestead Road, Plan 66399 (Manypeaks)		Freehold, purchase			national park		Proposed addition to Waychinicup National Park. Natural values include the poorly reserved 'Low forest; jarrah, <i>Eucalyptus staeri</i> and <i>Allocasuarina fraseriana</i> '.
Lot 5963, Manypeaks		Freehold, purchase			nature reserve		Lies between North Sister and White Lake nature reserves. Proposed addition to North Sister Nature Reserve.
28503	C	un-named	City of Albany	gravel quarry	national park		Proposal A10 – proposed addition to Torndirrup National Park (CALM 1992a) to consolidate the park boundary. The area to the south of Salmon Holes Road is the proposed addition, with the area to the north of the road to remain with the City of Albany.
21337	C	Un-named	City of Albany	caravan park, recreation, resorts	national park		Proposed addition of two triangular parts of this reserve will amend the park boundary to align with Vancouver and Whaling Station roads as a clear and defined boundary.

Some of the proposed reserves in this table form part of a proposed reserve block within the Pallinup/Beaufort Inlet area that spans both the City of Albany and Shire of Jerramungup and are outlined in the South Coast Regional Management Plan (CALM 1992a), and while these proposed reserves may lie outside the scope of this plan they nevertheless remain of interest to the department.

Proposed changes to existing reserves

Reserve name	Reserve number	Proposed changes
Arpenteur Nature Reserve	C36719	Add reserve (88ha) to Waychinicup National Park following CALM (1992a) recommendation proposal A23a to consolidate Waychinicup National Park, and to facilitate management of recreational use.
Mount Manypeaks Nature Reserve	C36028	Add only the isolated eastern part of the reserve to Waychinicup National Park to consolidate the national park. This follows CALM (1992a) recommendation proposal A22, although proposal A23b will not be pursued any further because of significant natural values (noisy scrub-bird, Albany banksia and broad-leaf daviesia) within the main part of Mount Manypeaks Nature Reserve.
Hassell National Park	A26650	Change national park (1,264ha) to conservation park following CALM (1992a) recommendation proposal A24 to facilitate management of this thin corridor of road reserve that, while having connectivity value, is largely insufficient in terms of habitat values for sensitive species.
Voyagers Park 5(1)(h) reserve	A21792	Add this 5(1)(h) reserve (4ha) to Gull Rock National Park.
Mt Martin 5(1)(h) reserve	C33308	Add this 5(1)(h) reserve (403ha) to Gull Rock National Park following CALM (1992a) recommendation proposal A14.
unnamed timber reserve	F217/25	Change this timber reserve (19ha) to nature reserve following CALM (1992a) recommendation proposal A1.
Two Peoples Bay Nature Reserve	A27956	Change nature reserve (4,745ha) to national park following CALM (1995a) recommendation to “Change the purpose to national park”. The reserve is very important for scientific study and the conservation of 14 threatened native animals that have been recorded there (see naturemap.dpaw.wa.gov.au), including Gilbert’s potoroo, noisy scrub-bird, Australasian bittern, western trout minnow, western ringtail possum, western whipbird, western bristlebird, Carnaby’s cockatoo, Balston’s pygmy perch, quokka, shy albatross, black-browed albatross, Atlantic yellow-nosed albatross and Carter’s freshwater mussel.
All ‘C’ class and unclassified reserves	various	Change to ‘A’ class reserves to enable adequate protection of their conservation values with a higher security of tenure.
Mt Martin 5(1)(h) reserve, Voyagers Park 5(1)(h) reserve, Torndirrup National Park, Waychinicup National Park, Mount Manypeaks Nature Reserve	C33308 A21792 A24258 A25865 C36028	Change the vesting to the low-water mark.

Appendix 3. Fire management area outcomes

Vegetation type and indicator species	Fire management outcome	Prescribed fire regime
Fire Management Area 1 – Albany coastal		
Coastal heath (for example, Torndirrup National Park)	Establish a fine-grained mosaic of fuel ages with a grain size of 20–200ha with a variety of fuel age classes. Provide adequate protection to surrounding community values.	Avoid re-burning areas within 1.5–2 times juvenile periods of key indicator species (excluding low fuel buffers).
Coastal dune scrub (for example, Cheyne Beach, Ledge Beach)	Protect from fire.	No planned fire.
Open coastal peppermint (for example, West Cape Howe National Park).	Maintain open peppermint woodland with shrub understorey. Establish a fine-grained mosaic with a grain size of 20–200ha with a variety of fuel age classes. Provide adequate protection to surrounding community values.	Avoid re-burning areas within 1.5–2 times juvenile periods of key indicator species (excluding low fuel buffers).
Proteaceous dominated heath (for example, Mount Manypeaks and Arpenteur nature reserves, Mt Martin reserve)	Establish a fine-grained mosaic with a grain size of 20–200ha with a variety of fuel age classes.	Avoid re-burning areas within 1.5 juvenile periods of last fire (excluding low fuel buffers).
Low woodlands / forest (for example, Gull Rock National Park, Angove water reserve)	Protect woodlands from repeated high intensity bushfire.	Application of fire to achieve a fine grain mosaic of fuel ages with a grain size of 20–200ha.
Wetlands (for example, Moates Lake, Gull Rock Lake)	Protect from fire.	No planned fire.
Fire Management Area 2 – Mixed Low Forest		
Open forest of jarrah, marri, banksia and <i>Allocasuarina</i> spp.	Establish a fine-grained mosaic with a grain size of 20–200ha with a variety of fuel ages. Provide adequate protection to surrounding community values.	Application of fire to achieve a fine grain mosaic of fuel ages with a grain size of 20–200ha and within 1.5 juvenile periods of key indicator species (excluding low fuel buffers).
Lower open forest of jarrah, blackbutt and yate	Establish a fine-grained mosaic with a grain size of 20–200ha with a variety of fuel ages. Protect from repeated high intensity bushfires. Provide adequate protection to surrounding community values.	Application of fire to achieve a fine grain mosaic of fuel ages with a grain size of 20–200ha and within 1.5–2 times juvenile periods of key indicator species (excluding low fuel buffers).
Karri with associated understorey	Establish a fine-grained mosaic with a grain size of 20–200ha with a variety of fuel ages. Protect from repeated high intensity bushfire. Provide protection to surrounding community values.	Application of fire to achieve a fine grain mosaic of fuel ages with a grain size of 20–200ha and within 1.5–2 times juvenile periods of key indicator species (excluding low fuel buffers).
Wetlands	Protect from fire.	No planned fire.
Fire Management Area 4 – Fitzgerald River - Ravensthorpe Range Region		
Scrub/mallee heath	Establish a fine-grained mosaic with a grain size of 500–1,000ha with a variety of fuel ages. Provide adequate protection to surrounding community	Avoid re-burning areas within 1.5–2 times juvenile periods of key indicator species (excluding low fuel buffers).

	values and department-managed assets.	
Proteaceous heath	Establish a fine-grained mosaic with a grain size of 500–1,000ha with a variety of fuel ages. Provide adequate protection to surrounding community values and department-managed assets.	Avoid re-burning areas within 1.5–2 times juvenile periods of key indicator species (excluding low fuel buffers).
Mallet	Determine the appropriate fire regime for mallet. Protect mature stands from the impact of bushfire.	No planned fire.
Yate, York and salmon gums	Establish a fine-grained mosaic with a grain size of 50–100ha with a variety of fuel ages. Provide adequate protection to surrounding community values and department-managed assets.	Low intensity fire at 12 to 15 year intervals.
Fire Management Area 10 – South Coast Islands		
All islands	Minimise bushfire size.	No planned fire.

For all vegetation types listed in the table above:

- **bushfire response** – give priority to minimising bushfire size
- **partnering considerations** – liaise with relevant stakeholders, e.g. local government, bush fire brigades, plantation industry groups, community groups and other government agencies
- **monitoring for fire management effectiveness** – ensure maintenance of viable populations and no loss of threatened and fire sensitive species. Monitor mosaic using remote sensing and field observations.

Appendix 4. Management settings for parks and reserves of the Albany coast

Visitor management settings

<i>Wilderness areas¹ / remote</i>	
Primarily large conservation areas in remote locations with no recreation or visitor facilities.	
Principle purpose	Primary conservation areas with no defined recreation opportunities.
	Maintaining and restoring the integrity of ecological processes, natural landscapes and biodiversity.
	Maintaining opportunities for solitude, maintaining or restoring the highest degree of apparent and biophysical naturalness and remoteness from permanent modern structures.
Recreation / visitor experience	Interaction between visitor groups is minimal.
	Visitors are self-reliant.
	The area offers opportunities for solitude, independence, closeness to nature and tranquillity in a natural environment.
Modifications / development	No facilities are provided in the area.
	No modifications have been made to the landform or features and no modern structures are present.
	No trails are marked.
<i>Natural</i>	
Conservation areas with minimal development and low level recreation opportunities.	
Principle purpose	Conservation of significant natural and cultural values, with low level recreation.
Recreation / visitor experience	Opportunities for solitude, independence, closeness to nature, tranquillity and self-reliance in an environment that offers high degree of challenge.
	Little interaction between visitor groups.
	Visitors need to be self-reliant.
	Infrequent department presence.
Modifications / development	Minimal site modification.
	Limited facilities offered apart from essential site infrastructure such as car parking, signage and trails. Parking areas provided are small scale.
	Site is dominated by the local landscape and features without major changes to the landform or features.
<i>Natural / recreation</i>	
Modified environment which is dominated by natural vegetation and has conservation significance. Area offers low to medium recreation opportunities.	
Principle purpose	Conservation of significant natural and cultural values, with low to medium level recreation.
Recreation / visitor experience	Active recreation opportunities. Opportunities for challenging interaction with nature using outdoor skills.
	Opportunities may have human elements but still high probability that visitors can experience isolation from human

	influences.
	Moderate level of seasonal visitation from the local population and visitors to the area. High likelihood of contact with individuals and small groups.
	Visitors need to be largely self-reliant, access only to basic facilities at specific locations.
	Opportunities for active activities, solitude, independence, closeness to nature, and tranquility in a natural environment.
	Some management presence including visits by department staff and signs.
Modifications / development	Minor modifications at specific sites. Basic facilities may be provided such as shade shelters, barbeques and toilets.
	Local landscape and features are dominant although there have been some changes to the vegetation and landform such as clearings and formed tracks.
	Signposting provided where necessary and some interpretive material may be provided off-site or at trailheads.
<i>Recreation</i>	
<i>Modified environments which includes areas with 'natural' landscape values, offers medium intensity recreation opportunities and unique experiences within the park/reserve.</i>	
Principle purpose	Conservation of significant natural and cultural values with moderate intensity recreation.
Recreation / visitor experience	Opportunities to interact with nature while still having access to facilities.
	High level of visitation, high likelihood of contact with other users.
	Low level of self-reliance.
	Outdoor skills important in areas away from roads and tracks.
	Frequent department ranger presence in the area.
	Interpretive material, brochures and track guides available. Well signposted at trailheads and along tracks.
Modifications / development	Modification of sites is evident, medium level of development. Facilities generally provided such as shade and interpretive shelters, gas barbecues, tables and toilets.
	Moderate on-site management requirements, including signs and barriers, facilities may be common but clustered.
<i>Developed / highly modified</i>	
<i>Highly modified environments offering moderate to high level nature – based recreation opportunities set in a mostly natural landscape.</i>	
Principle purpose	Conservation of significant natural and cultural values with a moderate to high level of recreation, education and interpretation. Group activities are specifically catered for at many sites.
Recreation / visitor experience	Extensive recreation opportunities available. Opportunities for nature appreciation and social interaction in a safe environment.
	The area has a high level of visitation from the local population and visitors to the area.
	Interaction with other visitors is expected and is constant. Group and family activities are an important part of the visitor experience.
	Generally, recreation experiences have opportunities for nature appreciation, a chance to discover a specific feature or experience.
	Interpretive shelters, displays and leaflets, guided tours may be provided; visitor centre may also be present.
	Well signposted at trailheads and along the tracks.

	Minimal self-reliance is needed.
	Frequent department staff presence.
Modifications / development	Modification of the area at specific recreation sites is highly evident with a medium to high level of development.
	Recreation sites have defined parking areas and day use facilities.
	A high level of facilities is provided at sites including shade shelters, gas barbecues, tables, toilets and visitor information.
	Recreation sites have a high degree of on-site management including use of physical barriers and on-site staff, vehicle and pedestrian movement is heavily controlled.

¹ = Refer to the department's [Corporate Policy Statement No. 62: Identification and management of wilderness and surrounding areas](#).

Recreation site hierarchy

<i>Major recreation sites</i>	
Primary recreation nodes catering for a broad range of visitors with facilities and interpretation hubs. Most visitors entering the park/reserve will be directed to these sites, considered to be the main attractions within the park/reserve.	
Recreation experience	Generally, the recreation experience has opportunities for nature appreciation, a chance to discover a specific feature or experience, and chances for solitude and social interaction in a natural environment with a higher level of access to facilities.
Modifications and development	The site is developed and has parking areas and facilities.
	The local landscape and features are evident although changes have occurred to the vegetation or landform, such as clearings, formed tracks, buildings and other structures. Some leveling of the site may have been undertaken to create developed areas.
Visitation and interaction	The site has a high level of visitation from the local population and visitors to the area.
	Choice in the level of social interaction between staying to oneself or one's group, however contact with other people will likely be unavoidable.
Services	Degree of self-reliance within a day use setting is low. Needs such as, shelter and toilets are catered for, providing for a high level of comfort and safety to visitors.
Management presence	A high degree of management presence at the site by authority or representative such as ranger patrols.
Interpretation	Moderate to high levels of the natural, cultural and historical interpretation including interpretation displays, brochures, interpretation tracks, guided activity program or access to information through ranger or expert contact.
<i>Medium recreation sites</i>	
Secondary nodes with a specific purpose or recreation activity such as scenic viewing. These sites are considered to be secondary sites and offer unique experiences within the park/reserve.	
Recreation experience	Generally, the recreation experience has opportunities for active activity, solitude, independence, closeness to nature, tranquility in a natural environment, but has access to basic facilities where possible.
Modifications and development	Site is modified with car parking areas and site access, additional facilities may be provided based on visitation.

	The local landscape and features are dominant although there have been some changes to the vegetation or land form, such as clearings and formed tracks.
Visitation and interaction	The site has a moderate level of seasonal visitation from the local population and visitors to the area. Choice in the level of social interaction between staying to oneself or groups however contact with other visitors is to be expected.
Services	Moderate degree of self-reliance for essential needs. Some facilities including shelter provided possibility of providing toilet facilities.
Management presence	Some degree of management presence such as ranger patrols at the site depending on site conditions.
Interpretation	Moderate levels of natural, cultural and historical interpretation which may include interpretation displays, interpretation tracks.
<i>Minor recreation sites</i>	
Minimal development and facilities catering specifically for a purpose.	
Recreation experience	Generally, the recreation experience has opportunities for solitude, independence, closeness to nature and tranquility in a natural environment.
Modifications and development	Some site modification to provide car parking areas and access. Site is dominated by the local landscape and features without major changes to the landform or features. Little facilities apart from essential site infrastructure such as car parking, signage and trails.
Visitation and interaction	Experiences a low to moderate level of visitation, visitors are predominantly local. Some likelihood of interaction between users, although the emphasis would be on socialising with own group.
Services	High degree of self-reliance for essential needs such as the provision of shelter and toilet facilities.
Management presence	Some degree of management presence such as ranger patrols at the site depending on site conditions.
Interpretation	No to low levels of natural, cultural and historical interpretation apart from essential information for identification of sites and visitor risk issues. Specific interest site signage for niche user groups may be present.

