Yawuru Birragun Conservation Park

Joint management plan 2016

Management plan 87

Department of Parks and Wildlife

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WARNING: This plan may contain names and images of deceased Aboriginal people

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Yawuru dedication

'The Yawuru story is one of resilience and pride. We recognise all the old people who carried the stories from *Bugarrigarra*, walked our lands, fished and hunted and survived from the water places. Those who gave evidence in court and worked tirelessly to negotiate the Yawuru Native Title Global Agreement we acknowledge with pride. We owe the benefits of today to our senior people who have gone before us. In the face of policies and practices of successive governments who sought to destroy our culture and extinguish our traditional rights, Yawuru people across many generations continued to practice customary law, speak our language and draw on the wisdom and knowledge of our traditions and customs. The Yawuru people have managed our country, including our waters, and cared for our society from time immemorial.

The senior people are the heroes of the Yawuru story and it is because of them that the younger Yawuru people living today are able to feel the pride and strength of being part of the community of Yawuru native title holders. While we are many individuals with strong associations to family it is the connection to each other as a community that gives us the strength to carve out our future destiny in a modern world to achieve *mabu buru*, *mabu liyan*, *mabu ngarrangunil*.'

by Patrick Dodson, October 2013

Above: Crab Creek wet season build up. Photo – Tracey Sonneman/Parks and Wildlife

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Summary

This management plan has a number of important precursors. In April 2006, the Federal Court of Australia determined Yawuru people to be the recognised native title holders for lands and waters around Broome. Three years of negotiation with the State Government followed the determination, and in February 2010, two Indigenous Land Use Agreements were signed between Yawuru Registered Native Title Body Corporate (Yawuru RNTBC), the Government of Western Australia and other parties. The agreements included the creation and joint management of the Yawuru conservation estate, which includes marine and terrestrial components.

This management plan is one of four integrated and complementary conservation estate joint management plans prepared in accordance with the ILUAs and the associated Joint Management Agreement. This plan prepared under the *Conservation and Land Management Act 1984* (CALM Act) will apply to the Yawuru Birragun Conservation Park component of the broader Yawuru conservation estate, an area that is to be managed for the purpose of conservation, recreation and traditional and customary Aboriginal use. Yawuru RNTBC and the Department of Parks and Wildlife (Parks and Wildlife) have collaborated on the development of the management plan, which describes proposed management of the Yawuru Birragun Conservation Park for the next 10 years, or until it is replaced with a new management plan.

Section 1 of the management plan introduces the management setting and highlights the relationship that Yawuru people have with their country. It also elaborates on the native title determination, relevant aspects of the ILUAs, joint management arrangements and the legislative context, including legal recognition of values of international and national significance. In this introductory section, the role of the *Yawuru cultural management plan*[1] as a key guiding document for the Yawuru conservation estate management plans is highlighted.

Sections 2 to 4 explain the tenure arrangements, requirements for assessing the effectiveness of management, and set out the vision that has been identified for the broader Yawuru conservation estate.

Section 5 of the document describes key cultural, ecological, social and economic values and management issues. Management objectives and strategies are presented for each value identified. Key Performance Indicators (KPIs) are specified for those values that have been identified as being of highest priority for management over the next ten years, and include:

- a set of key Yawuru cultural values
- hydrology
- wetland and melaleuca thicket habitats
- history and heritage values.

The cultural significance of Broome was articulated in an expert report to the Federal Court during native title deliberations:

'…the Broome region, in religious terms, [is] intensely crowded. It may not be an exaggeration, and may give some indication of its uniqueness, to say it is something of a Jerusalem, Mecca or Varanasi [for] a significant part of Aboriginal Australia' (Sullivan cited in Yawuru RNTBC 2011).

The Yawuru cultural significance and context of the Yawuru Birragun Conservation Park is a dominant feature of this management plan.

The Yawuru Birragun Conservation Park includes parts of the Roebuck Bay Ramsar site, but the majority of the Ramsar site lies within part of the Yawuru conservation estate that will be covered by a separate management plan (specifically, the Yawuru Nagulagun/Roebuck Bay Marine Park joint management plan). Parts of the Yawuru Birragun Conservation Park are included in the West Kimberley National Heritage Area. Figures in Section 1.5 show the park in relation to the Ramsar site and national heritage area boundaries.

A variety of marine and freshwater wetland habitats underpin many of the most significant values of the Yawuru Birragun Conservation Park, including cultural, ecological, social and economic values. Understanding and maintaining the function and integrity of hydrological systems that provide critical ecosystem benefits and services, and maintaining the condition of wetland habitats, must therefore be a high priority for management of the Yawuru Birragun Conservation Park. KPIs described in the sections dealing with hydrology, wetlands and melaleuca thickets, will help with assessing whether the management objectives for these values are being achieved.

[1] The term '*Yawuru cultural management plan*' is used throughout this document to refer to the *Walyjala-jala buru jayida jarringgun buru nyamba Yawuru ngan-ga mirli mirli (Planning for the future: Yawuru cultural management plan)* (Yawuru RNTBC 2011).

Other ecological values and habitats that are addressed in Section 5 are:

- geomorphology
- native flora, fauna and ecological communities
- saltmarsh
- pindan
- beaches and dunes.

Social and economic values addressed in Section 5 are:

- history and heritage
- recreation and tourism
- resource values.

Broome and surrounds, including the Yawuru Birragun Conservation Park, offer visitors to Broome and those who have chosen to live there, a range of highly valued opportunities for nature-based recreation and cultural tourism. Increases in the resident population of Broome, and in the number of tourists, will result in increasing numbers of people engaging in recreation and tourism activities in the Yawuru Birragun Conservation Park over the life of this plan. Because the Yawuru Birragun Conservation Park was, until recently, classified as unallocated Crown land, many of the recreation management issues arise because access and use to date has essentially evolved in an unplanned and unmanaged way, and due to the lack of appropriate recreational facilities and services. The plan (Section 5.3.2) proposes a range of measures to address this, including improving access, facilities and services, and providing visitors with a range of recreation and tourism opportunities that are consistent with and complementary to the conservation of cultural and ecological values. Development of new cultural tourism and ecotourism products that cater for visitors seeking to learn more about traditional and contemporary Aboriginal culture will be an important focus. The development of such products has the important benefit of providing employment and training opportunities for Yawuru people, and makes a valuable contribution to the local economy by adding to the range of tourism opportunities available for visitors to Broome.

Section 6 of the management plan identifies general management programs for the Yawuru Birragun Conservation Park. Implementation of these programs, in conjunction with the strategies described for each value in Section 5, will ensure the joint management partnership is well placed to realise the vision, objectives and targets described. Section 6 identifies objectives and strategies for:

- access management
- introduced species management
- fire management
- information, education and interpretation
- public participation
- research and monitoring
- patrol and enforcement
- visitor safety.

An important facet of the access management program is to ensure that access to culturally sensitive and significant areas is appropriate. Access to law grounds and areas surrounding law grounds, for example, will be restricted to senior Yawuru law men who have acquired the necessary cultural knowledge, a requirement stipulated in the Joint Management Agreement signed by all the management parties. Access restrictions to law grounds and other culturally sensitive areas will be given effect through implementation of the management plan (as described in Section 6.1.1).

While recognising the need for access restrictions to accommodate some Aboriginal cultural and customary purposes, the management plan also ensures that opportunities for locals and visitors to enjoy Yawuru country are maintained and improved.

Above: The threatened Airlie Island ctenotus skink. Photo – Karen Bettink/Parks and Wildlife

1. Introduction and management context

This management plan describes proposed management arrangements for the Yawuru Birragun Conservation Park, one part of the Yawuru conservation estate that has recently been established around Broome, Western Australia (see Map 1). This plan is one of a suite of management plans that will apply to the Yawuru conservation estate (as shown in Map 2). The Yawuru conservation estate will be managed by Yawuru Registered Native Title Body Corporate (Yawuru RNTBC) in partnership with a number of joint management partners. The entire Yawuru conservation estate will be jointly managed, although the management parties and arrangements vary across the conservation estate.

This plan has been prepared in accordance with Part V Division 1 of the CALM Act. The parties involved in joint management of the Yawuru Birragun Conservation Park are Yawuru RNTBC and the Department of Parks and Wildlife (Parks and Wildlife). The Yawuru Birragun Conservation Park will be Yawuru freehold land, which is to be jointly managed in accordance with the CALM Act by Yawuru RNTBC and Parks and Wildlife.

Values of the Yawuru Birragun Conservation Park of special note are:

- Yawuru cultural heritage sites and other cultural values including improved opportunities for Yawuru people:
  - to carry out customary activities and to enjoy country
  - to fulfil their responsibilities for country
  - to use and gain respect for traditional ecological knowledge and the concepts of living cultural landscape
- a variety of coastal and near coastal wetland habitats that are of great cultural significance to Yawuru people, are rich focal points for a diverse range of native flora and fauna, and which provide a variety of important ecological services and functions to terrestrial and marine environments
- provision of habitat and potential habitat for several threatened fauna species, and for migratory bird species subject to various international agreements (parts of the Yawuru Birragun Conservation Park are also included in the Roebuck Bay Ramsar site)
- opportunities for semi-remote nature-based recreation and eco-cultural tourism activities close to the town site of Broome.

Some potential threats to the values of the Yawuru Birragun Conservation Park are:

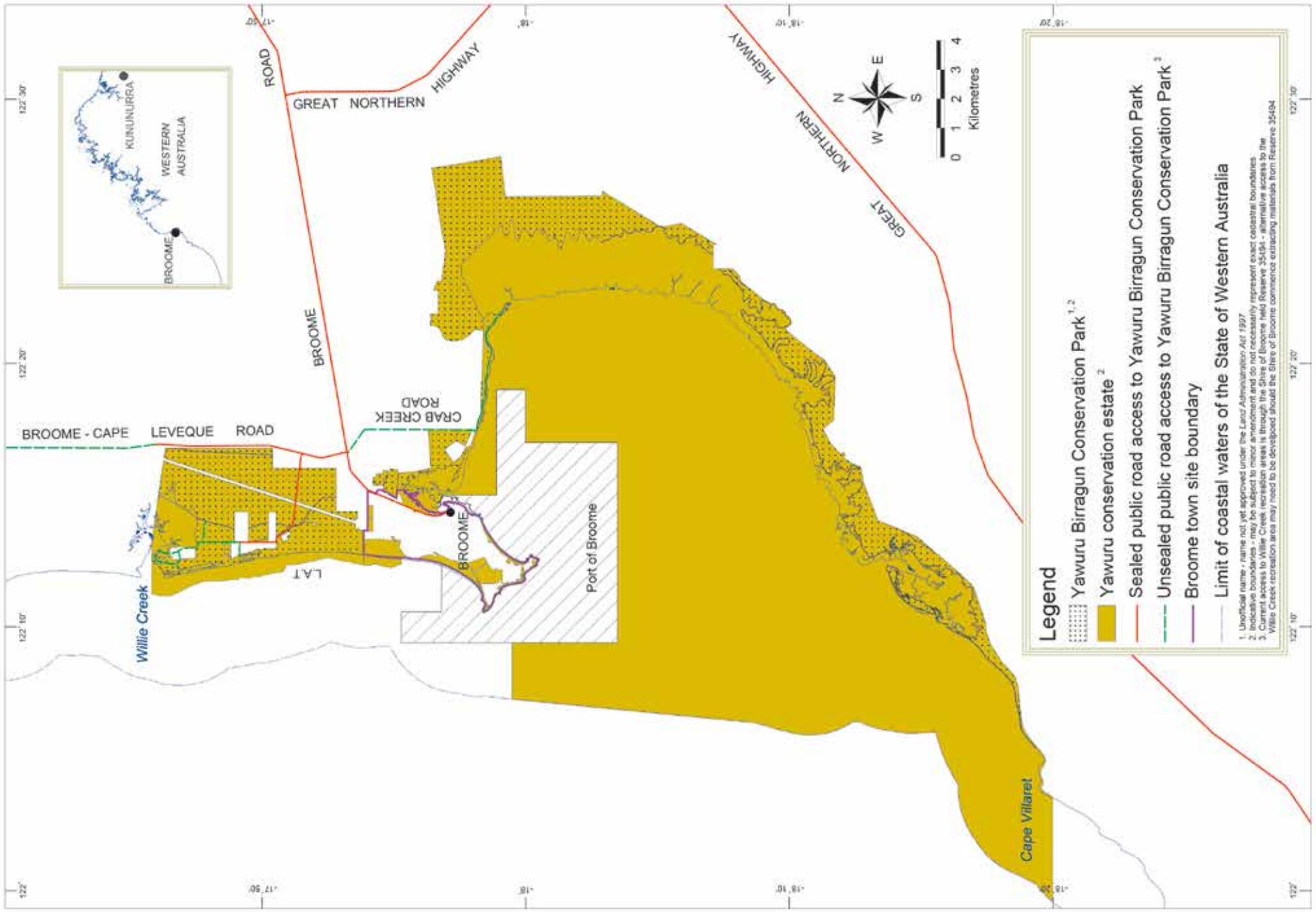
- a lack of awareness, understanding or respect for Yawuru cultural values and native title rights among people using the park
- any factors that have the potential to significantly alter the hydrological regimes or sedimentary processes that help sustain the flora and fauna
- disturbance to fauna through human use of habitats such as important shorebird roosting sites
- significant habitat loss or degradation from the spread of environmental weeds, the effects of feral herbivores and predators, the trend towards large, hot, late dry season fires, and the interactions and cumulative effects of these threatening processes.

Different parts of the Yawuru conservation estate are subject to differing tenure and management arrangements, but the values of the terrestrial and marine areas are intrinsically linked. Planning and management will be integrated, complementary and as seamless as possible across the various components of the conservation estate.

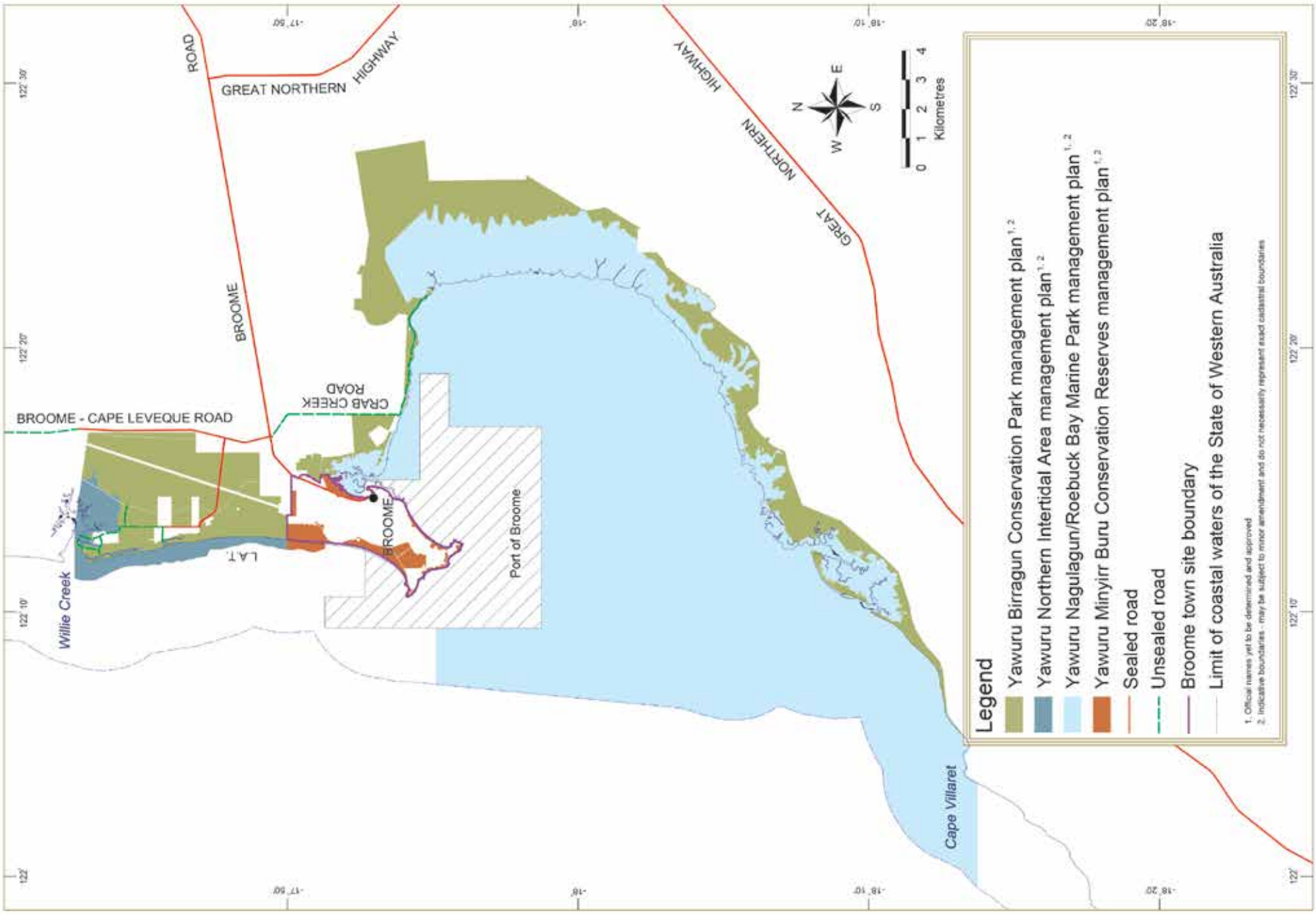
Some Yawuru names (e.g. for places, plants and animals) are used throughout this plan in italicised text. Map 3 shows some place names referred to in this plan, and Yawuru names for places have been included as well as official names; the Yawuru place names are, however, not official or formally recognised at this stage. Note that Yawuru language can be spelt in alternative ways. A glossary of Yawuru language names used in this plan is provided on page 89.

Above: A group of echnidnas found during a clean-up of rubbish in Yawuru Birragun Conservation Park. Photo – Yawuru Rangers

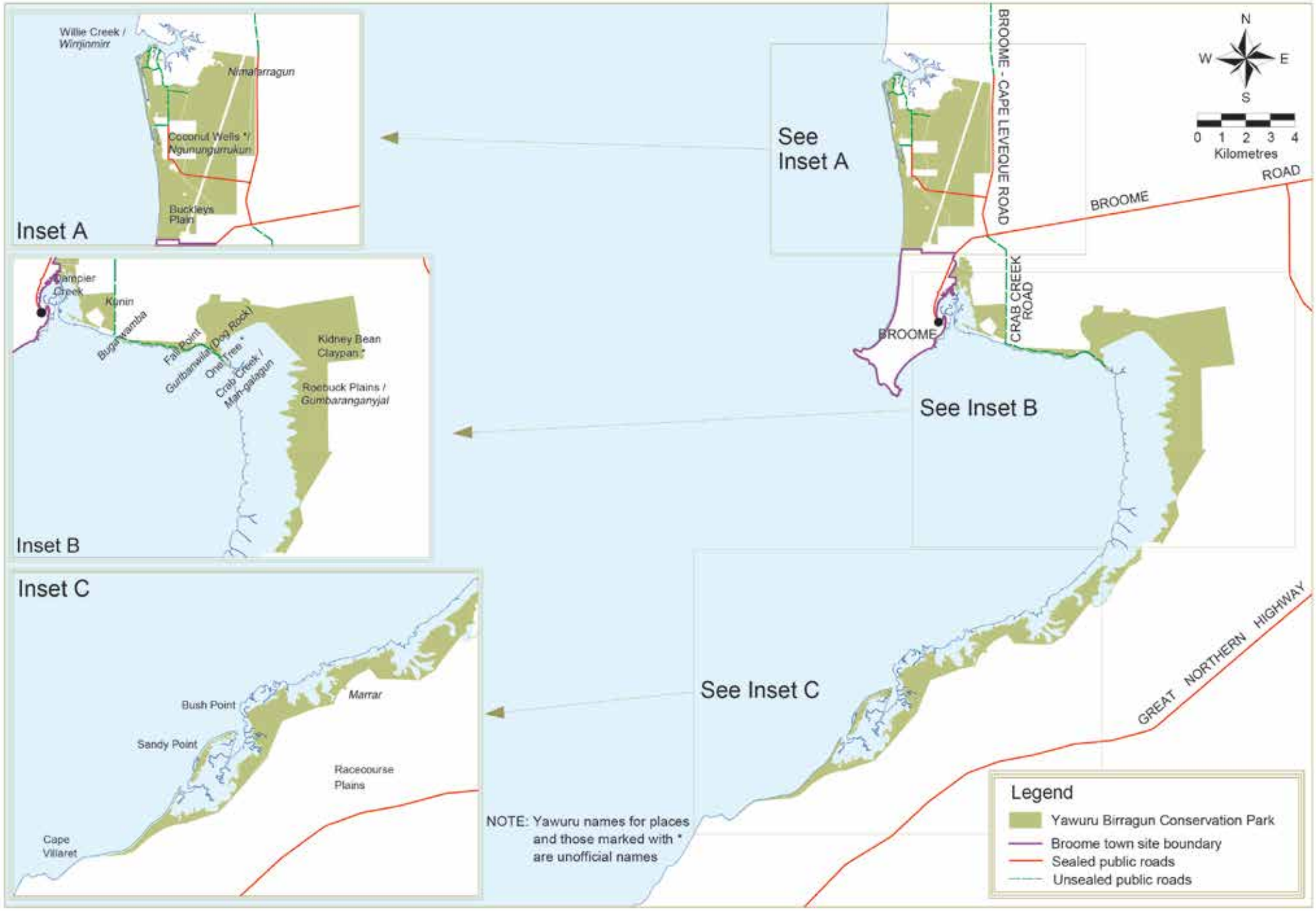
Map 1 – Location of the Yawuru Birragun Conservation Park within the Yawuru conservation estate



Map 2 – Yawuru conservation estate management plans



Map 3 – Yawuru place names



'*Liyan* is about relationships—with country, family, community. It is what gives meaning to people's lives. Yawuru peoples' connection to country and joy of celebrating our culture and society is fundamental to having good *liyan*.'

Patrick Dodson
(Yawuru RNTBC 2011)

1.1 *Yawuru buru, Yawuru ngarrungunil* – Yawuru country, Yawuru people

For thousands of years Yawuru people have lived along the foreshore of Roebuck Bay, across the pindan plains, as far inland as the *Walan-garr* (the Edgar Ranges) and along the fringes of the Great Sandy Desert. Yawuru country is land and sea moulded by the cycle of seasonal change, and is a living cultural landscape with which Yawuru people have a dynamic and enduring relationship. In Yawuru law everything comes from *Bugarrigarra*, the time when creative beings traversed the country, naming the landscape, defining the languages and setting down rules and customs. Created and given form by *Bugarrigarra*, country is the source of spirit, culture, language, and it is where spirits return on death. From *Bugarrigarra*, Yawuru people have responsibility to look after country and to ensure that their traditions are passed on to future generations. Every time Yawuru people go out on country, hunting and fishing, they live culture – these activities are an expression of culture and enable Yawuru people to reconnect with country, spirit places, ancestors and *Bugarrigarra*.

The relationship of Yawuru people to country is at the heart of their cultural responsibilities and being. This is expressed through *liyan*. *Liyan* comes from Yawuru peoples' connection to country, ancestors and Yawuru way of life. It reflects a sense of belonging to Yawuru society, and represents the feeling people hold, individually and collectively, particularly when they are on their country.

Mabu liyan (good *liyan*) expresses Yawuru peoples' emotional strength, dignity and pride. The guiding principle for good management of Yawuru country is that Yawuru people have to maintain good, clear *liyan* with the country within the modern, ever-changing world. To ensure Yawuru people can keep *Mabu liyan* they have to:

- visit country
- respect spirits abiding in country
- continue cultural traditions
- respect *Bugarrigarra*
- look after all the plants, animals and other resources that are part of country
- maintain and protect sacred places
- foster a relationship with country
- assume cultural responsibility as individuals and collectively for the future use and management of Yawuru country
- achieve balance between keeping things as they are and developing the country.

Above: 'We have *mabu liyan* (good feeling) when we visit country with our family' – Felix Edgar and Mati Gilbert at *Yardugarra*. Photo – Sarah Yu

Yawuru people want to generate an understanding of how they feel about and relate to country, with respect for *Bugarrigarra* and cultural traditions and practices, and how non-Yawuru people can respect this.

For countless generations Yawuru people managed country sustainably, relying on their intimate knowledge of the natural environment, and applying customary law, protocols, and practices passed down from ancestors. Ancestors hold the collective communal wisdom and knowledge passed down through families and Yawuru responsible leaders. This knowledge is passed on to their children when they go hunting, fishing, gathering and camping, as Yawuru people have always done. Understanding the subtle changes in country and following the seasons is part of Yawuru cultural heritage and provides Yawuru people with a guide to where and how to harvest and look after the resources of country. Because Yawuru activities change in response to the annual cycle of the seasons, Yawuru people believe their way of living has minimal impact on the environment. This plan is underpinned by this knowledge and its use, and aims to further integrate Yawuru knowledge to support successful conservation and management of Yawuru land and sea country.

In recent times Broome has undergone massive transformation as its population, infrastructure, housing and industry have expanded. Yawuru people, the native title holders of their country, are well aware of the many challenges such changes present for managing country and, in a mutually respectful partnership with others, are well placed to meet them.

1.2 Native title determination and Indigenous Land Use Agreements

With the High Court decision in Mabo and Wik the Commonwealth Government introduced the *Native Title Act 1993* (Native Title Act). Subsequently, Yawuru began a 12-year journey to lodge and determine their native title rights by way of court action and negotiations with the State Government. On 28 April 2006, the Federal Court of Australia determined Yawuru people to be the recognised native title holders of the lands and waters in and around Broome.

In February 2010, the Yawuru RNTBC, the Government of Western Australia, Shire of Broome and other relevant parties signed two Indigenous Land Use Agreements – the *Yawuru Prescribed Body Corporate Indigenous Land Use Agreement* and the *Yawuru Area Agreement Indigenous Land Use Agreement* ('the ILUAs') (National Native Title Tribunal 2010a, 2010b). An Indigenous Land Use Agreement is an agreement under the Native Title Act between a native title group and others about the use and management of land and waters. The ILUAs were a settlement of native title issues and clarified that native title was not extinguished over the Yawuru conservation estate, as well as resolving heritage issues about land required for the future development of Broome. In September 2016, Yawuru RNTBC, the State Government of Western Australia and other relevant parties signed an additional ILUA to provide for the creation of the marine park over specified intertidal areas of Roebuck Bay (the 'marine park ILUA'). All three ILUAs provide for the establishment and joint management of Yawuru conservation estate.

'History hasn't always been kind to Yawuru people. We had no say when our land, our home, was taken from us and we were pushed towards the edges. But we stayed strong and true to our culture. We can now take our rightful place in the Broome community.'

Gajai Frank Sebastian
(Yawuru RNTBC 2011)

More information on native title, the Yawuru peoples' journey for native title determination and the ILUAs can be found on the website for the National Native Title Tribunal (National Native Title Tribunal 2010c), the Yawuru website (www.yawuru.com), and in the *Yawuru cultural management plan*.

Above: Patrick Dodson, Francis Djiagween and Gajai Frank Sebastian at the signing ceremony. Photo – Peter Docker

1.3 *Walyjala-jala buru jayida jarringgun buru nyamba Yawuru ngan-ga mirli mirli* (Planning for the future: Yawuru cultural management plan)

The *Yawuru cultural management plan* was developed by the Yawuru RNTBC, as agreed in the ILUAs, to provide a foundation document to guide planning and management of the Yawuru conservation estate. The plan addresses Yawuru customs, practices and customary law, and provides detail on Yawuru policies, visions and requirements to be taken into account during the development of management plans for the Yawuru conservation estate.

As a comprehensive articulation of the aspirations and responsibilities of Yawuru native title holders, the *Yawuru cultural management plan* is an authoritative information source for the various joint management partners and the wider community. The development of the *Yawuru cultural management plan* involved all facets of the Yawuru organisational system and it will remain a key document for the joint management of the Yawuru conservation estate.

The *Yawuru cultural management plan* was a primary information source for many of the culturally based concepts and values outlined in this management plan. Copies of the *Yawuru cultural management plan* may be obtained through Nyamba Buru Yawuru Ltd (contact details available at the end of this document).

1.4 Holistic joint management across Yawuru conservation estate

While this management plan is one of a suite of joint management plans that will apply to the Yawuru conservation estate, the cultural, ecological, social and economic values of the Yawuru terrestrial and marine conservation reserves are implicitly linked. As such, a well-integrated management approach capable of protecting and managing the values in a culturally appropriate manner across the Yawuru conservation estate is required. Management objectives, strategies, performance measures and targets identified in this management plan complement those for the other Yawuru conservation estate management plans.

The various components of the Yawuru conservation estate are subject to varying tenure arrangements and therefore a suite of management plans (shown on Map 2) will apply to Yawuru conservation estate*:

- ***Yawuru Birragun Conservation Park management plan**
- *Northern Intertidal Area management plan
- *Yawuru Minyirr Buru Conservation Reserves management plan
- *Yawuru Nagulagun/Roebuck Bay Marine Park management plan.

These plans are all informed by the *Yawuru cultural management plan*.

Beyond collaboration on the development of management plans, integrated, holistic management of the Yawuru conservation estate is also facilitated by the joint management arrangements that are in place to implement, monitor and review the management plans. While the joint management arrangements differ across the Yawuru conservation estate, all involve partnerships with Yawuru RNTBC, and recognition of the Yawuru Park Council which has representatives of the all the various management parties (see section below for more information about the Yawuru Park Council's role, with a particular focus on the Yawuru Birragun Conservation Park).

1.4.1 Joint management of Yawuru Birragun Conservation Park

In accordance with the ILUAs, the Yawuru Birragun Conservation Park, which will comprise Yawuru conditional freehold land, is to be managed for the purpose of 'conservation, recreation and traditional and customary Aboriginal use and enjoyment and for the purpose of practising, sustaining and maintaining native title rights and interests'. This land will be managed under section 8A of the CALM Act, whereby Parks and Wildlife has entered into an agreement to

*Official names yet to be determined

manage that land jointly with Yawuru RNTBC. Provisions of the CALM Act allow that land to be managed as if it were a conservation park, however, the land remains freehold land. Management plans for conservation parks are to have the objective of fulfilling 'so much of the demand for recreation by members of the public 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 feature of archaeological, historic or scientific interest' (as described in section 56(1)(c) of the CALM Act). In addition, management plans for any land shall have the objective of 'protecting and conserving the value of the land to the culture and heritage of Aboriginal persons...' (as described in section 56(2) of the CALM Act).

The Joint Management Agreement, a sub-agreement of the ILUAs, describes various management arrangements for the Yawuru conservation estate including management principles, roles and responsibilities for each party, decision-making processes and administrative functions. In accordance with the Joint Management Agreement, the Yawuru Park Council (Park Council) has been established to jointly administer the management of the conservation estate. The Park Council comprises representative members from the Yawuru RNTBC, Parks and Wildlife and the Broome Shire Council, with administration of the conservation estate having regard to the differing joint management arrangements and associated responsibilities. The Park Council's role includes:

- preparation of management plans for the jointly managed conservation estate, ensuring these are consistent with the vision and policies set out in the *Yawuru cultural management plan*
- strategic monitoring of implementation of the joint management plans
- assessment of the effectiveness of joint management of the Yawuru conservation estate.

This management plan has been prepared collaboratively by the joint management parties, in accordance with the CALM Act and as required under the Joint Management Agreement. The plan has also been informed by the *Yawuru cultural management plan* as stipulated in the Joint Management Agreement.

Above: Sarah Yu, Dean Mathews and Jimmy Edgar (from left to right) discuss a planning field trip. Photo – Chris Nutt/Parks and Wildlife
Right: Micklo Corpus uses resources of the 'bush office' to help make a point on a planning field trip. Photo – Parks and Wildlife

Above: Plant fossil in Broome Sandstone. Photo – Kevin Kenneally

1.5 Legislative context

This management plan has been developed through collaboration of Yawuru RNTBC and Parks and Wildlife – the 'joint management partners' relevant to this management plan. The plan has been prepared in accordance with Part V Division 1 of the CALM Act and as agreed under the Joint Management Agreement. It will guide management of the Yawuru Birragun Conservation Park for ten years from the date of gazettal, or until it is replaced with a new plan. The plan may be amended if necessary in accordance with section 61 of the CALM Act.

Yawuru RNTBC and Parks and Wildlife will evaluate the effectiveness of the plan by using selected KPIs and/or other surrogates as necessary (this is discussed in more detail in Section 3 – Performance Assessment).

The CALM Act, the *Wildlife Conservation Act 1950* (Wildlife Conservation Act) and associated regulations include provisions for Aboriginal people to take flora and fauna and undertake a range of other activities for Aboriginal customary purposes. Management of the Yawuru Birragun Conservation Park needs to consider the Yawuru native title rights to hunt and gather for personal, domestic or non-commercial communal purposes in the conservation estate as recognised in the native title determination.

A range of legislative requirements apply or could apply in managing the Yawuru Birragun Conservation Park, in addition to requirements of the above-mentioned legislation that is administered by Parks and Wildlife. This includes, for example, legislation applicable to heritage protection, fisheries management and bushfire management. Some specific requirements are highlighted in relevant sections throughout this plan.

The Yawuru Birragun Conservation Park includes values that have been recognised as 'matters of national environmental significance' and therefore given additional protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any matter that will have, or is likely to have, a significant impact on a matter of national environmental significance, requires assessment and approval under the EPBC Act. More specifically, the relevant Yawuru Birragun Conservation Park values (at the time of writing) are:

- areas included in the Roebuck Bay Ramsar site and ecosystem components and processes that contribute to the ecological character of the Ramsar site
- areas included in the West Kimberley National Heritage Area
- migratory species
- nationally threatened species
- listed marine species.

Some parts of the Yawuru Birragun Conservation Park are included within the boundary of the Roebuck Bay Ramsar site (see Figure 1). Roebuck Bay was declared a wetland of international significance under the Ramsar Convention in 1990. It is regarded as having the most diverse and productive tropical intertidal flats in the world and is one of the most important staging sites for migratory shorebirds globally.

Any actions that are likely to significantly impact the ecological character of a Ramsar site require assessment and approval under the EPBC Act. Designation of a wetland as a Ramsar site carries certain obligations for the signatory countries, including management measures to maintain the ecological character of the site and to detect and report likely or measured changes in this. The *Ecological character description for Roebuck Bay* (Bennelongia 2009) describes the ecological character of the site, identifies critical ecosystem components and processes, documents the baseline condition, and quantifies limits of acceptable change for the most important features of the system. These are strongly focused on the marine environment of Roebuck Bay and therefore research, monitoring and reporting requirements regarding the status of critical ecosystem components and processes will be facilitated through the Yawuru Nagulagun/ Roebuck Bay Marine Park management plan, which will be the primary Ramsar site management plan. This plan for the Yawuru Birragun Conservation Park does, however, contribute to the management framework for the Ramsar site through inclusion of strategies aimed at protecting and maintaining those

critical ecosystem components and processes relevant to the Yawuru Birragun Conservation Park (e.g. aspects of geomorphology and hydrology; shoreline vegetation; shorebirds and turtles). Therefore, while the Roebuck Bay Ramsar site boundary occurs across the marine and terrestrial reserves and management plans of Yawuru conservation estate, management of the Ramsar site will be integrated and complementary, and meet the Australian Ramsar Management Principles in maintaining the values recognised under the listing for the site.

Parts of the Yawuru Birragun Conservation Park are included within the boundary of the West Kimberley National Heritage Area (see Figure 2). The listed area includes the intertidal zone of the Dampier Coast where dinosaur tracks and associated fossils are exposed in the Broome Sandstone (these have however been found in the adjacent intertidal areas of the Yawuru conservation estate and therefore fall within the Yawuru Nagulagun / Roebuck Bay Marine Park and the Northern Intertidal Area components). These fossils provide valuable insights into the ecology of the Mesozoic (DSEWPC 2011a).

The Yawuru conservation estate includes values that are the subject of national or international agreements (e.g. agreements pertaining to migratory species such as the Japan–Australia Migratory Birds Agreement, the China–Australia Migratory Birds Agreement, the Republic of Korea–Australia Migratory Birds Agreement or the Bonn Convention), and which are therefore given special protection under the EPBC Act. EPBC Act 'listed marine species' include crocodiles, marine turtles and birds, and all of these occur within the Yawuru Birragun Conservation Park.

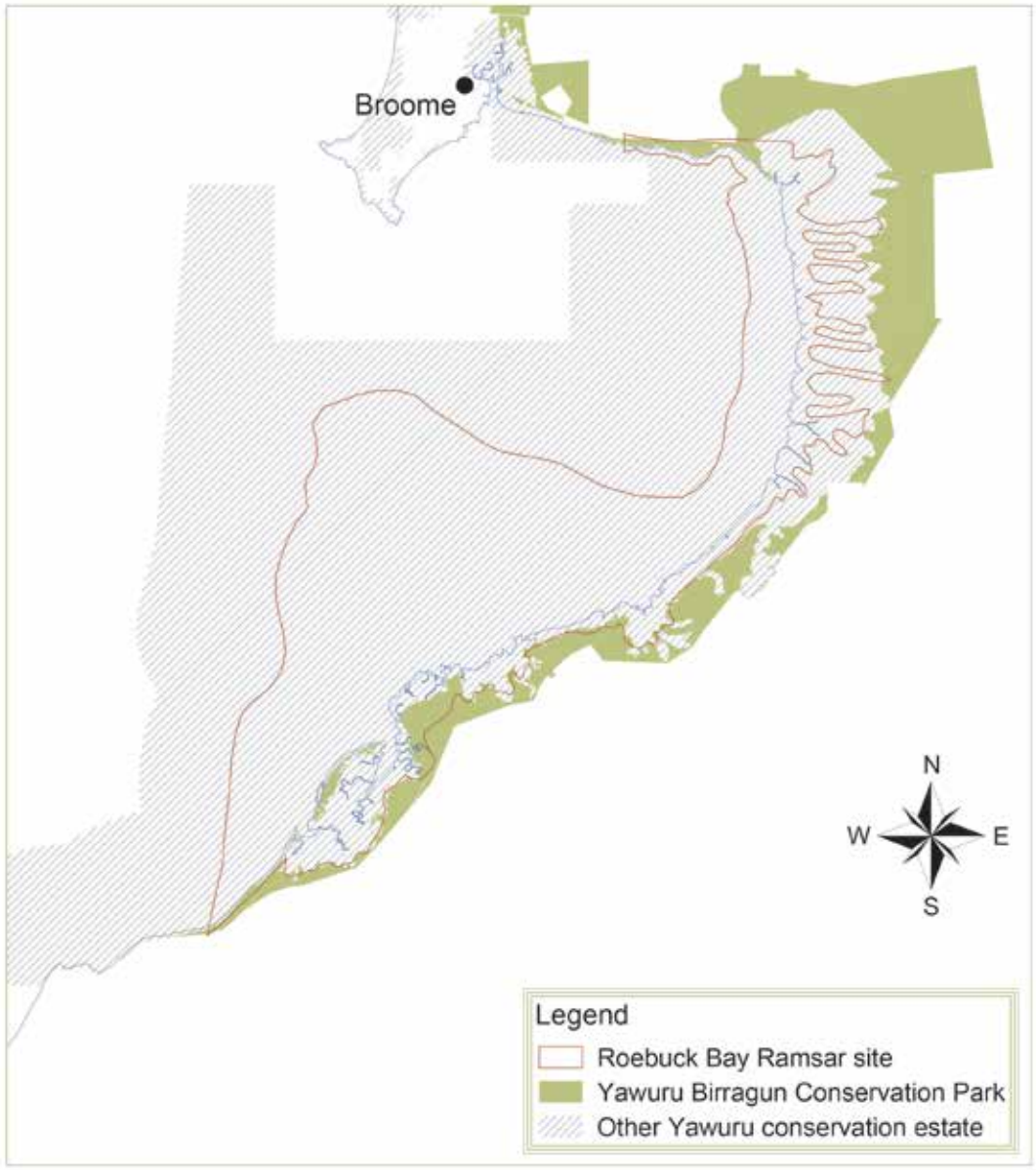


Figure 1 – Ramsar site boundary

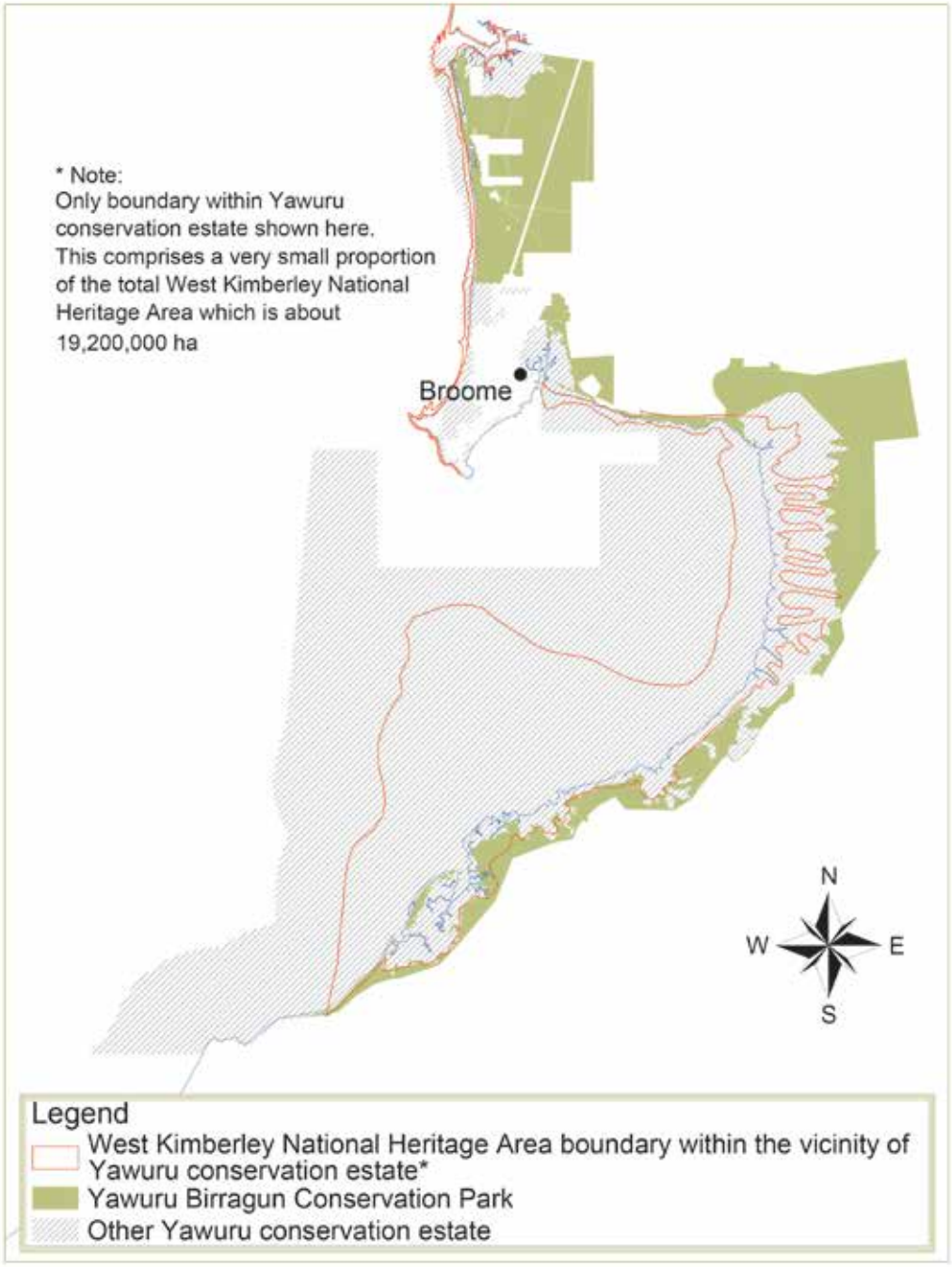
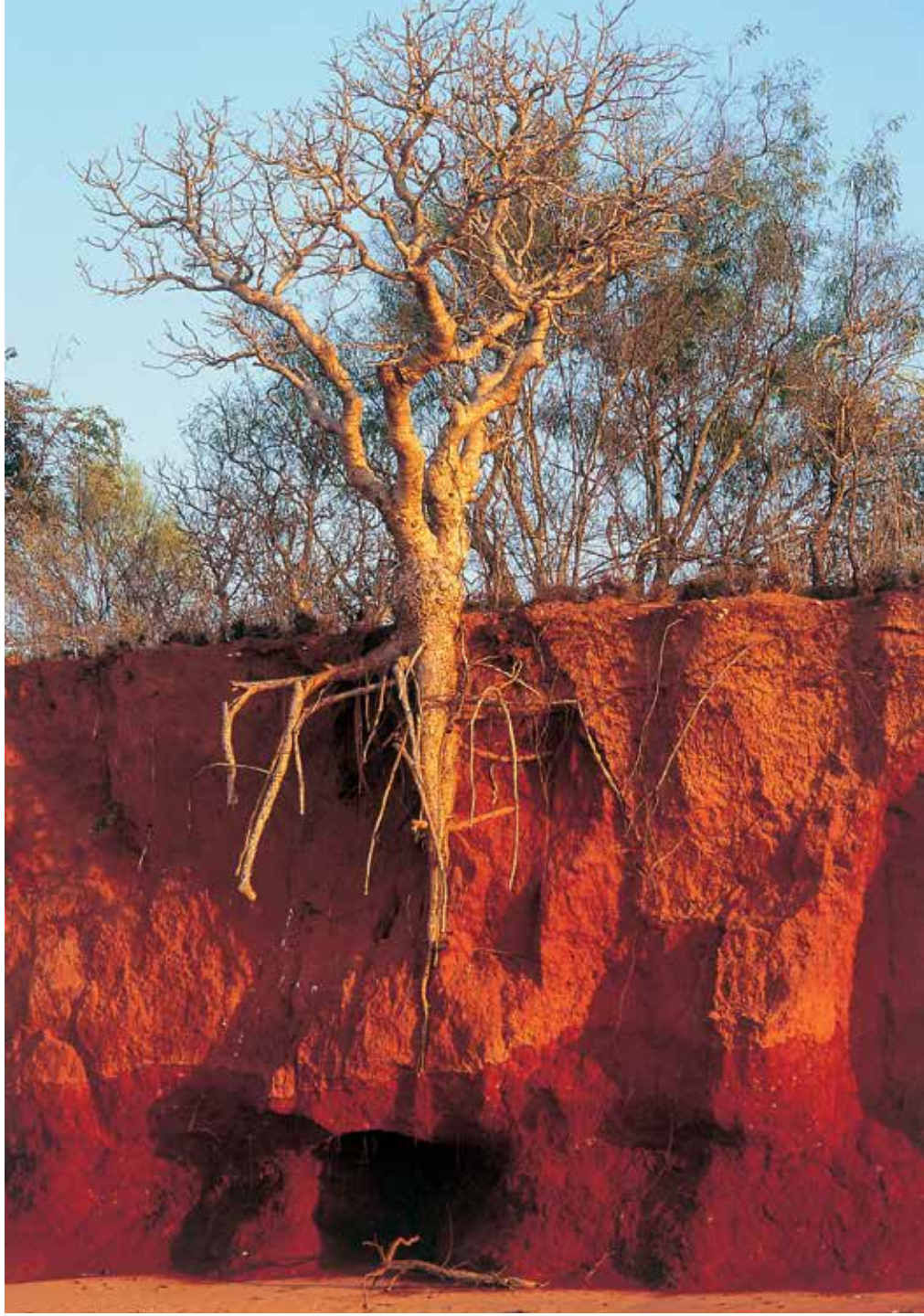


Figure 2 – National heritage area boundaries near Yawuru Birragun Conservation Park



Above: *Mirda* or coolamon tree (*Gyrocarpus americanus*) on an eroding pindan cliff.
Photo – Jan van de Kam

2. Tenure

Maps 4a and 4b show the tenure of the Yawuru Birragun Conservation Park and adjacent areas, including other parts of the Yawuru conservation estate. Much of the land adjacent to the Yawuru Birragun Conservation Park is unallocated Crown land or pastoral lease (Roebuck Plains Station and Thangoo Station). The Yawuru Birragun Conservation Park also borders parts of in-town, northern intertidal and Roebuck Bay components of Yawuru conservation estate, a Water Corporation water supply reserve, and private lands including the rural subdivision of Coconut Wells.

As stipulated in the ILUAs, the Yawuru Birragun Conservation Park will comprise land that is to be transferred to Yawuru RNTBC under section 75 of the *Land Administration Act 1997* (Land Administration Act) subject to conditions[2]. More specifically, this land transfer is to be subject to the condition that Yawuru RNTBC 'use and manage the area for the purpose of conservation, recreation and traditional and customary Aboriginal use and enjoyment and for the purpose of practising, sustaining and maintaining native title rights and interests'. To give effect to these arrangements, Yawuru RNTBC will grant a lease to the State for a term of 99 years. While the area of the Yawuru Birragun Conservation Park will be managed as if it were a 'conservation park' under the CALM Act[3], the land tenure nevertheless remains Yawuru conditional freehold subject to the lease to the State. The seaward boundary of the Yawuru Birragun Conservation Park extends to the high water mark.

2.1 Additions to or excisions from the Yawuru Birragun Conservation Park

The Yawuru Prescribed Body Corporate ILUA provides for areas of cultural significance on Thangoo pastoral lease to be excised from the pastoral lease (subject to agreement by the lessees) and incorporated into the freehold areas of the conservation estate. Final agreement on these additions to the Yawuru conservation estate has not been reached at the time of publication.

As described in the Joint Management Agreement, the joint management parties may (by written agreement) add to or subtract from the area of Yawuru conservation estate. Any agreed changes to freehold areas will also need to be reflected in a variation of the lease to the State.

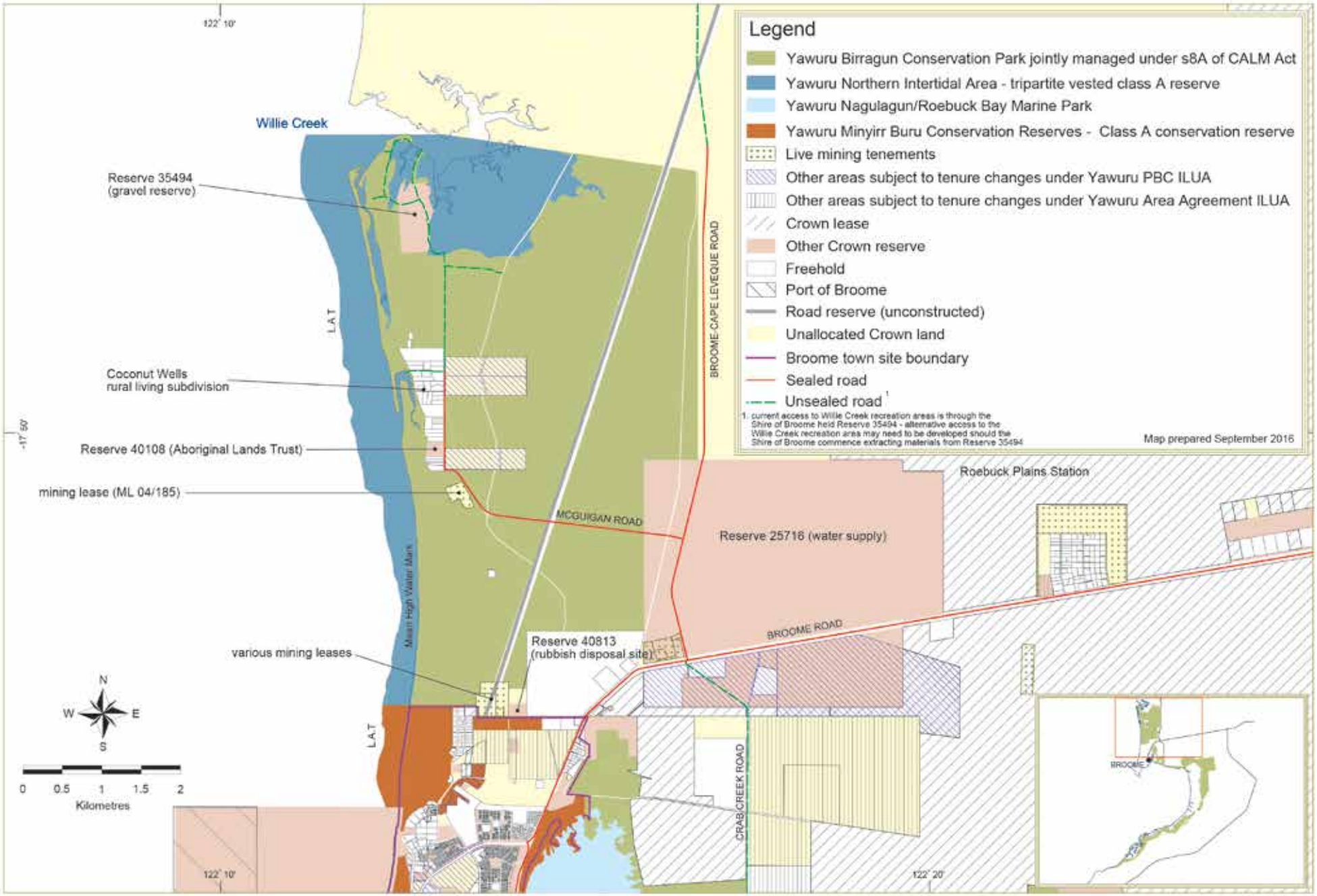
Opportunities may arise over the life of this plan to add areas of cultural or conservation value to the Yawuru conservation estate. These will be considered if and as they arise. Should land be added to the Yawuru Birragun Conservation Park over the life of this plan, it will be managed in accordance with the vision, goals, objectives and strategies of this plan, until such time that more specific and detailed planning is done for the area when the plan is reviewed.

[2] While the land assembly process for the Yawuru Birragun Conservation Park has commenced the final land tenure arrangements as described in the ILUAs are not yet complete.

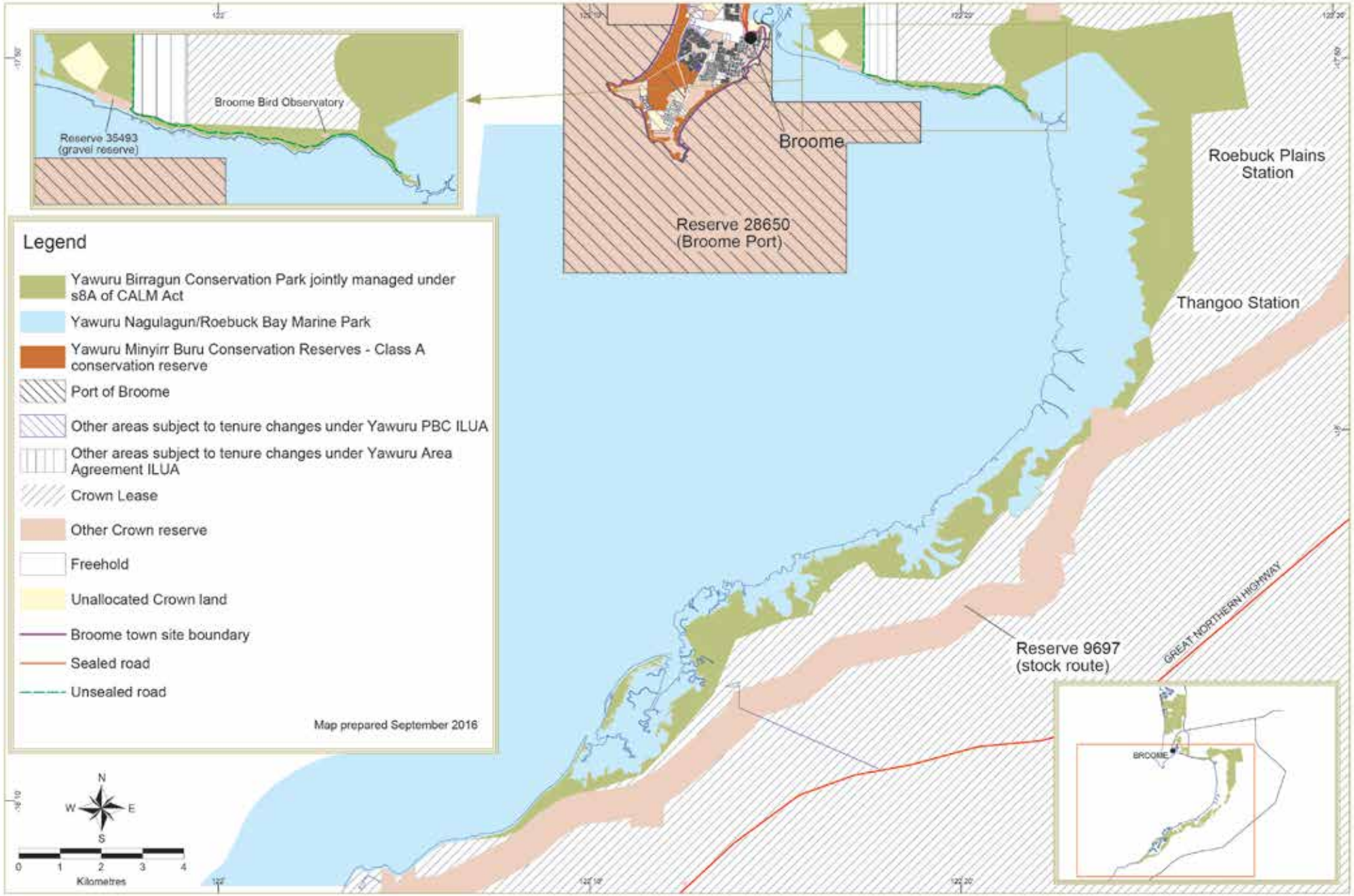
[3] As described in section 8A(5)(a)(iv) of the CALM Act.

Above: Kidneybean Claypan during the wet season (see photo on page 47 for a similar view during the dry season). Photo – Jan van de Kam

Map 4a – Yawuru Birragun Conservation Park and adjacent tenure (north)



Map 4b – Yawuru Birragun Conservation Park and adjacent tenure (south)



3. Performance assessment

Mechanisms to assess the implementation and effectiveness of management are important components of an adaptive management framework and signal where management may need to be altered if it is not successfully meeting management objectives. Parks and Wildlife and Yawuru RNTBC will use KPIs and/or other surrogates to assess the success of the management plan.

A set of KPIs (comprising performance measures, targets and reporting requirements) have been identified for selected values and management issues – these are presented throughout the management plan in the sections where those values and issues are discussed. KPIs have been identified for those values and issues that were identified during the planning process as being important focus areas to achieve effective management of the Yawuru Birragun Conservation Park. KPIs have been selected for the following values and management issues:

- Yawuru cultural values of
  - living cultural landscape
  - traditional ecological knowledge
  - enjoyment of country and customary practices
  - responsibility for country
- hydrology
- *bilarra* (wetlands)
- *murrga-yirr-garnburr* (melaleuca thickets)
- history and heritage values
- introduced flora management.

As it is a newly established conservation area, there is a lack of adequately detailed information documented about the ecological values of the Yawuru Birragun Conservation Park, and therefore the KPIs reflect that acquiring greater knowledge about these is a high priority in this initial management plan. Consequently, the plan includes KPIs that are focused on assessing achievement of management outputs (e.g. availability of baseline condition data and reports) and outcomes (e.g. protection of a particular value). Protocols for measuring and reporting on KPIs (e.g. details of the data required, calculation methods and data presentation) will be specified in the research and monitoring program to be developed for the Yawuru conservation estate.

A portfolio will be maintained showing evidence of those areas where the management plan is being successful and those where changes are needed. Some examples of evidence that may be used to assess implementation of this plan include:

- specific, quantitative monitoring of significant assets such as special habitats and threatened ecological communities
- series of photographs, mapping or other imagery that show whether spatial and temporal changes have occurred
- checklists
- surveys
- incident investigation reports or records
- other written documents or forms.

Additional specific monitoring and reporting requirements apply to Roebuck Bay due to its designation as a Ramsar wetland. Parks and Wildlife is the lead agency for implementing the Ramsar Convention in Western Australia, and is responsible for reporting to the Australian Government if the ecological character of the site has changed, is changing or is likely to change. As the Ramsar site is predominantly within the Yawuru Nagulagun/Roebuck Bay Marine Park, the management plan for the marine park will be the primary Ramsar site management plan, and Parks and Wildlife's monitoring and reporting responsibilities for the Ramsar site will therefore be facilitated through that management plan. Nevertheless, research, monitoring and evaluation activities from this management plan will support site condition evaluation and monitoring.

4. Vision and goals

The vision for the Yawuru Birragun Conservation Park is:

Yawuru people and their partners working together with the wider community to restore, protect and maintain the cultural and natural values of the Yawuru Birragun Conservation Park for the enjoyment and benefit of present and future generations of Yawuru people and the wider population.

A set of strategic goals have been developed for the Yawuru Birragun Conservation Park. These recognise Yawuru people as native title holders, the legally stipulated purposes for the Yawuru Birragun Conservation Park, and values of international and national conservation significance within the Yawuru conservation estate. These strategic goals provide a link between the vision statement and the desired outcomes expressed through the objectives identified in this plan.

The strategic goals for management of the Yawuru Birragun Conservation Park are to:

- uphold and respect Yawuru people's culture and knowledge of country
- provide for sustainable traditional and customary Aboriginal use and enjoyment
- protect and conserve the value of the land to the culture and heritage of Aboriginal people
- conserve features recognised as being of special, international and national conservation significance
- conserve biodiversity
- maintain ecological integrity
- provide for recreation that is consistent with conservation of the natural environment and of indigenous flora and fauna
- conserve features of archaeological, historic or scientific interest.

Top: Park managers with Jimmy Edgar on a planning day field trip. Photo – Chris Nutt/Parks and Wildlife
Above: Nesting osprey. Photo – Tim Willing

Above: Roebuck Plains. Photo – Sarah Yu

5. Management of Yawuru Birragun Conservation Park values

For the purposes of this management plan, the intrinsically connected values of the Yawuru conservation estate have been addressed under the separate headings of cultural, ecological, social and economic values. This helps with the development of clear management objectives and strategies for each value group. This section describes the main cultural, ecological, social and economic values, and KPIs have been identified for a selection of these. Those values that have KPIs reflect highest management priorities for the Yawuru Birragun Conservation Park likely over the life of this plan. Management strategies are prioritised as high (H), medium (M) and low (L), and those most critical to achieving the management objectives are identified as 'high priority key management strategies' (H–KMS).

5.1 Yawuru cultural values

Information in this section has been obtained from the *Yawuru cultural management plan* and discussions with Yawuru representatives. The values described in Sections 5.1.1 to 5.1.4 are those that Yawuru RNTBC identified in Section 2.3 of the *Yawuru cultural management plan* (Yawuru RNTBC 2011). Further details about Yawuru cultural values and concepts are available in the *Yawuru cultural management plan*.

Yawuru cultural values stem from the relationship between Yawuru people and Yawuru country. As with country itself, these values arise from *Bugarrigarra*, which gave form to the land and seascape, determined law and gave Yawuru people the responsibility for looking after Yawuru country.

The Broome area contains significant places for Yawuru people and other neighbouring groups. In Yawuru country the *Bugarrigarra* laid down three traditions of law, which hold esoteric knowledge of country and guide customary practices. The Northern Tradition is allied with the northern and coastal people who live there, particularly the Bardi. The Southern Tradition is associated with the people further south and inland including the Karajarri, Nyikina, Mangala and Nyangumarta. The third tradition arises in Broome itself and travels east toward the desert and Uluru in central Australia. Knowledge and practices of all traditions is shared with groups outside Yawuru country. The cultural significance of the area was articulated in an expert report to the Federal Court during the first Yawuru native title hearing:

'…the Broome region, in religious terms, [is] intensely crowded. It may not be an exaggeration, and may give some indication of its uniqueness, to say it is something of a Jerusalem, Mecca or Varanasi [for] a significant part of Aboriginal Australia' (Sullivan cited in Yawuru RNTBC 2011).

5.1.1 Living cultural landscape (KPI)

According to Yawuru law, everything comes from *Bugarrigarra*, the creative epoch in which the world was given form and meaning. During this time, ancestral beings travelled through country, naming places and creating the features of the land, waters and skies, introducing rules and rituals associated with particular areas, the regional languages, the seasons and their cycles. *Bugarrigarra* narratives form an intricate network of 'songlines' and 'Dreaming' tracks, which traverse Yawuru country.

In this way Yawuru *buru*, or 'Yawuru country', means much more than just the physical land to which Yawuru people belong. *Buru* is the physical expression of *Bugarrigarra*, in which the features of Yawuru country were formed. As *Bugarrigarra* beings created and named places they endowed them with significance. The associated narratives and rituals recount their activities and link Yawuru people to particular areas of country for all time. These narratives ascribe metaphysical meaning to all aspects of physical reality; the landscape, under the ground, the sky, the water, the diverse plants and animals, and ecosystems.

Like all living things, Yawuru people are believed to arise from country. Certain places in Yawuru country have *rayi*, a life-giving essence that creates Yawuru spirit-children. This connection of a spirit-child to a specific place, its *bugarri*, is typically discovered through dreams or unusual events. Throughout life a Yawuru person remains connected to their *rayi* place, the place that gave them life.

Other metaphysical beings are known to be linked with certain places, but can also move around and be unpredictable. *Jurru* are snake-like beings associated with salt water and fresh water, and protect Yawuru country.

Bugarrigarra is not detached from contemporary life. It continues to exist and is the spiritual force that shapes ongoing cultural values and practice, relationships, obligations and responsibilities. Life since colonial times has contributed to the continuing evolution of the living cultural landscape that is Yawuru country. The influence of the pearling industry was particularly strong, bringing Aboriginal and Asian people together as indentured labour, living and working together and intermarrying. These events and other heritage areas such as burial sites, contemporary camping places, mission areas and places of work that shaped the lives of Yawuru people have become part of the story.

Incorporating Yawuru language into the formal names of the Yawuru conservation estate reserves helps reinforce and communicate to others the context of the conservation estate within the living cultural landscape that is Yawuru country. Yawuru distinguish two broad environmental categories in traditional country – *birra* (inland or bush side) and *nagula* (sea country), and this has provided the basis of the name that Yawuru have proposed for the 'conservation park'; Yawuru Birragun means 'Yawuru bush country'. Formalisation of this name through the State's nomenclature process is pending.

'When we die our *rayi* return to that place in our country. When we visit places we know the *rayi* of our ancestors are there, guiding us and looking after country, watching the behaviour of our people.'

(Yawuru RNTBC 2011)

Summary of management arrangements for living cultural landscape

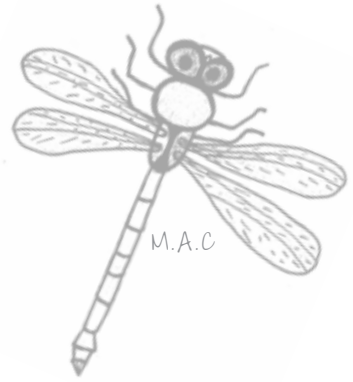
Management objectives	1. To ensure that activities within the Yawuru Birragun Conservation Park do not adversely affect opportunities for Yawuru people to have ongoing cultural connection and expression. 2. To promote increased understanding of Yawuru values and concepts of living cultural landscape.	
Management strategies	1. Ensure cultural heritage sites are protected, in particular highly significant and sensitive sites at immediate risk. 2. Assess human activities that may inhibit the protection of the area as part of a living cultural landscape, and implement management strategies to address any problems as necessary. 3. Carry out or support cultural mapping projects that spatially and conceptually characterise Yawuru cultural values within the conservation estate. 4. Develop and implement education and interpretation programs to inform visitors to the Yawuru Birragun Conservation Park about the value of the area as a Yawuru living cultural landscape. Yawuru people will have a primary and active role in this. 5. Undertake nomenclature procedures and processes to lodge and formalise Yawuru place names of and within the Yawuru Birragun Conservation Park as necessary in accordance with relevant Government legislation and policies (e.g. the *Land Administration Act 1997*).	H–KMS H–KMS H–KMS H H
Performance measures	1. Yawuru RNTBC level of satisfaction that opportunities for ongoing cultural connection of Yawuru people are not significantly disrupted because of management activities (or a lack of appropriate management activities) in the Yawuru Birragun Conservation Park. 2. Information, education and interpretation program for the Yawuru Birragun Conservation Park incorporates material about the values and concepts of living cultural landscape.	
Targets	1. Yawuru RNTBC is satisfied that opportunities for ongoing cultural connection of Yawuru people are being maintained or improved. 2. Yawuru RNTBC is satisfied that visitors have been provided with opportunities to increase their understanding about Yawuru values and concepts of living cultural landscape. 3. 50% of surveyed users of the Yawuru conservation estate are aware that the area forms part of the living cultural landscape of Yawuru country within the first five years following release of the management plan.	
Reporting requirements	Annually.	

Figure 3 – Yawuru seasons

5.1.2 Traditional ecological knowledge (KPI)

Like many Indigenous people across the globe, Yawuru people have a deep understanding of the flora, fauna, landscape features, seasons and cycles that make up their country, and changes that have occurred over time. Developed over millennia, this knowledge is deeply embedded within Yawuru culture and is often expressed through the stories and law that govern the relationships between people and country. Having used this knowledge to not only live off the land, but to sustain this lifestyle for thousands of years, there is much for conservation science and land management to gain from traditional ecological knowledge.

As with other aspects of Yawuru life and resource harvesting, knowledge of resources is largely underpinned by the six Yawuru seasons and the life cycles of individual species. Cultural rules and responsibilities established from this knowledge provide guidance on the use of country, such as what and when particular species should be harvested, how to tell when they are 'fat' or 'ready', who should not eat certain resources, and not wasting resources.



Summary of management arrangements for traditional ecological knowledge

Management objective	To apply Yawuru traditional ecological knowledge and integrate it with conservation science and land management.	
Management strategies	1. Document (e.g. in a database) the most important elements of Yawuru traditional ecological knowledge and investigate opportunities for integrating this with conservation science and land management.	H–KMS
	2. Develop processes and protocols for consulting and integrating Yawuru traditional ecological knowledge in the management of Yawuru conservation estate.	H–KMS
	3. Develop and implement education and interpretation programs to inform visitors to the Yawuru Birragun Conservation Park about Yawuru traditional ecological knowledge, with Yawuru people having a primary and active role.	H
Performance measure	Yawuru RNTBC level of satisfaction that traditional ecological knowledge is being consulted and adopted into management of the Yawuru Birragun Conservation Park.	
Target	Yawuru RNTBC is satisfied that traditional ecological knowledge is being consulted and adopted into management of the Yawuru Birragun Conservation Park.	
Reporting requirements	Annually.	

Above: *Girrbaju* (bush honey). Photo – Sarah Yu

5.1.3 Enjoyment of country and customary practices (KPI)

Although Yawuru country extends more than 100km inland, Yawuru people consider themselves to be saltwater people as they would travel and live along the coast, exploiting the resources of *nagulagun buru* – their sea country – according to seasons. Therefore, the ability to have access to the coast and sea within the conservation estate for customary practices is particularly important.

As the recognised traditional owners of Yawuru country, Yawuru people have the right to enjoy Yawuru country and maintain their customary practices. Native title rights and interests were stipulated under the Native Title Act determination. The ILUAs specify that the Yawuru Birragun Conservation Park area is to be managed for the purpose of 'conservation, recreation and traditional and customary Aboriginal use and enjoyment, and for the purpose of practising, sustaining and maintaining native title rights and interests'. This is also reflected in the Joint Management Agreement management principles which also include recognition of:

- access to the conservation estate for purposes consistent with Yawuru culture and tradition, and to preserve and sustain native title rights and interests

'We took the boys out to *Kunin* today. I had the best day. I feel so good. I been on country today and I will sleep good tonight.'

Gajai Frank Sebastian
(Yawuru RNTBC 2011)

- employment and training opportunities for Yawuru people in management of the conservation estate
- commercial and economic opportunities and benefits for Yawuru people.

In accordance with the Joint Management Agreement, access to certain culturally sensitive areas within the conservation estate is to be restricted to law bosses or authorised persons only. Further, other areas where Yawuru people can pursue cultural activities in privacy are important. Yawuru people have few outstation communities where they can go with their families to pursue cultural customary practices. Because most of the coastline in Yawuru country is used for a variety of purposes there are only limited areas available to undertake cultural activities and responsibilities in privacy.

As part of the (Yawuru Prescribed Body Corporate) ILUA Yawuru RNTBC have perpetual leases for two parcels of 'Thangoo land' close to the Yawuru conservation estate and on which Yawuru community facilities will be developed. Access from these communities into the Yawuru conservation estate will need to be developed over the life of this plan.

Summary of management arrangements for enjoyment of country and customary practices

Management objective	To recognise and support the right of Yawuru people to continue customary practices and to benefit from their country consistent with the purpose for the conservation estate.	
Management strategies	1. Implement access management arrangements (as discussed in Section 6.1.1 – Restricted access areas) to give effect to some special access arrangements needed for continuance of customary practices.	H–KMS
	2. Assess factors that may inhibit the rights of Yawuru people to enjoy country or maintain their customary practices, and implement management actions to address issues as necessary.	H–KMS
	3. Develop and implement education and interpretation programs to inform visitors to the Yawuru Birragun Conservation Park about Yawuru rights, as the recognised traditional owners, to enjoy Yawuru country and maintain their customary practices. Yawuru people will have a primary and active role in this.	H
Performance measure	Yawuru RNTBC level of satisfaction that they have been able to continue customary practices and benefit from country consistent with the purpose for the conservation park.	
Target	Yawuru RNTBC is satisfied that they have been able to continue customary practices and benefit from country consistent with the purpose for the conservation park.	
Reporting requirements	Annually.	

‘The people, the land, and the Law are three aspects of the same thing. We have a duty to look after them all, and looking after one means looking after the other two as well’.

Joseph Nipper Roe Ngulibardu (Yawuru RNTBC 2011)

Above: Pearl shells in the pindan. Photo – Chris Nutt/Parks and Wildlife

5.1.4 Responsibility for country (KPI)

Yawuru customary law and responsibility for country is derived from *Bugarrigarra*. Through this, Yawuru people maintain the right to ‘speak for and look after’ Yawuru country. These rights and responsibilities have been recognised in Australian law through a native title determination process.

The relationship of Yawuru people to their country is dynamic and the country is considered to be animated and often unpredictable. The country itself, and the forces that lie within, must be respected and it is the responsibility of the Yawuru people to use its resources sustainably and ensure the protection of the country and family and others who visit. This goes to the heart of maintaining good *liyan* with the country. If Yawuru people or others do the wrong thing there will be serious consequences for Yawuru people and their families.

Central to this responsibility is looking after sacred and significant areas. To Yawuru people, significance refers to cultural heritage in the broadest terms and includes the intangible values of country and heritage. Such areas include:

- cultural (*Bugarrigarra*) areas (sites, tracks), which may have cultural access restrictions
- registered sites
- areas next to cultural sites
- *rayi* sites (birth and origins – where child spirits arise from the country)
- burial sites
- seasonal hunting, fishing and harvest areas for specific species
- traditional camping areas
- water sites
- historical sites
- archaeological sites.

As part of responsibility for country, access to certain culturally sensitive areas must be restricted to persons who have special cultural authority. The need for special access restrictions to certain parts of the conservation estate is recognised in the ILUA and in the Joint Management Agreement, and provisions have been incorporated into this plan accordingly.

A Yawuru Ranger Program that has been established as agreed within the ILUAs will help Yawuru people fulfil their responsibilities for country. Through the Yawuru Ranger Program, members of the Yawuru community are trained and employed by Parks and Wildlife to patrol and undertake on-ground works in the Yawuru conservation estate.

Summary of management arrangements for responsibility for country		
Management objective	To facilitate and maintain the opportunity for Yawuru people to carry out their roles and responsibilities as protectors and managers of their country and culture.	
Management strategies	1. Implement strategies in this plan (with a focus on high priority strategies) to maintain the health of country.	H–KMS
	2. Implement access management arrangements as discussed in Section 6.1.1 – Restricted access areas to ensure access to culturally sensitive areas is managed appropriately.	H–KMS
	3. Continue to develop the Department of Parks and Wildlife Yawuru Ranger Program and authorisation of officers for enforcement activities.	H–KMS
	4. Ensure management activities comply with and facilitate adherence to agreed cultural protocols (e.g. as stated in the *Yawuru cultural management plan*, in the Joint Management Agreement and as otherwise agreed over the life of this plan).	H–KMS
	5. Develop and implement sustainable harvest strategies for vulnerable species subject to customary harvesting.	H–KMS
	6. Investigate opportunities to increase the number of Yawuru RNTBC members involved in management of the Yawuru Birragun Conservation Park (including, for example, exploring opportunities for traditional owners in caretaking roles and as cultural rangers).	M
	7. Develop and implement education and interpretation programs to inform visitors to the Yawuru Birragun Conservation Park about significant Yawuru areas, culturally appropriate behaviour and personal safety. Ensure Yawuru people have a primary and active role in this.	H
	8. Support Yawuru RNTBC to declare the Yawuru conservation estate, including the Yawuru Birragun Conservation Park, as an Indigenous Protected Area.	M
Performance measure	Yawuru RNTBC level of satisfaction that they have been able to undertake their role as protectors and managers of their country and culture in the context of jointly managed conservation estate.	
Target	Yawuru RNTBC is satisfied that they have been able to undertake their role as protectors and managers of their country and culture.	
Reporting requirements	Annually.	

Above: Flat Rock Willie Creek. Photo – Sarah Mullineux/Parks and Wildlife

5.2 Ecological values

5.2.1 Geomorphology

Several authors have written about the geology and geomorphology of the area. Information about the deep geology of the area is available in Towner and Gibson (1983), Hickman (1983) and Middleton (1990). Semenuik (2008) describes a range of other as yet unnamed units of Tertiary and Quaternary age that have an influence on the local coastal geomorphology, and provides a detailed explanation of Holocene formations of the area. Oldmeadow (2007) analysed the geochemistry of Roebuck Plains and Roebuck Bay sediments and evaluated the potential for contamination of these features. Mathews, Semeniuk and Semeniuk (2011), and the Semeniuk Research Group (2011) describe how the unique geology and geomorphology of the western Dampier Peninsula gives rise to a diverse range of freshwater seepages of ecological importance and of great cultural significance to Yawuru people. The following description of some of the main geomorphic features of relevance to the Yawuru Birragun Conservation Park has been largely drawn from the work of Semeniuk (2008) unless otherwise indicated.

The oldest outcropping rock in the area is the Broome Sandstone, a formation deposited in a shallow sea environment about 145 million years ago during the late Mesozoic. Other exposed rocks in the area are younger Quaternary deposits. Quaternary red sandplains cover much of the Broome Sandstone. These were deposited by sheetwash during seasonal flood episodes and by wind (Vogwill 2003).

Embayments, lagoons and other wetlands

The embayments of Roebuck Bay, Willie Creek and Dampier Creek are dominant features of the local geomorphology.

Roebuck Bay is much less indented now than it was some 7,500 years ago when the sea level was about 2m higher than present. The deep embayment provided low-energy conditions under which large volumes of marine-sourced carbonate mud (*galji*) were deposited to form the modern day Roebuck Plains and tidal mudflats. The inland margins of the modern day Roebuck Plains reflect the previous position of the coastline. The bay and Roebuck Plains are an interconnected ecological system and therefore land use and management on Roebuck Plains influences the ecological character of Roebuck Bay (Bennelongia 2009; Oldmeadow 2007). Tidal creeks continue to export large amounts of older fine grained carbonate mud through Roebuck Plains on to the tidal flats and, importantly, contribute to the habitat variability of the Roebuck Bay tidal mudflats.

Willie Creek, Coconut Wells and, to a lesser degree, Dampier Creek are barred embayments. Deposits (initially of sand and then later changing to limestone) created a barrier near the mouth of Willie Creek earlier in the Holocene, establishing low-energy conditions under which *galji* accumulated behind the barrier. At Coconut Wells, the barriers of sand and limestone have formed a linear lagoon parallel to the shore. The coastal area between the town site and Coconut Wells is a relict estuary filled with marine-sourced sediments (Lessa & Masselink 2006). Dampier Creek has only a small partial barrier of spits and dunes. Tidal creeks are carrying *galji* out of Dampier Creek.

The zone where the *galgi* of the tidal zone interacts with deposits from seasonal creek flows and/or pindan sands is variously associated with lakes, soaks and paperbark thickets; features of the Yawuru Birragun Conservation Park that have particularly high ecological and cultural significance.

Rocky shores and cliffs of Broome Sandstone and semi-hardened red sand

Red cliffs of pindan sand over Broome Sandstone occur along the northern shores of Roebuck Bay in the Yawuru Birragun Conservation Park. The weakly fused pindan soil is very prone to erosion on wetting. Erosion of the cliffs by wave activity is a natural process in this part of the bay. Similarly, natural erosion of pindan from the land surface occurs after heavy rain during the wet season. These natural processes are, however, amplified by water run-off from the roads providing access

Above: *Galgi* (white mud) from the Roebuck Plains wetlands. Photo – Sarah Yu

in this area, and deep gully erosion is a problem at several sites along this part of the coast.

Rocky shores of Quaternary limestone

An extensive platform of Quaternary limestone with low cliffs is found from Barred Creek through to Coconut Wells (Kenneally *et al.* 1996). The limestone is covered by sand dunes in places. This rock is highly weathered and friable and therefore susceptible to damage by vehicles.

Sand dominated beaches and dunes

The shelly sand beaches and high dunes along Cable Beach have formed under a contemporary high-energy depositional regime. Significant seasonal reworking of sediment and landform change is a natural occurrence in this highly dynamic coastal environment. The sparsely vegetated beach sand dunes are vulnerable to erosion, and uncontrolled vehicle or pedestrian access across these landforms makes this worse.

Fossils

The Broome Sandstone contains numerous fossils, including those of extinct plants and the greatest variety of dinosaur footprints of any area in the world (DSEWPC 2011a; Kenneally *et al.* 1996). Fossils of the Dampier coast are one of the features contributing to the west Kimberley being recognised as having outstanding heritage value to the nation and being included on the National Heritage List (DSEWPC 2011a). Semeniuk (2008) provides some information on fossils and subfossils of marine invertebrates from the area, as these were used to help with characterising coastal Holocene formations.

Existing and potential pressures on geomorphic values

The main pressures on the values described above are either from activities or developments that can cause direct physical damage to landforms or disturb the sedimentary and hydrological processes that maintain them.

Indiscriminate vehicle and pedestrian access, and to a lesser extent grazing and trampling by cattle, has caused some localised degradation of landforms in the Yawuru Birragun Conservation Park. Erosion, soil compaction and some localised changes in drainage are particularly obvious in sensitive wetland areas (e.g. in saltmarsh around Willie and Dampier creeks, and on Buckleys Plain) and in loosely consolidated and sparsely vegetated beach dunes (e.g. in the Coconut Wells area). Fragile areas of limestone platform along the coast between Coconut Wells and Willie Creek are also susceptible to damage from indiscriminate vehicle access.

Natural erosional processes along the northern shores of Roebuck Bay are being intensified by the channelling of water run-off from roads providing access to the area. The east–west road alignment is very close to the cliff edge in some parts, and several drainage culverts and spur roads to the bay have formed deep erosion gullies. The cliffs may be susceptible to collapse, particularly where they have been undercut and therefore may present a safety hazard to visitors. Increased erosion (from Roebuck Plains as well as the northern shores) also has the potential to influence the ecological character of Roebuck Bay through increased sediment loads, silting and turbidity. It can also affect mangrove survival and regeneration (Bennelongia 2009).

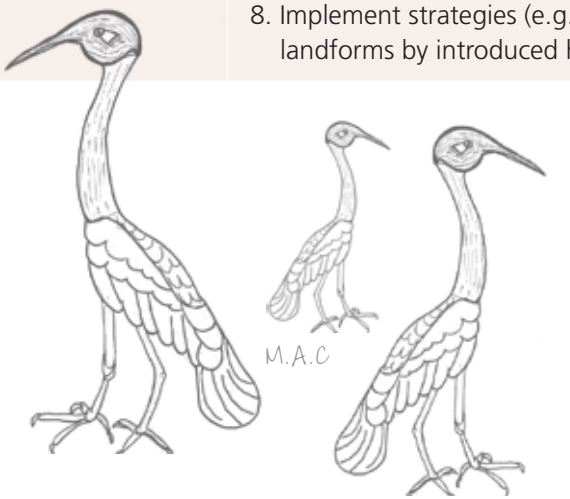
The extraction of gravel and other basic raw materials, and the development of coastal infrastructure have the potential to affect geomorphic features and processes. The joint management partners may be asked to review and provide advice regarding planning and development proposals within or near the Yawuru Birragun Conservation Park. In providing such advice the joint management partners should consider whether the proposal would significantly affect geomorphic values of the conservation estate. This should include consideration of activities and developments with the potential to indirectly affect geomorphology (e.g. by modifying sediment transport along the coast or by changing hydrological or sedimentary processes) as well as those which would cause direct physical disturbance.

Anoxic, sulfide-rich, low pH sediments found in wetland areas are associated with potential acid sulfate soils. These are soils which, when disturbed or subjected to prolonged drying and aeration, have the potential to generate increased acidity and mobilise heavy metals which may be harmful to flora, fauna and human health. Oldmeadow (2007) evaluated the contamination status of the sediments of Roebuck Bay and surrounds and found that, with the exception of Dampier Creek and certain sites within Broome town site, the area was largely unaffected by pollutants.

Above: Flowers of *jigily* or Kimberley bauhinia (*Bauhinia cunninghamii*). Photo – Greg Keighery/Parks and Wildlife

Summary of management arrangements for geomorphology

Management objective	The geomorphology and geomorphic processes that maintain the cultural and ecological values of the Yawuru Birragun Conservation Park are not adversely altered by human activity.	
Management strategies	1. Ensure that potential adverse effects on geomorphic features and processes from developments and management operations in the Yawuru Birragun Conservation Park are taken into account and mitigated.	H–KMS
	2. Provide advice on planning and development proposals for nearby areas, where necessary to encourage consideration and mitigation of any potential adverse effects on geomorphic features and processes of the Yawuru Birragun Conservation Park.	H–KMS
	3. Implement strategies (e.g. as described in Section 6.1 – Access management) to address adverse effects or potential effects on geomorphology from inappropriate vehicle and pedestrian access.	H
	4. Avoid disturbance of potential acid sulfate soils.	H
	5. Ensure appropriate coastal set back distances are used when developing significant recreation facilities and other infrastructure within the Yawuru Birragun Conservation Park.	H
	6. Implement strategies to minimise the risk to visitors from cliff falls and collapses (e.g. locate, design and manage recreation sites along the northern shores of Roebuck Bay to reduce risks, and provide visitors with information about these hazards).	H
	7. Support/promote integrated catchment management and cooperation between government agencies, landholders and other community stakeholders to address any potential adverse effects on geomorphic features and processes that may arise from activities and land use beyond the boundaries of the conservation estate (e.g. increased potential for erosion associated with overgrazing on adjacent pastoral lands).	M
	8. Implement strategies (e.g. as described in Section 6.2.2 – Introduced fauna management) to address damage to sensitive landforms by introduced herbivores (i.e. cattle and horses).	M



5.2.2 Hydrology (KPI)

Both marine water (e.g. tides, waves, currents) and fresh water (i.e. rainfall, creeks, groundwater seepages) features and dynamics are critical to maintenance of habitat in the Yawuru Birragun Conservation Park. Surface water flow to the coast is highly seasonal and associated with the heavy rainfall over *Man-gala* (the wet summer). Because the landscape around Broome is mainly flat, surface water generally flows to the coast in sheets rather than in well-defined channels. Some small temporary streams do flow over *Man-gala*, for example, into Willie Creek, and in the more defined drainage channels on Roebuck Plains (Mathews, Semeniuk & Semeniuk 2011; Oldmeadow 2007). In the flat low-lying areas of Roebuck Plains and Buckleys Plain, hydraulic conductivity is low, and water will often stay perched on the surface during the wetter months. The amount of water in the springs, soaks and other *bilarra* (wetlands) of the Yawuru Birragun Conservation Park varies throughout the year, reflecting the seasonal changes in surface and subsurface water.

Groundwater seepages and surface water run-off are important drivers of the local ecology, and are the 'living waters' and life source for the *jila* (permanent freshwater sources) that are of special cultural and spiritual significance to Yawuru people. 'Living waters' are manifestations of *Bugarrigarra*, the source of their names and the associated narratives that link water places geographically and in time (Yawuru RNTBC 2011).

There are a number of aquifers beneath the Broome area (Laws 1991) but it is the shallow aquifers, and principally the Broome Sandstone Aquifer, that are most directly relevant to management of Yawuru Birragun Conservation Park values. The Broome Sandstone Aquifer is the primary water supply for the Broome town site, and for horticultural, pastoral and other land use around Broome. Broome's town water is obtained from the water reserve next to the Yawuru Birragun Conservation Park (see Reserve 25716 on Map 4a).

Groundwater flows generally to the south and the west because of the south-westerly dip of the Broome Sandstone (Vogwill 2003). Near the coast and extending several kilometres inland a wedge of salt water lies beneath the fresh water in the Broome Sandstone (Laws 1991). Fresh water also occurs in the coastal limestone, coastal dunes and the Pleistocene red sand dunes. Depending on local conditions (such as the presence of mud, or variations in the topography of the Broome Sandstone), this water may be connected to or separate from the Broome Sandstone groundwater (Semeniuk Research Group 2011). A small local aquifer within the coastal dunes to the north of Broome is a source of recharge for the Broome Sandstone and is used as a domestic-scale water source (Laws 1991). Two small and highly localised unconfined aquifers overlie the Broome Sandstone Aquifer in the southern part of Yawuru conservation estate: the Thangoo Aquifer and the Roebuck Plains Aquifer (Oldmeadow 2007). The saltwater interface is maintained by westerly moving throughflow within the aquifer (DoW 2010c).

The interaction of groundwater with landforms along the coast produces a unique range of freshwater seepages and wetlands (Mathews, Semeniuk & Semeniuk 2011; Semeniuk Research Group 2011). These wetlands underpin and sustain many of the most significant cultural and ecological values of the Yawuru Birragun Conservation Park. Many species inhabiting these areas have restricted distributions, occurring only in areas of surface or near-surface fresh water, and would therefore be particularly vulnerable to alterations in water availability or quality. Groundwater also flows on to the low tidal and rocky shore zone in areas, commonly creating brackish water microhabitats which support species such as white mangrove (*Avicennia marina*) or sedges (Mathews, Semeniuk & Semeniuk 2011).

Surface and groundwater flows are identified as critical ecosystem components and processes helping to support the ecological character of the Roebuck Bay Ramsar site (Bennelongia 2009).

Potential pressures on hydrology values

The hydrological values described above underpin and support ecological and cultural values of the Yawuru conservation estate, both terrestrial and marine. Potential pressures on the values described above are:

- over-abstraction of groundwater
- gaps in knowledge of the ecological water requirements of groundwater-dependent species and communities
- pollutants and excess nutrients in surface and groundwater
- any activity or development which has the potential to significantly change the natural water regimes.

To make sure that the values of the Yawuru Birragun Conservation Park (and the adjacent Ramsar site) are not affected by abstraction of groundwater, water removal needs to be at a level that does not:

- significantly change the amount or quality of water available for flora and fauna, particularly for species that are fully or highly groundwater-dependent
- cause saltwater intrusion into naturally less saline areas
- change natural drainage flows and patterns.

There is currently little need for abstracting groundwater from the Yawuru Birragun Conservation Park for conservation reserve management purposes, and it is expected that this will continue to be the case over the life of this plan. Many of the Yawuru Birragun Conservation Park values are groundwater-dependent and may therefore be vulnerable to changes in regional groundwater, a resource which is subject to increasing and competing demands and already showing signs that limits of sustainable abstraction may have been reached (Searle 2012). Over-abstraction of groundwater from the Broome Groundwater Area is the likely cause of an increase in groundwater salinity along the coast, and at depths of about 100m below ground further inland (Searle 2012). The Department of Water has initiated several measures to address this situation, including reduced levels of abstraction from some production bores within the town water supply reserve, borefield redesign, research and monitoring program amendments, and a review of the existing Broome groundwater management plan (DoW 2010a; Searle 2012).

There is a need to increase understanding of the water requirements and regimes that are needed to sustain groundwater-dependent ecosystems and species and to maintain *bilarra* in a healthy condition. Regional water resource management plans include several strategies aimed at addressing this situation (DoW 2010a, 2010c, 2012).

In the absence of appropriate risk avoidance and mitigation measures, certain activities on adjacent lands and waters and/or within the Yawuru Birragun Conservation Park have the potential to adversely affect water quality in the conservation estate, both terrestrial and marine. Maintaining groundwater and surface water quality is an issue that requires collaborative and cross tenure management approaches, and several government agencies have responsibilities in this area.

Sediments such as those found in wetland habitats are linked to potential acid sulfate soils (see page 32). Trace metals present in the sediments can be mobilised by certain changes to physico-chemical conditions (e.g. seasonal changes in groundwater) (Oldmeadow 2007). Therefore, preventing contamination is particularly significant in potential acid sulfate sediments.

Above: *Man-gala* sky. Photo – Sarah Yu

Summary of hydrology management arrangements		
Management objectives	1. To work with agencies that have water resource protection and management roles and responsibilities, to maintain the water regimes that sustain the cultural and ecological values of Yawuru Birragun Conservation Park. 2. To increase knowledge of the ecological water requirements of groundwater-dependent species and ecosystems in the Yawuru Birragun Conservation Park.	
Management strategies	1. Implement (in conjunction with the relevant water resource management agencies) strategic water monitoring that records the baseline water regime[4], is linked to biological monitoring at the same time and place, and helps increase understanding of the ecological water requirements[5] of groundwater-dependent ecosystems and species. 2. Establish triggers and implement management interventions as needed to address any concerns identified by the water monitoring program (recognising jurisdiction of agencies with water resource management responsibilities as appropriate). 3. Ensure that groundwater abstraction, developments or management operations in the Yawuru Birragun Conservation Park do not adversely affect natural water regimes. 4. Provide advice about land use planning and development proposals for nearby areas, where necessary to encourage consideration and mitigation of any potential significant effects on hydrology of the Yawuru Birragun Conservation Park. 5. Support/promote integrated catchment management and cooperation of government agencies, landholders and other community stakeholders to address potential impacts on water regimes that may arise from beyond the boundaries of the conservation estate. 6. Prevent or minimise disturbance to areas of potential acid sulfate soil development.	H–KMS H–KMS H–KMS H–KMS H H
Performance measures	1. Availability of baseline water monitoring data and report. 2. Hydrological regime management triggers and limits of acceptable change[6] defined for high risk and/or high value sites. 3. Water quality and quantity measures (e.g. nutrients, toxicants, pathogens, water levels) relative to defined limits of acceptable change. 4. Level of understanding of the ecological water requirements of groundwater-dependent species.	
Targets	1. A strategic water monitoring program is being implemented, and baseline water monitoring data for selected high risk and/or high value sites within the Yawuru Birragun Conservation Park is available by 2018. 2. Hydrological limits of acceptable change are defined for high risk and/or high value sites by 2020. 3. Water quality and quantity parameters do not exceed defined limits of acceptable change (as a result of management activities or lack of appropriate management activities) for selected high risk and/or high value sites within the Yawuru Birragun Conservation Park. 4. The ecological water requirements of any groundwater-dependent species and ecosystems in the Yawuru Birragun Conservation Park are defined by 2020.	
Reporting requirements	Every two years.	

[4] E.g. normal natural variability in water quality, quantity and flow pattern.
[5] Including the hydrological limits of acceptable change for these species and communities.
[6] The term 'limits of acceptable change' used in this section on hydrology relates to groundwater/freshwater wetlands within the Yawuru Birragun Conservation Park, and not the limits of acceptable change defined by Bennelongia (2009) for the Roebuck Bay Ramsar site.

5.2.3 Flora, fauna and ecological communities

A dominant vegetation type of the Yawuru Birragun Conservation Park is that of the red sandplains; acacia shrubland over grassland with a sparse upper layer of eucalypts. This vegetation and the red soils on which it occurs are both commonly referred to as 'pindan'. Other vegetation types occurring in the Yawuru Birragun Conservation Park include melaleuca thickets, samphire flats, saline grasslands, mangrove communities, *nirliyangarr* or dune wattle (*Acacia bivenosa*) dominated communities on coastal limestone outcrops, and wetland vegetation communities in seasonal freshwater swamps and claypans. This diversity of habitats, and particularly the inclusion of a range of coastal elements, provides important biodiversity conservation values. The flora includes several species near or at the southern or northern limits of their known range in Western Australia (Kenneally 1983).

Descriptions of the vegetation, flora and fauna of the Dampier Peninsula have been compiled by McKenzie (1983a) and Kenneally *et al.* (1996). The flora and fauna reflects its location in a zone of environmental transition between arid areas further south and the monsoonal tropics in the north (Kenneally *et al.* 1996). Species are predominantly affiliated with north Kimberley assemblages, but some arid desert species are also present.

During wetter conditions in the mid-Holocene, the Dampier Peninsula appears to have supported a mammal fauna assemblage that included species that are now restricted to the north-western Kimberley (McKenzie 1983b). With the onset of drier conditions, and then later colonial settlement, several of the medium-sized mammal species disappeared from the peninsula (McKenzie 1983b). The declines after settlement are thought to have stemmed from changes brought about through the pastoral industry, the introduction of exotic mammals and changes in fire regimes (McKenzie 1983b; McKenzie & Burbidge 2002; McKenzie *et al.* 2009).

The diversity of habitats near the coast is an important factor contributing to the rich bird fauna of the area (Johnstone 1983). Many habitats which are quite restricted in area, such as mangroves, melaleuca thickets and other wetland habitats, are particularly important for conservation of bird diversity (Johnstone 1983; Waples 2007). Johnstone (1983) describes birds associated with these and other habitats of the Dampier Peninsula.

Most species of reptiles and amphibians recorded on the Dampier Peninsula are widespread and extend from the Kimberley south to at least the Pilbara (Storr & Johnstone 1983). Storr and Johnstone (1983) identified more than a quarter of recorded species as being northern species occurring at or near their southern limit, and eight arid zone species close to their northern limit.

There has been very little survey of the terrestrial invertebrate fauna of the area. Colless (1983) describes some insect collections from the Dampier Peninsula.

The Rubibi native title determination recognised Yawuru native title rights and interests including the right to hunt and gather for personal, domestic or non-commercial communal purposes (including social, cultural, religious, spiritual and ceremonial purposes). Recent amendments to the CALM Act, the Wildlife Conservation Act, and associated regulations

Top: Airlie Island ctenotus (*Ctenotus angusticeps*).
Photo – Karen Bettink/Parks and Wildlife
Above: An Australian crow butterfly (*Euploea core*) obtains nectar from saltwater paperbark (*Melaleuca acacioides*) flowers.
Photo – Greg Keighery/Parks and Wildlife

include provisions for Aboriginal people to take flora and fauna for Aboriginal customary purposes. These provide the broad context for management of Yawuru hunting and gathering activities in the Yawuru Birragun Conservation Park.

Threatened and priority flora

The fringed fire-bush (*Seringia exastia* formerly *Keraudrenia exastia*) is the only threatened flora species recorded as possibly occurring in the Yawuru Birragun Conservation Park. Fringed fire-bush, which is specially protected under the Wildlife Conservation Act and listed as critically endangered under the EPBC Act, has been recorded from within the Broome town site (i.e. outside the area covered by this plan). An interim recovery plan is in place for this species (DEC 2010). Fringed fire-bush has been recorded in association with acacia shrubland in pindan dune swale with slow drainage. Areas of similar habitat may be suitable for future translocations (DEC 2010).

The Yawuru Birragun Conservation Park includes several species which are on department-maintained lists of flora species that do not meet the criteria for listing as threatened, but which are nevertheless of special conservation interest. Flora species that need more survey to accurately determine whether they are threatened are added to the Priority Flora List under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of their conservation status.

At the time of writing, Priority 1 species recorded for the Yawuru Birragun Conservation Park were:

- Broome tobacco (*Nicotiana heterantha*) which is often associated with melaleuca thickets on black clay and seasonally wet flats
- Cable Beach ghost gum (*Corymbia paractia*), which is endemic to Broome, often occurring in the transition between coastal beach dunes and pindan sand (Kenneally *et al.* 1996)
- *Thespidium basiflorum*, which often favours saline areas, and occasionally grows among grasses in saltwater paperbark (*Melaleuca alsophila*) stands (Kenneally *et al.* 1996).

The Priority 2 species *Gomphrena pusilla*, and the Priority 3 species *Aphyllodium glossocarpum*, *Pterocaulon intermedium* and *Glycine pindanica* have also been recorded in the Yawuru Birragun Conservation Park.

Numerous Priority 4 species (species that have recently been removed from the threatened list, or which are rare but not threatened and require monitoring) have been recorded in the Yawuru Birragun Conservation Park.

Threatened and other significant fauna

A number of fauna species occurring or possibly occurring in the Yawuru Birragun Conservation Park are specially protected under the Wildlife Conservation Act because they are rare or likely to become extinct:

- two species of mammal; the wintarru or golden bandicoot (*Isoodon auratus* subsp. *auratus*) and the bilby or dalgyte (*Macrotis lagotis*)
- three species of reptile; a skink called the Airlie Island ctenotus (*Ctenotus angusticeps*), the flatback turtle (*Natator depressus*) and the *gurlibil* or green turtle (*Chelonia mydas*)
- 11 species of bird; the Australian painted snipe (*Rostratula benghalensis* subsp. australis)[7], grey falcon (*Falco hypoleucos*), Hutton's shearwater (*Puffinus huttoni*), curlew sandpiper (*Calidris ferruginea*), great knot (*Calidris tenuirostris*), greater sand plover (*Charadrius leschenaultii leschenaultii*), lesser sand plover (*Charadrius mongolus*), bar-tailed godwit (*Limosa lapponica menzbieri*), eastern curlew (*Numenius madagascariensis*) and two subspecies of red knot, being red knot – new Siberian Islands (*Calidris canutus piersma*i) and red knot – North Eastern Siberia (*Calidris canutus rogersi*). The latter eight are the subject of international migratory bird agreements.

Other species of the Yawuru Birragun Conservation Park that are specially protected under the Wildlife Conservation Act include the estuarine crocodile (*Crocodylus porosus*) and numerous migratory bird species which, in addition to those mentioned above, are the subject of various international agreements (e.g. the Japan–Australia Migratory Birds Agreement, the China–Australia Migratory Birds Agreement and the Republic of Korea–Australia Migratory Birds Agreement).

All of the above-mentioned species which are specially protected under the Wildlife Conservation Act are also variously listed and considered 'matters of national environmental significance' under the EPBC Act.

The wintarru was once numerous on the Roebuck Bay coast. On the Kimberley mainland it is now usually only recorded in rocky sandstone habitats and vine thickets (Palmer *et al.* 2003).

Historically the bilby occurred across a large area of Australia's arid and semi-arid zones, but its distribution declined significantly after European settlement and the associated introduction of cats, foxes and pastoralism (Friend 1990, Southgate 1990). The bilby is a specially protected species under the Wildlife Conservation Act and is also listed as 'vulnerable'

[7] Listed as *Rostratula australis* rather than a subspecies under the EPBC Act.

Top: Yawuru Rangers Jason Fong (left) and Jason Richardson (right) survey for the threatened Airlie Island ctenotus. Photo – Karen Bettink/Parks and Wildlife
Above: Wetland soak. Photo – Sarah Yu

under the EPBC Act. In Western Australia they appear to currently occur in small scattered colonies within a few disjunct areas – in the Gibson Desert, the inland Pilbara, the northern Great Sandy Desert and along the southern edge of the Kimberley (Friend 1990). The abundance of bilbies across the distribution is unknown, but they are generally considered to be low in abundance (Bradley *et al.* 2015). The genetic diversity between sub-populations is also not well known (Bradley *et al.* 2015). It is possible that the bilby provides important ecological services (e.g. through dispersal of fungi and providing burrows that are used by other native fauna species) (Pavey 2006). Bilbies have been recorded in Yawuru conservation estate and elsewhere around Broome in recent years, but monitoring and research is needed to improve understanding of local occurrences, ecological roles and requirements and threatening processes (e.g. introduced predators such as foxes and cats, inappropriate fire regimes and grazing pressures).

The Airlie Island ctenotus was previously only known from Airlie Island in the Pilbara and two other disjunct locations, one being on the coast of Roebuck Bay and the other on the mainland adjacent to Airlie Island (DSEWPC 2012a). However, surveys in 2011 and 2012 revealed additional populations along the north-western coast including within and near the Yawuru conservation estate at Thangoo, Crab Creek and Willie Creek (Maryan *et al.* 2013)[8]. It appears there is little genetic variation between the disjunct populations and it is thought to be a single widespread population (Maryan *et al.* 2013). This skink is highly specialised, occupying a very specific habitat type; the landward fringe of saltmarsh communities vegetated with samphire and marine couch grass adjacent to or closely associated with mangroves (Maryan *et al.* 2013). The Airlie Island Ctenotus frequently uses and is possibly dependent on the presence of crab holes for shelter, but it is not clear whether its distribution is correlated to any particular type of crab (Maryan *et al.* 2013). Apart from extreme weather events, the main threats to this species include weed invasion (e.g. buffel grass) and other factors which could lead to habitat degradation (DSEWPC 2012a).

Although five species of marine turtle are known to frequent the waters around Broome, only the flatback turtle is known to regularly nest on beaches around Broome, including at the southern end of Roebuck Bay near Cape Villaret, occasionally on the northern shores of the bay, and also on Cable Beach. The peak nesting period is from November to December and the peak hatching

[8] Given this, an alternative common name that reflects the broader distribution of this species may be adopted in the future (Maryan *et al.* 2013).

period is from February to March. Annual flatback turtle monitoring programs include the beach at the southern end of Roebuck Bay and parts of Cable Beach within the town site reserves. Flatback turtles nest every one to five years so monitoring needs to occur over several years to determine population trends. Green turtles may also very occasionally nest on the beaches in the area, but monitoring to date indicates this is rare (Conservation Volunteers Australia recorded one green turtle nest on Cable Beach during the 2006/07 monitoring period).

The Australian painted snipe generally inhabits shallow fresh or brackish water wetlands including temporary and permanent lakes, swamps and claypans (DSEWPC 2012b). Threats to the Australian painted snipe are loss and degradation of wetland habitats through grazing and trampling by stock, and weed invasion (DSEWPC 2012b).

While the critical habitat for migratory shorebirds visiting the Broome area is focused on the Roebuck Bay intertidal areas, roosts in the Yawuru Birragun Conservation Park are also very important. Shorebirds commonly roost on the northern shores of Roebuck Bay, but also at Bush Point and Sandy Point, and sometimes on the claypans and saltmarsh further inland.

Broome is at the southern extent of the distribution of estuarine crocodiles in Western Australia (Australian Museum 2010), although confirmed sightings are now regularly recorded from the Pilbara further south. Estuarine crocodiles occur in the mangroves and tidal creeks of Yawuru conservation estate in very small numbers.

Parks and Wildlife maintains lists of fauna species that do not meet the criteria for listing as threatened but are nevertheless of special conservation interest. At the time of writing, there were no Priority 1 fauna species and two Priority 2 fauna species recorded in the Yawuru Birragun Conservation Park: the Dampierland plain slider (*Lerista separanda*) and the Dampierland burrowing snake (*Simoselaps minimus*), which is endemic to Western Australia (Storr, Smith & Johnstone 2002). Several Priority 3 and 4 species are currently recorded in the Yawuru Birragun Conservation Park.

Threatened ecological communities

Parks and Wildlife maintains a database of threatened ecological communities; none are currently recorded in the Yawuru Birragun Conservation Park. The 'Monsoon vine thickets on coastal sand dunes of the Dampier Peninsula' is a threatened ecological community occurring within the (in-town) Yawuru Minyirr Buru Conservation Reserves of Yawuru conservation estate, but comprehensive surveys have found no occurrences in the Yawuru Birragun Conservation Park (Black, Willing & Dureau 2010).

Parks and Wildlife also maintains a 'Priority Ecological Communities' list – these are ecological communities that may be identified as 'Threatened Ecological Communities' in the future, but that do not meet survey criteria, or that are not adequately defined. The *Nimalarragun* wetland within the Yawuru Birragun Conservation Park is a 'Priority Four' Ecological Community, as it is near threatened and requires regular monitoring. It is known as the 'Nimalaica claypan community' on the Priority Ecological Community list. More information about the *Nimalarragun* wetland is found on page 45.

Above: Fringed firebush (*Seringia exastia*). Photo – Sharon Ferguson

Existing and potential pressures on flora and fauna

The main existing or potential pressures on flora and fauna values of the Yawuru Birragun Conservation Park are:

- introduced fauna species that predate on or compete with native species and weeds
- inappropriate fire regimes
- recreational pressures on habitats used by specially protected species vulnerable to disturbance (e.g. migratory shorebird roosting areas)
- alterations in hydrological regimes.

These pressures and other potential pressures are discussed in more detail in other sections of the plan as relevant (e.g. see sections 5.2.2 – Hydrology, 6.2 – Introduced species management, 6.3 – Fire management and 5.3.2 – Recreation and tourism values). While influential in isolation, when combined

these threatening processes can leave native flora and fauna particularly vulnerable to environmental stressors. Preventing or reducing pressures such as those described above is a vital facet of management needed to improve and promote the natural resilience and resistance of species and ecosystems.

Pressures or potential pressures on marine turtles in the Yawuru Birragun Conservation Park include predation and unsustainable harvesting for cultural purposes. Turtle nests are subject to predation (e.g. by sand goannas and wild dogs) (McFarlane 2010), although more study is needed to explore the local conservation implications of this issue. Marine turtles are an important Aboriginal customary harvest species for Yawuru people. The harvest of turtles for Aboriginal customary purposes has not been quantified, so its impacts on turtle populations are unknown (Limpus and Prince cited in Waples 2007). Yawuru people recognise the need for scientific research to increase knowledge about marine turtle populations and controls that may be needed for harvesting by Aboriginal people.

One of the most significant local pressures on migratory shorebirds is disturbance during roosting. Disturbances cause birds to move or take flight, which costs energy and reduces roosting opportunity. This can impact on the ability of migratory species to put on enough weight to successfully migrate to northern hemisphere breeding grounds. People, dogs, birds of prey, vehicles and low-flying aircraft (in particular helicopters) are examples of potential sources of disturbance to roosting shorebirds. Most migratory bird species are in the Broome area during the wet season when the likelihood of human disturbances is low. However, many young birds remain in Roebuck Bay during their first winter, and there are concerns about increasing levels of human disturbance during the dry season when visitor numbers are higher (Rogers *et al.* 2011). This issue particularly applies to shorebird roosts along the northern shores of the bay and becomes especially significant when high tides markedly constrain the available roost area. Human disturbance of roosting shorebirds is less of an issue at other important roosts in the Yawuru Birragun Conservation Park where human use is very low (e.g. at Bush Point, Sandy Point and the saltpans and saltmarsh of Roebuck Plains). Anecdotal reports also indicate that the extent of mangroves along parts of the northern shores of Roebuck Bay may be increasing, and concerns have been raised that this may further diminish suitable shorebird roosts. The scale, causes and management implications of this will be investigated through the *Yawuru Nagulagun / Roebuck Bay Marine Park joint management plan 2016*.

Migratory shorebirds using the Yawuru Birragun Conservation Park are also subject to pressures elsewhere in the East Asian–Australasian Flyway, outside Australia. There have been some widespread declines in shorebird numbers in non-breeding grounds of the flyway, and these are generally considered to be related to loss of staging habitats that the birds use on their migration (Rogers *et al.* 2011). Various shorebird research and monitoring programs are implemented through groups such as the Broome Bird Observatory, the Australian Wader Study Group and the Global Flyway Network.

Above: Yawuru Ranger Preston Manado weighing a southern shovel-nosed snake (*Simoselaps semifasciatus*) during a biodiversity survey. Photo – Sarah Mullineux/ Parks and Wildlife

Summary of management arrangements for flora, fauna and ecological communities

Management objectives	1. To increase understanding of the flora, fauna and ecological community values of the Yawuru Birragun Conservation Park and the factors presenting a threat to those values.	
	2. To conserve the flora, fauna and ecological communities of the Yawuru Birragun Conservation Park.	
Management strategies	1. Implement strategies to manage the effects of threatening processes on native flora, fauna and ecological communities (e.g. strategies described in Section 5.2.2 – Hydrology, Section 6.2 – Introduced species management and Section 6.3 – Fire management).	H–KMS
	2. Provide information for visitors and others (e.g. helicopter and other aircraft operators) as necessary about flora and fauna that are sensitive to disturbance (e.g. roosting shorebirds) to promote behaviour which avoids disturbance.	H–KMS
	3. Implement access restrictions as necessary to protect flora, fauna and ecological communities (e.g. establish temporary control areas under section 62 of the CALM Act where necessary to provide seasonal protection to turtles or shorebirds).	H–KMS
	4. Implement research, monitoring and recovery actions for threatened and priority species and communities relevant to the Yawuru Birragun Conservation Park as necessary (in accordance with approved recovery plans where they exist).	H–KMS
	5. Carry out research and monitoring to increase understanding of the flora and fauna of the Yawuru Birragun Conservation Park and their ecological requirements, to identify significant threats, to increase understanding of the effects of management and help guide future management.	H–KMS
	6. Work with Yawuru people to manage sustainable customary harvesting of marine turtles and eggs (and other flora and fauna species harvested for customary purposes if necessary).	H
	7. Provide advice on nearby planning and development proposals, as necessary to encourage consideration and mitigation of any potential significant effects on flora, fauna and ecological communities of the Yawuru Birragun Conservation Park.	H

Above: Brolgas. Photo – Karen Bettink/Parks and Wildlife

'There is water right back to the pindan country – all our *jila* (permanent waterholes), from reef back to *birra* (inland) have got stories. The underground streams feed the *jila*.'

Jimmy Edgar
(Yawuru RNTBC 2011)

'Water is the life for us all. It is the main part. If we are gonna lose that water...everything will die. That's the power of water. He connect with the land. *Bugarrigarra* put im all together. One life.'

John 'Dudu' Nangkiriny
(Yawuru RNTBC 2011)

Above: The wetlands on the periphery of Roebuck Bay provide important breeding habitat for several shorebird species. Photo – Kandy Curran

5.2.4 *Bilarra* (wetlands) (KPI)

A variety of marine and freshwater *bilarra* (wetlands) underpin and sustain many of the most significant cultural and ecological values of the Yawuru Birragun Conservation Park. Many *bilarra* of cultural and ecological importance also occur outside the Yawuru conservation estate (for example, on adjacent pastoral station lands).

Bilarra hold a number of spiritual values and have other special cultural significance for Yawuru people (Yawuru RNTBC 2011). For Yawuru people, the permanent freshwater places or *jila* are life-sustaining 'living waters' given names and narratives through *Bugarrigarra*, and are geographically and temporally linked.

Traditionally Yawuru people moved according to the seasons, and knowledge of the location, size and condition of water sources was essential for survival, as people traversed the country from inland to coast (Yawuru RNTBC 2011). Early European visitors made use of this knowledge, engaging Aboriginal people to show them the location of 'native wells' to obtain fresh water for themselves and their stock (Yawuru RNTBC 2011). With the occupation of land for pastoral and other uses, Yawuru people have been prevented from accessing and protecting many of their *bilarra*. Many plants and animals only found in association with *bilarra* are of special cultural importance. Many cultural heritage sites and cultural values occur in all of the *bilarra*.

There are a variety of *bilarra* within the Yawuru Birragun Conservation Park. A general discussion of the major wetland areas within the park is provided in this section of the plan, while management relating to specific wetland habitats is discussed separately under the respective headings (e.g. see sections on saltmarsh and melaleuca thickets). Detailed descriptions of the evolution and features of wetland complexes (i.e. natural units or aggregates of wetland units) within the Yawuru Birragun Conservation Park are available in reports by the Semeniuk Research Group (2011) and Semeniuk (2008). The different ways in which fresh water enters and forms the unique array of *bilarra* in the coastal zone is described by the Semeniuk Research Group (2011) and Mathews, Semeniuk and Semeniuk (2011).

Wirrjinmirr/Willie Creek embayment complex

The *Wirrjinmirr*/Willie Creek wetland system is included in the Directory of important wetlands in Australia (DSEWPC 2011b). Much of this wetland system is outside the boundary of the Yawuru conservation estate, and most of the wetland system that is within the Yawuru conservation estate is in the Northern Intertidal Area. This area will be subject to a separate CALM Act management plan.

Several law grounds, *Bugarrigarra* sites, historic living areas and many archaeological sites which provide evidence of traditional habitation occur in the area. *Wirrjinmirr*/Willie Creek is at the northern boundary of Yawuru country and much of the coastline surrounding this area marks the travels of the creative beings of the tradition of law allied with people who live in these northern areas (i.e. the Northern Tradition).

Within the Yawuru Birragun Conservation Park, lakes, soaks and saltwater paperbark thickets occur at the eastern margins of the *Wirrjinmirr*/Willie Creek system, where the carbonate mud of the intertidal and supratidal zone intersects with alluvial sediments, and where surface and subsurface fresh water from the

hinterland enters the system.

Specifically, in the south-east of the Willie Creek wetland complex is the *Nimalarragun* wetland, a freshwater lake surrounded by seasonally inundated swamp. It receives freshwater seepage from seasonal streams and springs and sustains several flora and fauna species not widespread on the Dampier Peninsula. The site has been added to the 'Priority Ecological Community' list – these are ecological communities that may be identified as 'Threatened Ecological Communities' in the future, but that do not meet survey criteria or that are not adequately defined. Known as the 'Nimalaica claypan community' on the Priority Ecological Community list, this community is currently identified as a 'Priority Four' Priority Ecological Community as a community that is near threatened are requires regular monitoring. *Nimalarragun* supports melaleuca thicket with an intermediate layer of vines and a ground layer of ferns and sedges (Semeniuk Research Group 2011). Wetland plants recorded include *Melaleuca alsophila*; broadleaf paperbark (*Melaleuca viridiflora*); river gum (*Eucalyptus camaldulensis*); the evergreen tree (*Timonius timon*); rirrwal or white dragon tree (*Sesbania formosa*); rushes and sedgelands with *Schoenoplectus litoralis*; *bilgin*, a water chestnut (*Eleocharis dulcis*); and black mangrove (*Lumnitzera racemosa*) (DSEWPC 2011b; Mathews, Semeniuk & Semeniuk 2011, Semeniuk Research Group 2011).

In the Directory of important wetlands in Australia database entry (DSEWPC 2011b) the *Nimalarragun* wetland is noted for:

- being an important bird (and perhaps fish) breeding and refuge area
- supporting species near the southern end of their ranges, for example, frogsmouth (*Philydrum lanuginosum*) and mangrove fern (*Acrostichum speciosum*)
- supporting species not known from elsewhere on the Dampier Peninsula (e.g. the free floating aquatic *Ceratophyllum demersum* var. *demersum*; the herb *Heliotropium curassavicum* and an annual sedge *Schoenus falcatus*)
- being the most southerly, near-coastal locality known for *jarrmirdany* or screw palm (*Pandanus spiralis*)
- its reported use by the locally scarce variegated fairy-wren (*Malurus lamberti*) and yellow wagtail (*Motacilla flava*)
- a partially submerged forest of tall cadjeput trees that are notable for their cable-like aerial roots, which is unusual in this species (Kenneally *et al.* 1996)
- supporting an abundance of the freshwater herring or bony bream (*Nematolosa erebi*) and the freshwater eel (*Anguilla bicolor*)[9].

Levee banks and a causeway built to raise water levels at *Nimalarragun* while the area was part of the Waterbank pastoral station are still present. Before these structures were installed, the wetland would naturally dry to a claypan over the winter months.

Ngunungurrukun/Coconut Wells complex

The wetland complex at *Ngunungurrukun*/Coconut Wells consists of a lagoon and saltmarsh (Buckleys Plain) behind a barrier of sand and limestone located between Coconut Wells and Cable Beach (Semeniuk Research Group 2011). Buckleys Plain is a relict estuary filled with at least 6m of marine sediments (Lessa &

[9] In Australia, *Anguilla bicolor* is only known from the Kimberley region, where it is not common (it is widespread in the tropical waters of the Indo-West Pacific) (Allen, Midgley & Allen 2002).

Above: Aerial photography – Coconut Wells lagoon.
Photo – Landgate aerial photography; Broome May 2007

Masselink 2006). It is now covered with saltmarsh and fringed with melaleuca thicket (Semeniuk Research Group 2011). While the very northern part of Buckleys Plain is still inundated by tides, more extensive seawater flooding of the plain would only occur very infrequently, during storm surges or when storm surges coincide with very high spring tides (Lessa & Masselink 2006). Water can remain perched on the surface after heavy or prolonged rains during the wetter months, particularly in the deeper depressions across the plain.

Dampier Creek embayment complex

The Dampier Creek wetland complex is an embayment with a small partial barrier of spits and dunes. The major elements are low tidal flats, fringing mangroves, areas of hypersaline bare tidal salt flat behind the mangroves, samphire flats and saline grasslands. Melaleuca thicket occurs at the junction of the *galji* (carbonate mud) and pindan sands (Semeniuk Research Group 2011). Dampier Creek is part of the Roebuck Bay area included in the Directory of important wetlands in Australia (DSEWPC 2011b).

The boundary of the Yawuru Birragun Conservation Park is to high water mark at Dampier Creek, and most of this wetland complex is not within the Yawuru conservation estate. It is proposed that more of the Dampier Creek wetland complex will be added to the Yawuru conservation estate in the future, as part of the Yawuru Nagulagun / Roebuck Bay Marine Park.

The Dampier Creek area is of special significance to Yawuru people with law grounds, *Bugarrigarra* sites, historic living areas and many archaeological sites providing evidence of Aboriginal use and habitation all located in and surrounding the creek system. This wetland system includes several *jila* which were important for sustaining Yawuru people, visitors from neighbouring Aboriginal groups, the 'Manila Men' and others who were forced to live in camps outside the 'common gate' (explained further on page 58) (Yawuru RNTBC 2011).

Gumbaranganyjal/Roebuck Plains samphire–saltmarsh complex

Gumbaranganyjal is a major freshwater floodplain with a range of distinct wetland features (such as creeks, claypans, springs and soaks) occurring within the floodplain complex. Only a small proportion of Roebuck Plains floodplain complex is within the Yawuru Birragun Conservation Park (or the Yawuru conservation estate). The plains become partly inundated during extremely high spring tide floods, storms and cyclones, or otherwise after heavy rainfall during the wet season (see photos on pages 17 and 22) (Bennelongia 2009; Oldmeadow 2007; Semeniuk Research Group 2011; Vogwill 2003). Monsoonal rains pond in depressions and local basins, forming semi-permanent, seasonally inundated pools that persist into the dry season (Semeniuk Research Group 2011). Inundation of the whole floodplain is however uncommon, probably occurring about every 5–10 years (DSEWPC 2011b).

Gumbaranganyjal provides important habitat for a variety of fauna, particularly birds drawn by the frogs, fish and invertebrates which are readily found there during the wet season (Collins *et al*. 2001; Rogers, Boyle & Hassell 2001; Rogers *et al*. 2003). *Gudurrwarany* or brolgas (*Grus rubicunda*) gather and mate on the plains during *Laja* (i.e. October–November) (Yawuru RNTBC 2011). *Gumbaranganyjal* provides habitat for several waterbird species which are the subject of international treaties and given

Above: Aerial photography – Buckleys Plain. Photo – Landgate aerial photography; Broome May 2007

special protection under the Wildlife Conservation Act and the EPBC Act[10] (Rogers *et al*. 2003), and also for some bird species which are uncommon on the Dampier Peninsula[11]. The saltpans and saltmarshes of Roebuck Plains become particularly important for migratory shorebirds during spring high tides when roosts along the northern shores of Roebuck Bay contract or become unsuitable (Bennelongia 2009).

Ornithological research (Rogers, Boyle & Hassell 2001; Rogers *et al*. 2003) of one of the larger ephemeral wetland features within the *Gumbaranganyjal* wetland complex, informally known as the Kidneybean Claypan, has identified several special values:

- it may sometimes hold internationally and nationally significant numbers of several species of specially protected migratory birds
- it appears to be important for shorebirds during spring high tides, when preferred spring tide roosts closer to Roebuck Bay are unsuitable
- it provides breeding habitat for several bird species (e.g. red capped plovers, whiskered terns and red-kneed dotterels)
- it is a valuable birdwatching site and one of the most reliable sites in the world to see the yellow chat, a species which occurs unpredictably in remote places.

The Kidneybean Claypan is inundated occasionally during extremely high spring tides and when rains flood the plains during the wet season, but usually dries completely over the dry season (Oldmeadow 2007; Rogers, Boyle & Hassell 2001; Vogwill 2003). The presence of an aquatic grass (*Najas* sp.), which forms a carpet over the claypan as it dries, appears to make an important contribution to the value of this wetland for shorebirds (Rogers, Boyle & Hassell 2001). Beneath the drying *Najas* sp., the mud remains moist and rich in invertebrates well after the surface water has evaporated (Rogers, Boyle & Hassell 2001).

Above: Kidneybean Claypan in the dry season (see page 17 for a similar view in the wet season). Photo – Jan van de Kam

Existing and potential pressures on *bilarra* (wetlands)

Some localised effects of off-road vehicle access, weeds and introduced animals are evident in some wetland areas of the Yawuru Birragun Conservation Park.

More broadly, potential pressures on the important values of *bilarra* include:

- altered hydrological regimes
- introduced plants and animals that have the potential to significantly affect wetland ecology
- inappropriate fire regimes
- insufficient knowledge about the extent, condition and ecology of local wetlands.

Maintaining high water quality and natural fluxes in water quantity and flow is critical to conserving the values of *bilarra*. The main threats to achieving this are over-abstraction or pollution of groundwater, although these are not currently known to be significant factors affecting *bilarra* in the Yawuru Birragun Conservation Park. Nevertheless, adjacent land uses

[10] For example: the glossy ibis (*Plegadis falcinellus*), little curlew (*Numenius minutus*), marsh sandpiper (*Tringa stagnatillis*), white-winged tern (*Chilidonias leucopterus*) and the oriental pratincole (*Glareola maldivarum*). The glossy ibis is a CAMBA species; the little curlew and marsh sandpiper are ROKAMBA and CAMBA species; the white-winged tern (*Chilidonias leucopterus*) and oriental pratincole (*Glareola maldivarum*) are JAMBA, CAMBA and ROKAMBA species.

[11] For example, the tawny grassbird (*Megalurus timoriensis*), red-backed button quail (*Turnix maculosa*) and black falcon (*Falco subniger*).

and management have the potential to influence water quality and quantity in the conservation estate and therefore cross tenure management approaches are a fundamental part of addressing potential issues. For example, much of the Willie Creek wetland complex is outside the boundary of the Yawuru conservation estate.

Building levees or making other major alterations to wetlands, such as has occurred at *Nimalarragun*, disrupts natural hydrological and ecological dynamics (Semeniuk Research Group 2011). The structural alterations at *Nimalarragun* have been in place for at least 20 years and the earthworks have now been colonised by wetland vegetation. Yawuru people would like to see the levees removed (Yawuru RNTBC 2011). However, the feasibility and full implications of attempting to remove these modifications to restore a more natural geomorphology and hydrology is unclear and therefore further investigation and consideration of management options is needed.

Marine tidal exchange of water is a critical ecosystem process of many *bilarra* within the Yawuru conservation estate. Developments that could significantly alter tidal exchanges therefore have the potential to affect the integrity of some of the wetlands within the Yawuru conservation estate.

Bilarra sustain some of the most important cultural and ecological values of the Yawuru Birragun Conservation Park, and therefore control of any weeds and feral animals that have the potential to significantly alter wetland ecology is a high management priority. While numerous introduced plant species occur in the park, including wetland areas, none are known to be presenting a specific or significant threat to wetland ecology at present. Similarly, the effects of introduced fauna on wetlands of the Yawuru Birragun Conservation Park are not fully known.

The extent, values, condition and wetland ecology of *bilarra* within Yawuru conservation estate is not comprehensively known. While many Yawuru and other local people have a good knowledge of the local *bilarra*, this has not been collated or captured in any readily accessible form. Wetland mapping and documentation of values is required to establish the baseline condition against which *bilarra* can be assessed in future. Research into aspects of the local wetland ecology, including, for example, the ecological water requirements of pivotal wetland species, and wetland fire ecology, would be helpful for developing more targeted strategies to better protect *bilarra* values.

Above: Red-kneed dotterel. Photo – Jan van de Kam

Summary of management arrangements for *bilarra* (wetlands)

Management objective	To increase understanding of, and to maintain or improve, the condition and ecological function of *bilarra* in the Yawuru Birragun Conservation Park.	
Management strategies	1. Implement strategies described in Section 5.2.2 – Hydrology to help maintain the water regimes which sustain *bilarra* and associated cultural and ecological values.	H–KMS
	2. Close *bilarra* to inappropriate vehicle and pedestrian access and (where possible) rehabilitate degraded areas. Develop and maintain well-defined, low-impact vehicle and pedestrian access to *bilarra* for cultural, recreation or management purposes.	H–KMS
	3. Implement strategies described in Section 6.2 – Introduced species management to control any introduced plants and animals presenting a significant threat to *bilarra* values.	H–KMS
	4. Carry out (in collaboration with water resource management agencies and/or other external researchers[12]) wetland mapping, monitoring and research to increase understanding of *bilarra* values and condition, and to facilitate assessments and reporting of management effectiveness (e.g. against performance measures described below).	H–KMS
	5. Ensure that cultural sites and values associated with *bilarra* are protected.	H
	6. Investigate the feasibility of and management options for removal of artificial structures from *Nimalarragun*. Remove or modify those structures if this will help to meet the objectives of this management plan.	H
	7. Liaise with external parties (e.g. neighbouring landholders, other government agencies) as needed to protect the values of *bilarra* within (or connected to *bilarra* within) the Yawuru Birragun Conservation Park.	H
Performance measures	1. Availability of baseline data and report on the values and condition of *bilarra*.	
	2. Condition of *bilarra*[13].	
Targets	1. Wetland mapping and report documenting baseline values and condition of *bilarra* in the Yawuru Birragun Conservation Park is completed by 2018.	
	2. No decline in the condition of *bilarra* in the Yawuru Birragun Conservation Park (attributable to management activities or lack of appropriate management activities) over the life of this plan.	
Reporting requirements	Every three years.	

[12] Note the Department of Water and the Department of Agriculture and Food Western Australia have some basic wetland mapping and data of relevance to the Yawuru conservation estate.
[13] Condition of *bilarra* relates to water quality and quantity measures in relation to defined acceptable limits of change (see Hydrology section), species richness, species composition and abundance, and vegetation or habitat structure and extent.

5.2.5 *Bundu* (saltmarsh)

The *bundu* or saltmarsh of the Yawuru conservation estate comprises *wirn-gi* (samphire flats) and *gurlju buru* (saline grasslands) and commonly borders the bare salt flats found behind stands of *gundurung* (mangroves). The bare salt pans are formed through high evaporation rates during the dry season, leaving the sediment extremely saline and essentially uninhabitable by vegetation, although some highly salt-tolerant algae may be present (Adam 2009; Connolly & Lee 2007; Oldmeadow 2007). *Bundu* occurs in areas straddling or above the high tide mark and is therefore infrequently inundated by tides, although it is exposed to salt spray and occasional storm surges. Freshwater flows, both surface and groundwater, have the effect of reducing saltmarsh sediment salinity and both play an important role in the distribution of plants in this habitat (Connolly & Lee 2007).

Bundu includes species with varying degrees of salt tolerance. The succulent *wirn-gi* dominated communities tolerate the more saline conditions immediately abutting the bare salt flats. At the landward edges of the *wirn-gi* communities, *balyjarr* or saltwater couch grass (*Sporobolus virginicus*), rice grass (*Xerochloa imberbis*) and *Frankenia ambita* begin to be present, reflecting a transition to *gurlju buru* (saline grasslands) (Kenneally *et al*. 1996). Samphire communities in the Yawuru Birragun Conservation Park are mainly found at Willie Creek, around Dampier Creek and on Roebuck Plains.

In the Yawuru Birragun Conservation Park *gurlju buru* dominated by *balyjarr* occur inland from Fishermans Bend and Dampier Creek, at Buckleys Plain and behind Willie Creek (Kenneally *et al*. 1996). *Gurlju buru* are found in the higher, less frequently inundated, zones of the saltmarsh. They are subject to flooding and ponding following heavy periods of monsoonal rain (Kenneally *et al*. 1996). The Roebuck Plains saltmarshes bind the soil and help to reduce erosion associated with floods and wind – these are identified as critical ecosystem components and processes of the Roebuck Bay Ramsar site (Bennelongia 2009).

Little is known about the ecological value and function of Australian saltmarsh, and even less about Western Australian saltmarsh (Connolly & Lee 2007). This habitat may have a role in providing nutrients to coastal waters, or as nursery areas for migratory fish. However, it is not clear to what extent this applies in an Australian context where saltmarsh inundation is infrequent and short (Connolly & Lee 2007).

A recent study by Maryan *et al*. (2013) has found populations of the Airlie Island ctenotus, which is specially protected under the Wildlife Conservation Act, within *bundu* of Yawuru conservation estate; at Thangoo, Crab Creek and Willie Creek. This lizard species frequently uses and is possibly dependent on the presence of crab holes for shelter, but it is not known whether it is linked with any particular type of crab (Maryan *et al*. 2013). Apart from extreme weather events, the main threats to the Airlie Island ctenotus include invasion of buffel grass and other weeds, and other factors which could lead to degradation of its saltmarsh or associated mangrove habitats.

In general, there is little information available about the fauna inhabiting Kimberley saltmarshes. Studies conducted elsewhere in Australia indicate that faunal groups generally using these habitats include a mix of marine and terrestrial invertebrates, insectivorous birds, birds of prey and some fish (Bridgewater & Cresswell 1999; Laegdsgaard 2006). Johnstone (1990) notes that birds associated with samphire flats include the brown quail, red-chested button quail, Australian bustard, oriental pratincole, Horsfield's bushlark, Australasian pipit, and the golden-headed cisticola. The saltmarsh and saline grasslands of Roebuck Plains provide high tide roosts and other important habitat values for many waterbirds, and other services that support the ecology of Roebuck Bay (Bennelongia 2009).

Existing and potential pressures on *bundu*

The main existing pressures on *bundu* values are from disturbance by vehicles being driven off-road and grazing pressure. The effects of off-road vehicles on saltmarsh in the park are particularly noticeable around Willie Creek, Buckleys Plain and Dampier Creek. As well as destroying or damaging vegetation, this activity causes localised soil compaction and erosion, changes surface water run-off and disturbs fauna. Grazing pressure and trampling by cattle also affects *bundu* and associated values by removing and damaging the vegetation, introducing and spreading buffel and other weeds, compacting the surface and altering water quality through concentration of nutrients (Semeniuk Research Group 2011). Once disturbed, saltmarsh can be slow to regenerate and difficult to rehabilitate. In a New South Wales study, *S. virginicus* was estimated to take four to five years to recover to natural densities from a denuded area of saltmarsh (Laegdsgaard 2006).

Any activities or developments that could significantly alter the normal hydrological regimes sustaining *bundu* are a threat. Saltmarsh is likely to be highly sensitive to alterations in freshwater inflows or tidal exchange of water (Connolly & Lee 2007). To maintain

the integrity of saltmarsh habitat, any developments or activities that have the potential to significantly alter the usual flow patterns, salinity, or availability of marine or fresh water need to be avoided or managed to mitigate adverse effects.

Summary of management arrangements for *bundu* (saltmarsh)

Management objective	To maintain, and where necessary improve, the condition (i.e. species richness, composition and abundance, or areal extent) of *bundu* in the Yawuru Birragun Conservation Park.	
Management strategies	1. Implement strategies aimed at maintaining the hydrological and other ecological processes that help to sustain *bundu* (e.g. strategies in Section 5.2.1– Geomorphology, Section 5.2.2 – Hydrology).	H–KMS
	2. Implement strategies to address unauthorised vehicle access (e.g. as described in Section 6.1 – Access management and Section 6.7 –Patrol and enforcement).	H–KMS
	3. Implement strategies described in Section 6.2 – Introduced species management to manage the impacts of weeds and introduced herbivores such as cattle on *bundu*.	H
	4. Provide advice on nearby planning and development proposals, as necessary to encourage consideration and mitigation of potential significant effects on *bundu* of the Yawuru Birragun Conservation Park.	M
	5. Carry out research and monitoring to increase understanding of *bundu* values to help identify and manage any significant threats to these values.	L

Top: Samphire flats. Photo – Parks and Wildlife
Above: Saline grasslands near Willie Creek. Photo – Parks and Wildlife

5.2.6 *Murrga-yirr-garnburr* (melaleuca thickets) (KPI)

Fringes of *murrga-yirr-garnburr* (paperbark thicket) commonly occur in a zone of surface or subsurface freshwater seepage at the landward margins of *galji* (carbonate mudflats) and saline grasslands (Kenneally *et al*. 1996; Semeniuk Research Group 2011, Yawuru RNTBC 2011). In the Yawuru Birragun Conservation Park they occur, for example, at the eastern margins of the Willie Creek wetland complex, and fringing the saltmarsh of Buckleys Plain and Roebuck Plains. Dominant species of the *murrga-yirr-garnburr* include saltwater paperbark (*Melaleuca alsophila*), blue paperbark (*M. dealbata*) and broad-leaved paperbark (*M. viridiflora*). A grove of tall cadjuput (*M. cajuputi*) occurs at *Nimalarragun*, where the melaleuca thicket has an intermediate layer of vines and a ground layer of ferns and sedges (Semeniuk Research Group 2011). While the total area of *murrga-yirr-garnburr* in the Yawuru Birragun Conservation Park is not extensive, it is a culturally and ecologically important habitat.

The *murrga-yirr-garnburr* provide many important resources for Yawuru people. Traditionally, towards the end of *Laja*, people would create paperbark shelters (*manggaja*) to provide protection from the wet season rains. A range of materials obtained from the paperbark thickets were used for many different purposes including cooking utensils, ceremonial activities, medicine, to obtain water and for food (Yawuru RNTBC 2011). Goannas, lizards and *langurr* or northern nail-tail wallaby (*Onychogalea unguifera*) are some of the animal foods sought out in the *murrga-yirr-garnburr* (Yawuru RNTBC 2011).

Despite their limited extent, the *murrga-yirr-garnburr* provide important habitat for a number of bird species, particularly when flowering (Johnstone 1983). Species such as the mangrove grey fantail, mangrove gerygone[14], bar-shouldered dove, rufous whistler, restless flycatcher, brown honeyeater, white-gaped honeyeater, rufous-throated honeyeater and great bowerbird prefer melaleuca thickets (Johnstone 1990). Others such as the yellow white-eye and red-headed honeyeater are primarily found in mangrove habitats, although they also use adjoining melaleuca thickets (Johnstone 1990).

Potential pressures on *murrga–yirr–garnburr*

Pressures arise from any activities or developments with the potential to significantly alter the quantity or quality of water available to *murrga-yirr-garnburr*. These communities are associated with freshwater seepages and depend on the maintenance of the usual or natural water regimes. However, the specific ecological water requirements of these communities are not well understood.

The effects of cattle are also evident in melaleuca thickets, where they commonly congregate to escape the heat and access water. Cattle trample and compact the surface and vegetation, introduce and spread weeds, and alter water quality through concentration of nutrients (Semeniuk Research Group 2011). In addition to feral cattle, a proportion of cattle within the Yawuru Birragun Conservation Park may be stock that have strayed from adjacent areas.

Located in wetter parts of the landscape, *murrga-yirr-garnburr* is likely to have specific fire regime requirements, although the fire response of these communities is not currently understood in detail. Inappropriate fire regimes could exacerbate weed invasion, and this issue warrants special consideration for *murrga-yirr-garnburr*, given their quite restricted extent. The wild passionflower (*Passiflora foetida*) is a weed that can be particularly problematic in melaleuca thickets (Kenneally *et al*. 1996).

Above: *Nimalarragan*. Photo – Sarah Mullineux/Parks and Wildlife

[14] This species is more common on the Dampier Peninsula than elsewhere in the Kimberley (Johnstone 1990).

Summary of management arrangements for *murrga-yirr-garnburr* (melaleuca thickets)

Management objective	To maintain, and where necessary improve, the condition of *murrga-yirr-garnburr* in the Yawuru Birragun Conservation Park.	
Management strategies	1. Implement strategies described in Section 5.2.2 – Hydrology to help maintain the hydrological processes that sustain *murrga-yirr-garnburr*.	H–KMS
	2. Implement strategies described in Section 6.2 – Introduced species management to manage the impacts of introduced herbivores such as cattle on *murrga-yirr-garnburr*.	H–KMS
	3. Carry out research and monitoring to establish the baseline condition of *murrga-yirr-garnburr* within the Yawuru Birragun Conservation Park and to help identify significant threats (e.g. document extent, species richness, composition and abundance, and the effects of threatening processes).	H–KMS
	4. Provide advice on nearby planning and development proposals, as necessary to encourage consideration and mitigation of any potential significant effects on *murrga-yirr-garnburr* in the park.	H
Performance measures	1. Availability of baseline data and report on the condition of melaleuca thickets. 2. Condition of melaleuca thickets.	
Targets	1. Report documenting baseline values and condition of melaleuca thickets completed by 2020. 2. No decline in the condition (i.e. species richness, composition, abundance and areal extent) of melaleuca thickets in the Yawuru Birragun Conservation Park (attributable to management activities or lack of appropriate management activities) over the life of this plan.	
Reporting requirements	Every five years.	

Above: Rainbow bee-eater. Photo – Karen Bettink/Parks and Wildlife

5.2.7 *Bundurr-bundurr* (pindan)

Pindan, grassland with a sparse upper storey of trees and a middle storey of dense acacia thicket, is the vegetation associated with the red sand and silty soils also known by the same name. This vegetation has been described as an acacia and eucalypt-dominated tree savanna over annual tussock grassland (Kenneally *et al*. 1996). McKenzie (1983a) describes some different trends in the patterning of pindan sandplain communities of the Dampier Peninsula. The pindan communities in the south of the peninsula are low, open acacia-dominated woodlands, while further north there is a trend towards open eucalypt-dominated forests, reflecting differences in rainfall and soils (McKenzie 1983a).

Bundurr-bundurr is one of the most important habitats for Yawuru bush medicine trees, and it is also where Yawuru people hunt for meat and collect bush foods such as *girrbaju* (bush honey) according to their knowledge of the seasons. Fauna associated with the pindan and of particular cultural significance to Yawuru people include a number of birds, lizards, snakes, the northern brushtail possum and the agile wallaby (Yawuru RNTBC 2011).

Several bird species are more common in pindan than in other vegetation (McKenzie 1983a), including a number of sedentary birds and a large proportion of nomadic species that seek out flowering trees and shrubs (Johnstone 1983).

Existing and potential pressures on *bundurr-bundurr*

Inappropriate fire regimes currently present the main threat to the values of *bundurr-bundurr*. Fire plays an important role in maintaining the health of pindan. Pindan acacias can, for example, be heavily infested and killed by parasitic native mistletoes, such as *Lysiana spathulata* and *Dendrophthoe acacioides*, in the absence of fire (Kenneally *et al*. 1996). Pindan wattles are able to rapidly recover from fire by rootstock suckering and prolific seedling regrowth. However, fire regeneration cycles in pindan span five to seven years (Kenneally *et al*. 1996). The current trend in the Kimberley, however, is towards more frequent, high intensity fires during the late dry season. McKenzie (1983a) noted that only isolated areas of pindan that had escaped burning for several years had a substantial shrub layer.

Introduced plants and animals are potential pressures on *bundurr-bundurr*, although the specific extent and significance of this threat in the Yawuru Birragun Conservation Park is not well known.

Summary of management arrangements for *bundurr-bundurr* (pindan)

Management objective	To improve the condition (i.e. species richness, composition and abundance) of *bundurr-bundurr* in the Yawuru Birragun Conservation Park.	
Management strategies	1. Implement fire management strategies that consider and promote the fire regimes which help sustain *bundurr-bundurr* in good condition.	H–KMS
	2. Carry out research and monitoring to establish the baseline condition of *bundurr-bundurr* within the Yawuru Birragun Conservation Park and to help identify and manage significant threats.	H–KMS

5.2.8 *Niyamarri* (sand beaches and dunes)

Shelly, white sand beaches and dunes occur on the coast in the northern parts of the Yawuru Birragun Conservation Park, and adjacent to the southern parts of Roebuck Bay. North of Coconut Wells these *niyamarri* are adjacent to and sometimes overlie an extensive limestone platform that continues to Barred Creek (Kenneally *et al.* 1996). To the south of the Coconut Wells area, high sand dunes lie next to Buckleys Plain, a relict estuary.

Rarrga-rarrga (*Spinifex longifolius*) is a dominant feature of the sparsely vegetated foredunes. *Nirliyangarr* (*Acacia bivenosa*), *jigily* tree or stunted bauhinia (*Bauhinia cunninghamii*) and beach bean creeper (*Canavalia rosea*) are common on the more established dunes (Kenneally *et al.* 1996). On sheltered slopes and in swales these and a diverse range of other species form a dense shrub community (Kenneally *et al*. 1996). Open scrub dominated by *Acacia bivenosa* occurs on the limestone outcrops (Kenneally *et al*. 1996).

‘People always cook their fish or crab on the beach, day or night. We cook the whole fish on the coals. We don’t waste anything. We still want to be able to take our families fishing and cook our fish and shellfish on the beach.’

Neilo McKenzie
(Yawuru RNTBC 2011)

Numerous middens, artefacts and other sites of cultural heritage significance are associated with *niyamarri*. Some of these need to be mapped and better protected (Yawuru RNTBC 2011). Historically, Aboriginal people would regularly camp throughout the dunes which provide an array of important bush tucker and other resources. The *Yawuru cultural management plan* lists some of the key plants and animals of *niyamarri*. Cooking on fires on the beach is a customary tradition that continues.

Niyamarri provides habitat for several threatened species and other fauna of special conservation significance. One of these is the flatback turtle, which nests on beaches within the Yawuru conservation estate. The beaches of the Yawuru conservation estate, particularly along the northern shores of Roebuck Bay, and the sandy spits and beach ridges at Sandy and Bush Point, are important high tide roosts for migratory shorebirds (Rogers, Hassell & Lewis 2006; Rogers *et al*. 2011).

Existing and potential pressures on *niyamarri*

The main pressures on *niyamarri* values arising from human uses are:

- inappropriate vehicle and pedestrian access – the beach sand dunes are loosely consolidated and sparsely vegetated, and are vulnerable to erosion if the vegetation is damaged or removed
- potential disturbance to turtles, shorebirds and other fauna for which *niyamarri* provide critical habitat.

Summary of management arrangements for *niyamarri* (sand beaches and dunes)

Management objective	To maintain, and where necessary improve, the condition of *niyamarri* in the Yawuru Birragun Conservation Park.	
Management strategies	1. Define and manage access as necessary to address degradation of *niyamarri* and associated cultural and ecological values.	H–KMS
	2. Ensure management takes account of legislative provisions regarding Aboriginal customary purposes, including the use of fires for cooking food or other customary purposes (e.g. section 103A of the CALM Act and associated regulations).	H–KMS
	3. Close and rehabilitate degraded areas of *niyamarri* as necessary.	H
	4. Carry out cultural heritage site mapping and protection as necessary.	H
	5. Implement access restrictions where necessary to protect fauna (e.g. establish temporary control areas under section 62 of the CALM Act if necessary to provide seasonal protection to shorebirds).	H
	6. Provide information for visitors to promote behaviour that minimises potential disturbance to fauna for which *niyamarri* provide critical habitat.	H

5.3 Social and economic values

5.3.1 History and heritage values (KPI)

Broome and its surrounds, including the Yawuru conservation estate, are exceedingly rich with history and multilayered cultural heritage. Thousands of years of Aboriginal occupation and the arrival of settlers, which led to the evolution of the pearling and pastoral industries, are defining influences in the heritage of the region.

The heritage significance of some sites within the Yawuru Birragun Conservation Park has been formally recognised through registration under heritage protection legislation. There are numerous Aboriginal heritage sites registered under the *Aboriginal Heritage Act 1972*. Parts of the park are included within the boundary of the West Kimberley National Heritage Area (as shown in Figure 2). There are currently no sites within the Yawuru Birragun Conservation Park listed on the *State Register of Heritage Places*.

Changes to the CALM Act in 2012 included that CALM Act management plans must have the objective of 'protecting and conserving the value of the land to the culture and heritage of Aboriginal persons' (as described in section 56(2) of the CALM Act).

Aboriginal occupation and custodianship

Yawuru conservation estate is part of country that Yawuru people have been a part of for thousands of years before the arrival of the early European explorers. Archaeological records from the area include numerous middens and artefacts that provide evidence of Aboriginal peoples' long occupation. Other cultural heritage sites in the Yawuru Birragun Conservation Park include *Bugarrigarra* sites and law grounds, *jila*, burial sites and camping areas.

Many Yawuru cultural heritage sites are now formally recognised on the register of sites maintained under the *Aboriginal Heritage Act 1972*. However, registered sites do not represent a comprehensive record of the actual sites in the area. Under the *Aboriginal Heritage Act 1972*, Aboriginal heritage sites and objects are protected, whether they have been entered on the register or not, and it is an offence to alter a site or object without prior approval under the Act. More discussion of Yawuru cultural values including heritage values is provided in Section 5.1.

Above: Pearling is an important part of Broome's heritage. Photo – Parks and Wildlife

European explorers

Europeans began exploring the coastline in the 1600s. Some of the first explorers of the region included Dutch mariner Abel Tasman in 1644, and Englishman William Dampier, initially as a buccaneer aboard the *Cygnet* in 1688 and later aboard the *Roebuck* (after which Roebuck Bay was named) (Green 1981; Kenneally *et al*. 1996). Later European visitors included French mariners Nicolas Baudin and Louis de Freycinet in 1801–02, who gave French names to several places along the Kimberley coast (DSEWPC 2011c).

Pearling industry

The Broome area is synonymous with pearling and this is a major foundation of the area's heritage values. Well before the arrival of European pearlers, Yawuru people had a long tradition of harvesting pearl shell. This was carved with decorative designs and worn on ceremonial occasions or used for trading with other Aboriginal groups (Yawuru RNTBC 2011). During the 1870s, European pearlers operating out of Cossack and Roebourne travelled north to Broome in search of new pearling beds to exploit for mother-of-pearl. By the first decade of the twentieth century Broome was producing the majority of the world's supply of mother-of-pearl and was recognised as the pearling capital of the world (DSEWPC 2011c). In the 1960s the industry developed into the cultured pearl farming industry that continues to be a major contributor of pearls to the world market (DSEWPC 2011c).

Aboriginal people are an integral part of Broome's pearling story, with many kidnapped for forced labour on the luggers and on shore when the industry was

'*Marrar* was the main meeting ground for ceremony, a meeting place to clear up trouble, with secret grounds belong to men. We used to walk from Thangoo to *Marrar* with our mummy and daddy for corroboree. Carry tucker. I remember going there. All the big men were there. That time people used to stop Top-way ... old, old people.'

Elsie Edgar
(Yawuru RNTBC 2011)

'Now we have to ask the white man if we can go into our country. Our family are buried in the country, and we can't go there. My old man, my mother's father, Garngurr and his brothers. They are from this area and are buried in *Yardugarra*.'

Elsie Edgar
(Yawuru RNTBC 2011)

first established (Green 1981; Yawuru RNTBC 2011). As the pearling industry developed, Asian men (from Japan, China, Philippines, Malaysia, Koepang and the Indonesian archipelago) were brought to Broome to work in the industry as indentured labour, and Broome became unique in Australia for being a predominantly Asian town during the late nineteenth to mid-twentieth century (DSEWPC 2011c). Asian workers interacted with Aboriginal people who supplied water and wood for the pearling vessels, and a fascinating cultural and racial fusion emerged (Yawuru RNTBC 2011).

Pastoral industry

During the 1860s settlers from the south began to explore the region for locations to raise sheep and cattle. These early pastoral endeavours failed in the face of sustained Aboriginal resistance and harsh environmental conditions. One of the region's first recorded massacres of Aboriginal people occurred near Cape Villaret in 1866, in retaliation for the deaths of three pastoral explorers killed during an earlier violent conflict with local Aboriginal people (Battye & Fox 1985; DSEWPC 2011c; Yawuru RNTBC 2011). The area was not colonised by pastoralists until the late 1890s (DSEWPC 2011c).

Conflict between Aboriginal people and the European pastoralists continued throughout the early days of the pastoral industry. Aboriginal people were regularly physically punished and jailed for taking stock from stations (DSEWPC 2011c). The stations interfered with Aboriginal people's access to their traditional lands and resources and brought about major disruptions to the traditional way of life. Important sources of fresh water and associated sacred places became water reserves on the De Grey stock route. These hostilities gradually quietened down as pastoralists began to take advantage of an Aboriginal workforce to help run their stations, and as Aboriginal people adapted to the new circumstances so they could live on or near their traditional country, fulfil their custodial duties and maintain their traditional way of life as much as possible (DSEWPC 2011c).

Station work and life features strongly in the memories of many Yawuru people and is a major and important part of Yawuru heritage and contemporary identity. Many Yawuru people who were born, grew up and worked on the local pastoral stations have been unable to access their traditional and sacred places on the stations for many years.

Law gatherings and ceremonies held on Thangoo Station for many years were displaced. Access to traditional lands that were taken over by pastoral leases is a dominant concern for Yawuru people:

'We want to visit the sites where our old people are buried, and visit our own birth and rayi places. We need to go fishing and hunting and to harvest shellfish on the coast. We need to visit all the historic and cultural sites on Thangoo with our children so that they know their country and their history. Under our law it is our duty to visit our ancestral places and to look after our country'. (Yawuru RNTBC 2011)

The recognition of Yawuru native title by the federal court has opened the way for Yawuru people to regain access to some of their cultural sites taken over in pastoral

stations. Yawuru peoples' aspirations to reconnect with these traditional lands were recognised in the ILUAs and have been incorporated into this management plan (e.g. see Section 6.1.1 – Restricted access areas).

The Aborigines Act

Under The *Aborigines Act 1905*[15], Broome and other town sites throughout Western Australia were declared 'prohibited' to Aboriginal people unless they renounced their cultural ties and families to obtain citizenship (DSEWPC 2011c). Persons classified as 'natives' who were not housed at their employer's residence had to be out of town every evening and were forced to camp outside the prohibited area (Yawuru RNTBC 2011). A fence initially erected on the town boundary to keep cattle out was used as a convenient physical boundary to regulate 'native' access to the town after it had been declared a prohibited area (Lingiari Foundation 2007). One of the cattle gates along this fence became known locally as the 'common gate' and is a symbol of these policies of exclusion. The Yawuru Birragun Conservation Park includes areas where Aboriginal people were forced to camp during that time, and access will now only be permitted by Yawuru people or those accompanied by Yawuru people (see Section 6.1.1 – Restricted access areas).

Existing and potential pressures on the park's cultural heritage values

The immediate cultural heritage management issues for the Yawuru Birragun Conservation Park are associated with managing access to ensure culturally sensitive sites are given appropriate protection.

Other potential heritage management issues arise from:

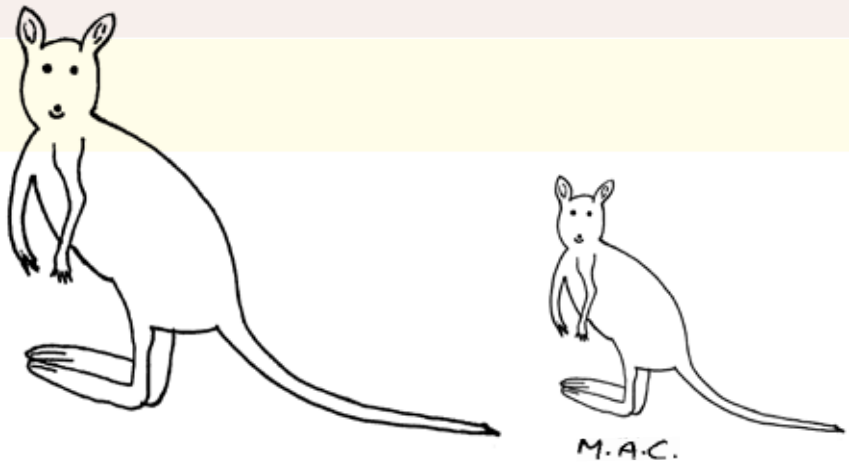
- alteration or damage to heritage sites or materials from the development of recreation facilities or other infrastructure, or from some operational activities (e.g. fire management activities)
- poor understanding and appreciation of the area's history and heritage values.

[15] Repealed in 1963

Above: Common gate fence post made out of paperbark on marsh. Photo – Sarah Yu

Summary of management arrangements for history and heritage values

Management objective	1. To conserve cultural heritage sites and other cultural heritage values of the Yawuru Birragun Conservation Park. 2. To protect and conserve the value of the Yawuru Birragun Conservation Park to the culture and heritage of Aboriginal people.	
Management strategies	1. Manage visitor access as required to restrict access to culturally sensitive areas. 2. Assess factors that may diminish or have adverse effects on cultural heritage sites or the value of the Yawuru Birragun Conservation Park to the culture and heritage of Aboriginal people. Implement management actions to address these as necessary. 3. Ensure that Yawuru people have a primary and active role in the conservation and communication of their cultural heritage, and that Yawuru intellectual property is recognised. 4. Ensure management activities are consistent with Yawuru cultural protocols (e.g. as stated in the *Yawuru cultural management plan*, in the Joint Management Agreement and as otherwise agreed over the life of this plan). 5. Provide materials and opportunities (e.g. cultural heritage tours and interpretive signage, brochures and other media) to enhance visitor understanding and appreciation of the cultural heritage and historical context of the area.	H–KMS H–KMS H–KMS H–KMS M
Performance measure	Condition of heritage sites.	
Target	No deterioration of heritage sites within the Yawuru Birragun Conservation Park (attributable to management activities or lack of appropriate management activities).	
Reporting requirements	Every two years.	



5.3.2 Recreation and tourism values

Broome and its surrounds, including the Yawuru Birragun Conservation Park, offers residents and visitors to Broome a range of highly valued opportunities for nature-based recreation and cultural tourism. Broome is the largest town in the Kimberley region[16], has experienced above average population growth over many years, and has a base population projected to increase by 84 per cent between 2011 and 2041 (Shire of Broome 2011). Consequently, the number of residents engaging in recreational activities in the park is expected to increase over the life of this plan. A sustained or increased level of visitation to the Yawuru Birragun Conservation Park by tourists is also expected. Broome is a popular tourist destination and commonly used as a gateway for visitors wanting to explore the wider Kimberley area. During the peak tourism season (April–November), the local population of Broome swells to about 35,000 (Shire of Broome 2011). Tourism Research Australia statistics indicate the average number of overnight visitors to the Shire of Broome for the 2009-2011 period was about 209,600 (Tourism WA 2011a). Visitation data for the Yawuru conservation estate is currently insufficient to provide a good picture of visitor use numbers and patterns, however, it is likely that visitation to the Yawuru Birragun Conservation Park would mirror fluctuations in the local population cycle, with a dramatic increase in visitation through the dry season.

The main attraction for most people visiting the Yawuru Birragun Conservation Park is the scenic, semi-remote natural environments in which they can engage in activities such as fishing, swimming, walking, birdwatching, nature appreciation, picnics and spending time with family and friends. There are few cultural tourism opportunities currently available to visitors.

Currently, Yawuru Birragun Conservation Park is not widely used by commercial tours. Tour operators undertaking commercial tourism activities within the park will require a licence issued under the CALM Act and must abide by specified conditions. Allowing commercial tourism enterprises within conservation reserves can help to extend the range of services, facilities and experiences available to visitors. Commercial tourism activities within the park must be compatible with the purpose and management of a conservation park. Commercial leases cannot be issued under the Conservation and Land Management Regulations 2002 for the Yawuru Birragun Conservation Park (section 100 (2A) of the Act). Yawuru RNTBC may wish to explore alternative legislative and other mechanisms in the event that firm proposals for commercial leases (consistent with the purposes of conservation and recreation) arise over the life of this plan.

The main focus areas for recreational activity in the Yawuru Birragun Conservation Park are *Wirrjinmirr*/Willie Creek and several areas along the northern shores of Roebuck Bay from Dampier Creek through to *Man-galagun*/Crab Creek. There are currently no facilities at recreational-use areas within the park.

Wirrjinmirr/Willie Creek

Wirrjinmirr has numerous cultural values and is used for fishing, both customary and recreational, and sightseeing. The wetlands at the eastern margins of the creek system are visited by birdwatchers. There are currently no facilities in the area and vehicle access is unregulated. The Willie Creek area is sometimes used as an access point for people wishing to drive their vehicles on the Northern Intertidal Area beach.

Ngunungurrukun/Coconut Wells

The Coconut Wells area is sometimes visited by sightseers or used to access the beach in the adjacent Northern Intertidal Area. Numerous four-wheel-drive tracks have been pushed through the dune and limestone landforms to obtain vehicle access to the beach from the Coconut Wells subdivision and Buckleys Plain. Access management strategies are needed to define sustainable access from this area into the Northern Intertidal Area and to address inappropriate and unauthorised vehicle use.

Bugawamba-Man-galagun/northern Roebuck Bay foreshore

The coast between Dampier Creek and *Man-galagun* is of high cultural importance; it is lined with middens, has many *Bugarrigarra* sites (associated with the northern and southern traditions of law) and numerous cultural heritage sites. Public access to the Yawuru Birragun Conservation Park surrounding and immediately east of Dampier Creek will be restricted for cultural purposes (see Section 6.1.1 – Restricted access areas).

Visitors mainly use the cliffs and beaches between Dampier Creek and *Man-galagun* for fishing, birdwatching, sightseeing, picnics, walking and to launch small boats at *Gurlbanwila* (Dog Rock) and *Man-galagun*. Four-wheel-drive and various other off-road vehicles currently access the northern beaches of Roebuck Bay in several places to drive and park on

[16] Data from the 2011 *Australian Bureau of Statistics Census of Population and Housing* indicates the resident population of the Broome townsite was 12,766 people, and the resident population of the Shire of Broome was 14,997 (ABS 2011).

the beach. However, to protect cultural values and minimise disturbance to migratory shorebirds, vehicles will no longer be permitted on these beaches, with the exception of access to the boat launching area at *Gurlbanwila* (Dog Rock) (see Section 6.1 – Access management for more information). A number of informal day-use areas (clearings) are dispersed along this stretch of coast and some informal, unauthorised camping also occurs. A separate reserve near Fall Point is leased to the Broome Bird Observatory (shown on Map 4b inset and Map 5b). The Broome Bird Observatory provides recreational and educational opportunities for visitors (e.g. camping and other accommodation options, walking trails and interpretive displays) in addition to their scientific research programs.

Existing and potential recreation management issues

The major recreation management issues for the Yawuru Birragun Conservation Park arise because of the lack of recreational facilities and services, and because historic access and use has essentially evolved in an unplanned and unmanaged way.

As discussed in various sections of this plan, addressing inappropriate vehicle and pedestrian access is a key management issue for the Yawuru Birragun Conservation Park. The proliferation of indiscriminate and inappropriate tracks is particularly significant at Buckleys Plain, Coconut Wells and around Willie Creek, affecting natural values cultural sites and impacting on visual amenity. Providing users of the conservation estate with well-defined, sustainable vehicle and pedestrian access and improved recreation facilities will go some way towards helping to address these issues and promoting appropriate access and use. Detailed planning and design for recreation sites within the Yawuru Birragun Conservation Park will also explore options for improving access between the park and the Northern Intertidal Area as appropriate.

Existing roads and informal recreational-use areas are not necessarily located in the most environmentally or culturally appropriate areas. There are several management issues associated with the east–west road that provides access from Crab Creek Road to the Broome Bird Observatory and beyond (these are discussed in Section 6.1 – Access management). The number of spur roads and recreational-use areas on the northern shores of the bay is not warranted and several are in inappropriate locations, presenting concerns with potential disturbance to roosting shorebirds, affecting other natural and cultural values, or presenting a safety hazard.

The potential inadvertent disturbance of fauna by visitors, particularly shorebirds and marine turtles, is an issue that needs addressing in some parts of the Yawuru Birragun Conservation Park. Shorebird values are the primary reason that Roebuck Bay has been listed as a Ramsar site, and the intertidal mudflats and high tide roosts provide critical shorebird habitat (Bennelongia 2009). Disturbance of migratory shorebirds during roosting or feeding can interfere with their ability to build up the enormous energy stores required for successful migration to northern hemisphere breeding grounds. The potential for disturbance of roosting shorebirds is greatest along the northern shores of Roebuck Bay, and to a lesser degree at high tide roosts at Bush and Sandy Point in the southern part of the bay (because of low levels of human use there). Studies of shorebird roosts around Roebuck Bay indicate that shorebird disturbance levels have increased since 2000 and identify increasing numbers of human visitors during the dry season as a contributing factor (Rogers *et al*. 2011). One study of shorebird disturbance by Rogers, Hassell and Lewis (2006) found that, in general, visitors using the northern beaches of Roebuck Bay were unaware of the importance of the area to shorebirds. The work by Rogers, Hassell and Lewis (2006), which looked at shore-based disturbances only, found disturbance by people was most common at the roosts that were closer to town and readily reached by beachwalkers.

Litter left behind by visitors or washed up on beaches is a management issue. Litter is mainly found at recreational-use areas and left behind at sites used for informal/unauthorised camping. Old vehicles and household rubbish are also occasionally found dumped within the conservation estate. Litter affects visual amenity, causes injury to fauna and can be a source of environmental pollution. Information that raises visitor awareness of these effects may help in managing this problem and is an important component of a multi-faceted approach to litter management in the conservation estate.

In the short-term there are no specific proposals to designate or develop camping areas within the Yawuru Birragun Conservation Park. This is because of proximity to the Broome town site, and because of other competing management priorities. However, some opportunities for overnight camping may be explored over the life of this plan; for example opportunities for overnight stays may be considered in conjunction with cultural and ecotourism products that may be developed in the future. In the interim, 'lawful authority' may on occasions be provided in response to specific requests for 'remote camping'[17].

[17] The term 'remote camping' for the purposes of this plan refers to camping where no facilities are provided, often to areas only accessible by walking in - 'leave no trace' principles are to be observed.

Above: View from northern shore of Roebuck Bay. Photo – Chris Nutt/Parks and Wildlife

Because much of Yawuru conservation estate has until recently been unallocated Crown land, availability of interpretation, information and education facilities and services has been limited. Groups such as the Broome Bird Observatory and the Roebuck Bay Working Group do, however, provide valuable community information and education services within limited budgets. Provision of information and interpretation is important to improve the experience of visitors, to promote awareness and understanding of natural and cultural values and to gain support for protection and management.

It is important that visitors have opportunities to appreciate the Aboriginal cultural context and history of the conservation park, as well as the usual focus on interpretation of natural and European cultural values which is provided in conservation reserves. The establishment of conservation areas around Broome provides an opportunity to develop new cultural tourism and ecotourism products that cater for visitors seeking to learn more about traditional and contemporary Aboriginal culture[18]. Cultural tourism activities that may be suited to the Yawuru Birragun Conservation Park include guided day tours, self-guided tours incorporating multi-media interpretive tools and guided multi-day safaris including overnight camping. The development of such products has the important benefit of providing employment and training opportunities for Yawuru people, and of making a valuable contribution to the local economy by adding to the range of tourism opportunities available for visitors to Broome.

[18] Tourism Western Australia (2011b) reports that in 2010/11 about 30% of visitors to Western Australia they surveyed engaged in some form of Aboriginal cultural tourism activity during their stay. About one third of visitors they surveyed expressed an interest in guided cultural tours.

Summary of management arrangements for recreation and tourism

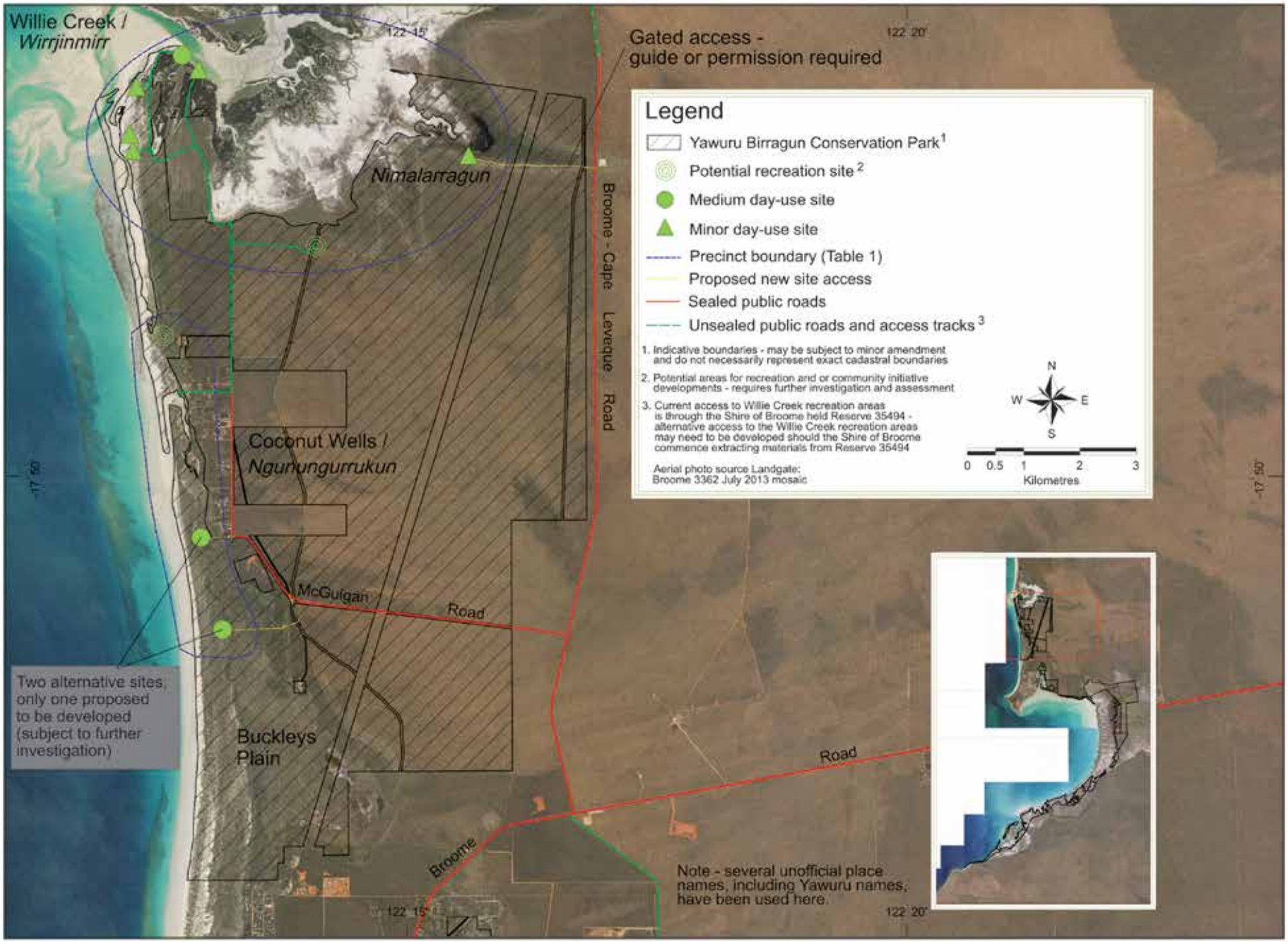
Management objective	To provide a range of opportunities for recreation and tourism consistent with conservation of the cultural and ecological values of the Yawuru Birragun Conservation Park.	
Management strategies	1. Develop recreation sites as proposed in Table 1 and Maps 5a and 5b, subject to detailed assessment of site opportunities and constraints including potential adverse effects on ecological, cultural, visual amenity or other values.	H–KMS
	2. Provide a range of recreation options including moderately and minimally modified sites and settings.	H–KMS
	3. Carry out research and monitoring to evaluate visitation levels and patterns, and the effects of recreation and tourism activities on key values, and implement management measures to address these as necessary. In particular, research human disturbance levels at shorebird high tide roosts (along the northern shores of Roebuck Bay and at Bush and Sandy Point).	H–KMS
	4. Phase implementation of Strategy 1, taking into account cumulative effects of each new recreational development and knowledge gained from implementation of Strategy 3.	H–KMS
	5. Close recreation use areas (and any associated spur roads) in environmentally and culturally inappropriate areas (e.g. some along the northern shores of Roebuck Bay).	H
	6. Ensure that commercial tourism activities occurring within the Yawuru Birragun Conservation Park are compatible with the purpose and management of the Yawuru Birragun Conservation Park and appropriately licensed (e.g. licence issued pursuant to the *Conservation and Land Management Regulations 2002*).	H
	7. Develop cultural tourism and ecotourism products and opportunities that enhance recreation and tourism within the Yawuru Birragun Conservation Park and provide employment and training for Yawuru people.	H
	8. Provide information, interpretation and education that improves visitors' appreciation of the cultural, natural and historical values, and promotes behaviour sensitive to the conservation of these values.	H
	9. Implement a targeted litter management program (including education, enforcement and clean-up components) to minimise littering and the effects of littering on the values of the Yawuru Birragun Conservation Park.	H
	10. Implement strategies described in Section 6.8 – Visitor safety to help minimise visitor safety risks.	H
	11. Implement strategies described in Section 6.7 – Patrol and enforcement to address non-compliant recreational use (including issues such as unauthorised camping and vehicle access restrictions).	H

Table 1 – Recreation site proposals

Recreation precinct [19]	Proposals	Comments
Wirrjinmirr/Willie Creek precinct	▸ Define the public access routes to the Willie Creek recreational areas and close and rehabilitate access not required. ▸ Implement site developments to provide minor to medium day-use areas with a focus on managing low level use for recreational fishing and sightseeing (e.g. installation of shelter and interpretative facilities). ▸ Implement site developments to provide minor day-use area near *Nimalarragun* with a focus on cultural ecotourism, birdwatching and nature appreciation. ▸ Investigate opportunities for cultural ecotourism and/or other community development initiatives at or near the old Waterbank Station homestead consistent with the purpose of Yawuru Birragun Conservation Park. Develop associated facilities as required (e.g. provision for camping in association with cultural tourism activities or other initiatives).	▸ Site level planning and development will consider and include measures to: - help manage visitor safety risks associated with crocodiles potentially occurring in the area (e.g. signage) - help minimise potential disturbance to nesting birds at *Nimalarragun* (e.g. appropriate location and design of facilities).
Ngunungurrukun/ Coconut Wells precinct	▸ Define the public access routes in the *Ngunungurrukun* area and close and rehabilitate other access not required for management purposes. ▸ Implement site developments as necessary to support medium to major day-use areas with a focus on picnics, barbeques and sightseeing.	▸ Site level planning and development will consider and include measures to: - manage potential disturbance to nesting turtles on beaches in the adjacent northern intertidal area (e.g. interpretive signage and shelters) - provide improved, sustainable access between the Yawuru Birragun Conservation Park and the Northern Intertidal Area as appropriate. - take account of the adjacent Coconut Wells rural residential subdivision.
Buga wamba to *Man-galagun*/ northern shores of Roebuck Bay precinct	▸ Reduce the number of recreation use areas: - close (and rehabilitate where feasible) inappropriately located recreation areas and spur roads (e.g. those too close to culturally sensitive areas or important high tide bird roosts). ▸ Implement site developments to provide a range of minor to medium day-use areas to cater for: - more sustainable, hardened access to the *Gurlbanwila* (Dog Rock) area to launch small boats - recreational fishing from the beach - picnics - birdwatching and nature appreciation.	▸ Site level planning and development will consider and include measures to: - help manage visitor safety risks (e.g. signage and site design to minimise cliff fall or collapse hazards) - improve understanding and awareness of Ramsar site values and opportunities for non-intrusive birdwatching (e.g. appropriately designed and located bird-hides) - help minimise potential disturbance to shorebirds (e.g. interpretive signage and/or shelters, improved design and location of site facilities).
Trails	▸ Explore opportunities to improve recreational use and experiences by provision of guided and self-guided trails.	More detailed trail planning and design will consider opportunities to help with achievement of information, education and interpretation management objectives.

[19] Broad recreation planning precincts are depicted by blue-dashed lines on Maps 5a and 5b.

Map 5a – Recreation site proposals (north)



Map 5b – Recreation site proposals (south)

5.3.3 Resource values

The region has identified and prospective mineral, oil and gas resources that are important to the regional economy. Several petroleum exploration permits apply to the Yawuru Birragun Conservation Park. There are also several 'pending' mining tenements over parts of the park, although no mining leases have been granted.

A number of sites next to the Yawuru Birragun Conservation Park are used or reserved for extraction of gravel or other basic raw materials needed for roads and general construction. These include Reserve 35494 and Reserve 35493, both held by the Shire of Broome (shown on maps 4a and 4b), and an active quarry near Coconut Wells (on Mining Lease 04/185).

While current vehicle access to the Willie Creek recreation area passes through the Shire of Broome held Reserve 35494, alternative access arrangements may need to be developed for these sites should the Shire of Broome wish to commence extracting materials from the reserve.

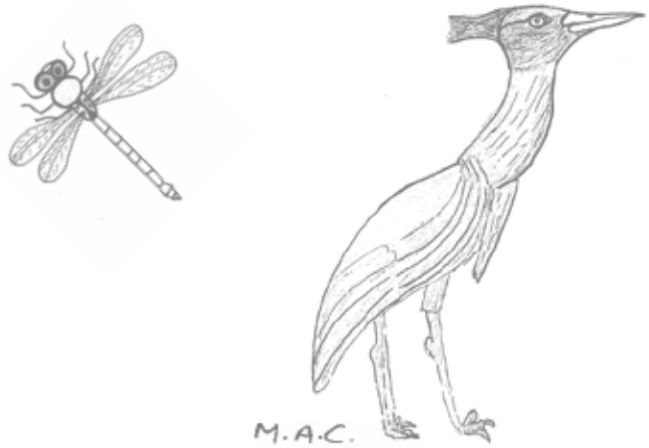
In accordance with section 8A(4) of the CALM Act, an agreement made under section 8A of the Act cannot apply to any areas where a mining lease or general purpose lease granted under the *Mining Act 1978* applies. Therefore, should any mining leases or general purpose leases be granted over parts of the Yawuru Birragun Conservation Park, areas subject to the lease would cease to be jointly managed conservation reserve while the mining or general purpose lease applied.

In recognition of the natural and cultural values and the management purpose of the Yawuru Birragun Conservation Park, it is preferable that all basic raw materials needed for construction within the conservation estate (e.g. for the construction of roads and recreation developments) are obtained from outside the conservation reserve, or from areas that are already disturbed or of lower conservation value.

Water resources

The Department of Water is responsible for managing Western Australia's water resources. The Water Corporation wellfield from which Broome's water supply is drawn is within the water reserve to the north-east of town and is adjacent to part of the Yawuru Birragun Conservation Park (see Reserve 25716 on Map 4a). Two groundwater areas[20] apply to the Yawuru Birragun Conservation Park; the Broome groundwater area, and the Canning–Kimberley groundwater area. The Department of Water's *Broome groundwater area management plan* (Water Authority of Western Australia 1994) and the *La Grange groundwater allocation plan* (DoW 2010c) guide water management in the Broome groundwater area and the La Grange groundwater subarea respectively. In setting allocation limits (i.e. the maximum amount of groundwater that can be taken from these areas) the Department of Water takes the water requirements of groundwater-dependent ecosystems and cultural values into account (DoW 2010a, 2010c). However, there are significant gaps in understanding about the groundwater resource, the water regimes needed to maintain groundwater-dependent ecosystems and limits of acceptable change in these water regimes (DoW 2010a). The various Department of Water strategic plans recognise the need to address these knowledge gaps, and to use precautionary approaches in the interim in setting water allocation limits (DoW 2010a, 2010b; 2010c, 2012).

There are several disused bores in the Yawuru Birragun Conservation Park. While there is generally little need to abstract groundwater for conservation reserve management purposes, groundwater bores may sometimes be used (e.g. for the purposes of fire management or recreation site facilities). The Broome and Canning–Kimberley groundwater areas are proclaimed under the *Rights in Water and Irrigation Act 1914*, and therefore the Department of Water may require that a licence be obtained to construct bores and abstract water in these areas.



[20] These are proclaimed under the *Rights in Water and Irrigation Act 1914*

Summary of management arrangements for resource use

Management objective	To protect the values of the Yawuru Birragun Conservation Park from any adverse effects associated with resource use activities in or next to the park.	
Management strategies	1. Provide information or advice to relevant agencies about resource use proposals as needed to address potential adverse effects on the cultural, natural and other values of the Yawuru Birragun Conservation Park.	H–KMS
	2. Obtain raw materials for use within the Yawuru Birragun Conservation Park from outside the conservation reserve unless any adverse effects on the natural and cultural values are demonstrated to be very low, and there are no other practical, environmentally or culturally acceptable alternatives.	H
	3. Ensure that any areas of the Yawuru Birragun Conservation Park disturbed by basic raw material extraction for use within the park are rehabilitated. Ensure that rehabilitation has been effective by post-rehabilitation monitoring and evaluation, and implementation of additional or alternative restorative works if necessary.	H
	4. Ensure that any groundwater abstraction within the Yawuru Birragun Conservation Park does not adversely affect natural, cultural and other values.	H

Above: *Jinjalgurinyar* or crab's eye bean (*Abrus precatorius*).
Photo – Carolyn Thomson-Dans/Parks and Wildlife

6. General management programs

To realise the vision, goals, objectives and targets described in this plan, the management programs in this section will be implemented in addition to the strategies described for the values in Section 5. The eight management programs to be developed and implemented for the Yawuru Birragun Conservation Park are:

- access management
- introduced species management
- fire management
- information, education and interpretation
- public participation
- research and monitoring
- patrol and enforcement
- visitor safety.

Management strategies for these programs are prioritised as high (H), medium (M) and low (L), and those most critical to achieving the management objectives are identified as 'high priority key management strategies' (H–KMS).

6.1 Access management

6.1.1 Restricted access areas

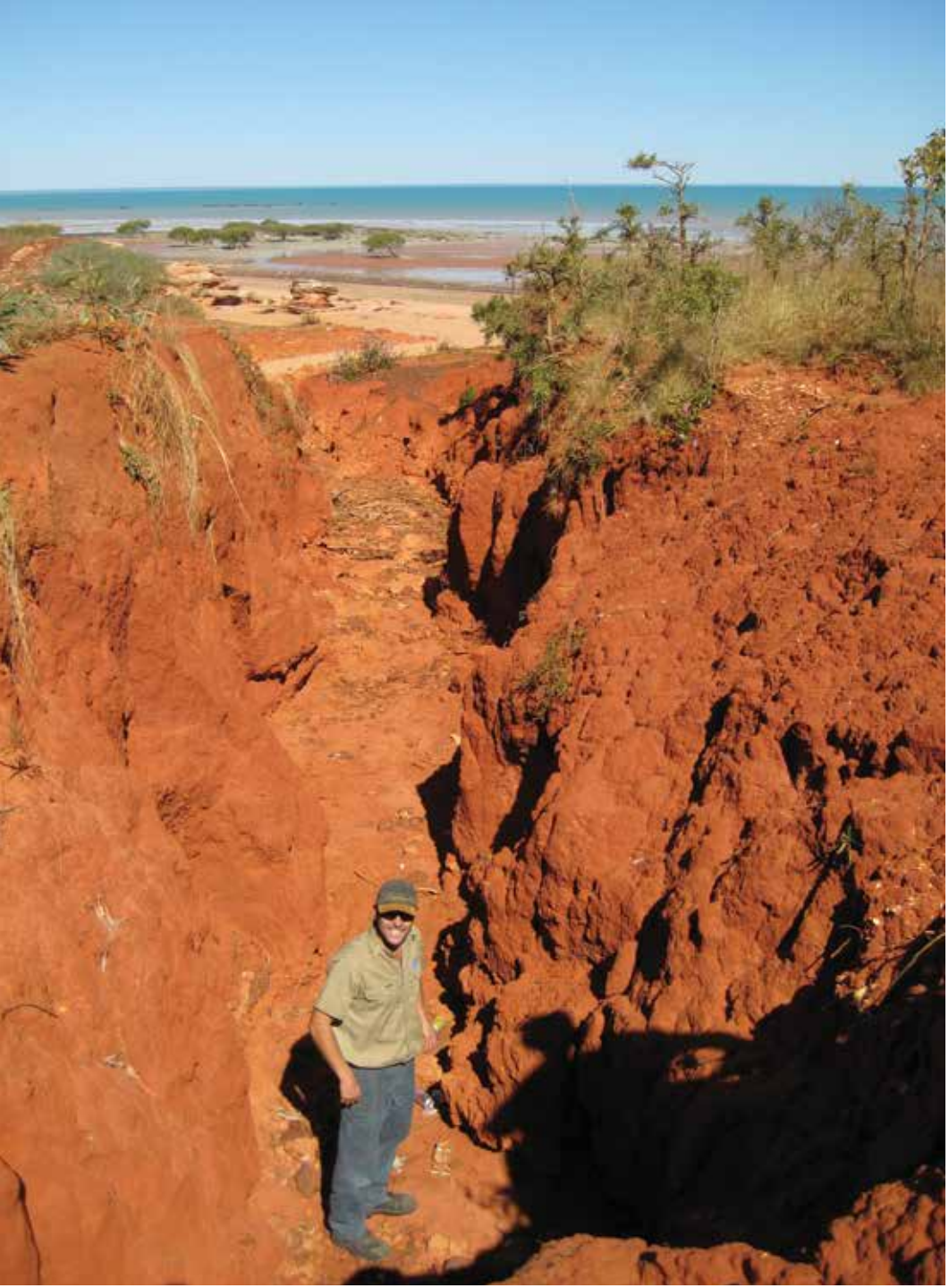
Special access arrangements will apply to parts of the Yawuru Birragun Conservation Park to accommodate certain Aboriginal cultural and customary purposes. Access to areas identified as 'cultural protection prohibited access areas' (law grounds and other culturally sensitive areas) will be restricted to senior Yawuru law men who have acquired the necessary cultural knowledge. Access to areas identified as 'cultural purposes areas' will be restricted to Yawuru people and Yawuru-nominated people in accordance with agreed Yawuru protocols. Map 6 gives a broad indication of parts of the Yawuru Birragun Conservation Park in which such areas will be established, while further work to define specific boundaries and detailed management arrangements within each area will be done early in the plan implementation. Roads and trails providing public access to recreation sites and other public areas will be excluded from the restricted access 'Yawuru Cultural Protection Prohibited Access Areas' or the 'Yawuru Cultural Purposes Areas'. Management access or otherwise authorised access to the cultural protection and cultural purposes areas will be in accordance with agreed protocols and arrangements. Some basic facilities and access tracks may be developed in these areas if needed to protect values.

In addition, tracks and roads will need to be developed to provide Yawuru people with access to the *Marrar* law ground in the southern part of the Yawuru Birragun Conservation Park, and access from the Yawuru conservation estate to nearby 'Thangoo land' for which Yawuru RNTBC has been issued perpetual lease in accordance with the ILUAs. This will involve negotiations with pastoral lessees as necessary and appropriate.

6.1.2 Vehicle access

Maps 1, 5a and 5b show existing roads within the Yawuru Birragun Conservation Park that provide public vehicle access to recreation areas at Willie Creek, Coconut Wells and recreation sites along the northern shores of Roebuck Bay. It should however be noted that current vehicle access to the Willie Creek recreation area passes through the Shire of Broome held Reserve 35494, and that alternative vehicle access to the Willie Creek recreation sites may need to be developed should the Shire of Broome need to commence extracting materials from Reserve 35494. Vehicle access within Yawuru Birragun Conservation Park recreation areas will be further defined through site-level design and development. Some proposed sites would also require development of access to the new site (e.g. as indicated in Map 5a for some proposed recreation sites in the Coconut Wells area).

The Shire of Broome manages the Broome to Cape Leveque Road, McGuigan Road, Lawrence Road and Denham Road, which provide public vehicle access into the Yawuru Birragun Conservation Park north of the town site. The Crab Creek Road provides public vehicle access to the northern shores of Roebuck Bay and is also managed by the Shire of Broome. The currently unnamed east–west road that provides public access from the terminus of the Crab Creek Road to the Broome Bird Observatory and beyond is under joint Department of Parks and Wildlife–Yawuru management. The standard of these roads is variable, and many of the unsealed roads, particularly where they pass through low-lying wetter areas,



Above: A Parks and Wildlife Officer in a deep gully along the northern shores of Roebuck Bay. Photo – Jeremy Flynn/Parks and Wildlife

become impassable after heavy rainfall, temporarily limiting access to part of the Yawuru Birragun Conservation Park.

As well as sometimes becoming impassable during the wet season, the unnamed east–west road and the numerous spur roads that provide access to the northern shores of Roebuck Bay present several other management concerns. The alignment is very close to the cliff edge in some parts, and a number of drainage culverts and spur roads to the bay have contributed to the formation of deep erosion gullies. Drainage from the road is also contributing to poor cliff stability in some areas. Reducing the number of spur roads, dealing with unauthorised camping and closing informal day-use areas along this coast will help to limit the extent of erosion. Some improvements to the way that drainage from the east–west road is managed may also help. However, maintaining the existing road alignment will be costly and will continue to present management difficulties by increasing the natural erosion processes in this area. It would be preferable for the east–west road to be located further to the north along the boundary of Roebuck Plains Station and the Yawuru Birragun Conservation Park (see Map 5b) and this option will be explored if sufficient funds become available. The existing road would then need to be reduced and rehabilitated as much as possible.

All vehicles entering the Yawuru Birragun Conservation Park must be licensed under the *Road Traffic Act 1974*. There are no 'permitted areas' for off-road vehicles under the *Control of Vehicles (Off-road Areas) Act 1978* within the park. Vehicles such as unlicensed off-road motorbikes and dune buggies are not permitted. The use of licensed vehicles off-road in the Yawuru Birragun Conservation Park is only permitted in designated areas within a recreation precinct, for example at *Gurlbanwila* (Dog Rock) to allow people to launch and retrieve small boats. Illegal use of unlicensed off-road vehicles and indiscriminate use of licensed four-wheel-drive vehicles is a problem at several locations within the park, particularly:

- around Crab Creek, where a haphazard network of tracks has developed as a result of vehicles venturing beyond the end of the formed road to obtain closer access to the creek
- around Willie Creek, Coconut Wells, Buckleys Plain and Dampier Creek, where unregulated vehicle access has led to the creation of multiple tracks and caused localised degradation of saltmarsh, fragile limestone platforms and sand dunes.

These problems can be difficult to deal with in areas where vegetation is low and open, and regular patrols and enforcement of vehicle access restrictions are an important aspect of effectively managing this problem.

6.1.3 Boat launching access

Small boats are sometimes launched and retrieved off the beach via the Yawuru Birragun Conservation Park, principally at *Gurlbanwila* (Dog Rock) and near Crab Creek, but due to a number of management issues only *Gurlbanwila* (Dog Rock) will be the permitted boat launching area.

Vehicle and boat access on to the beach at *Gurlbanwila* (Dog Rock) is currently difficult and contributes to erosion and other management problems. An upgrade of this site will be required if launching boats here is to be sustained and visitors are to better provided for. For this reason, options are being explored for works at *Gurlbanwila* (Dog Rock) to formalise the boat ramp, improve parking and pedestrian access, and install toilets, shelter and other visitor facilities.

Launching of boats and vehicle access to Crab Creek presents several management difficulties. The haphazard network of vehicle tracks has caused considerable damage to the fragile coastal vegetation and landforms between *Mirrda* (One Tree) and the creek. Due to the proposed upgrade of the *Gurlbanwila* (Dog Rock) boat launching area, the proximity of this site to Crab Creek, and the limited capability of the landforms immediately around Crab Creek to sustain use by vehicles, boat launching will no longer be permitted at Crab Creek.

6.1.4 Management access

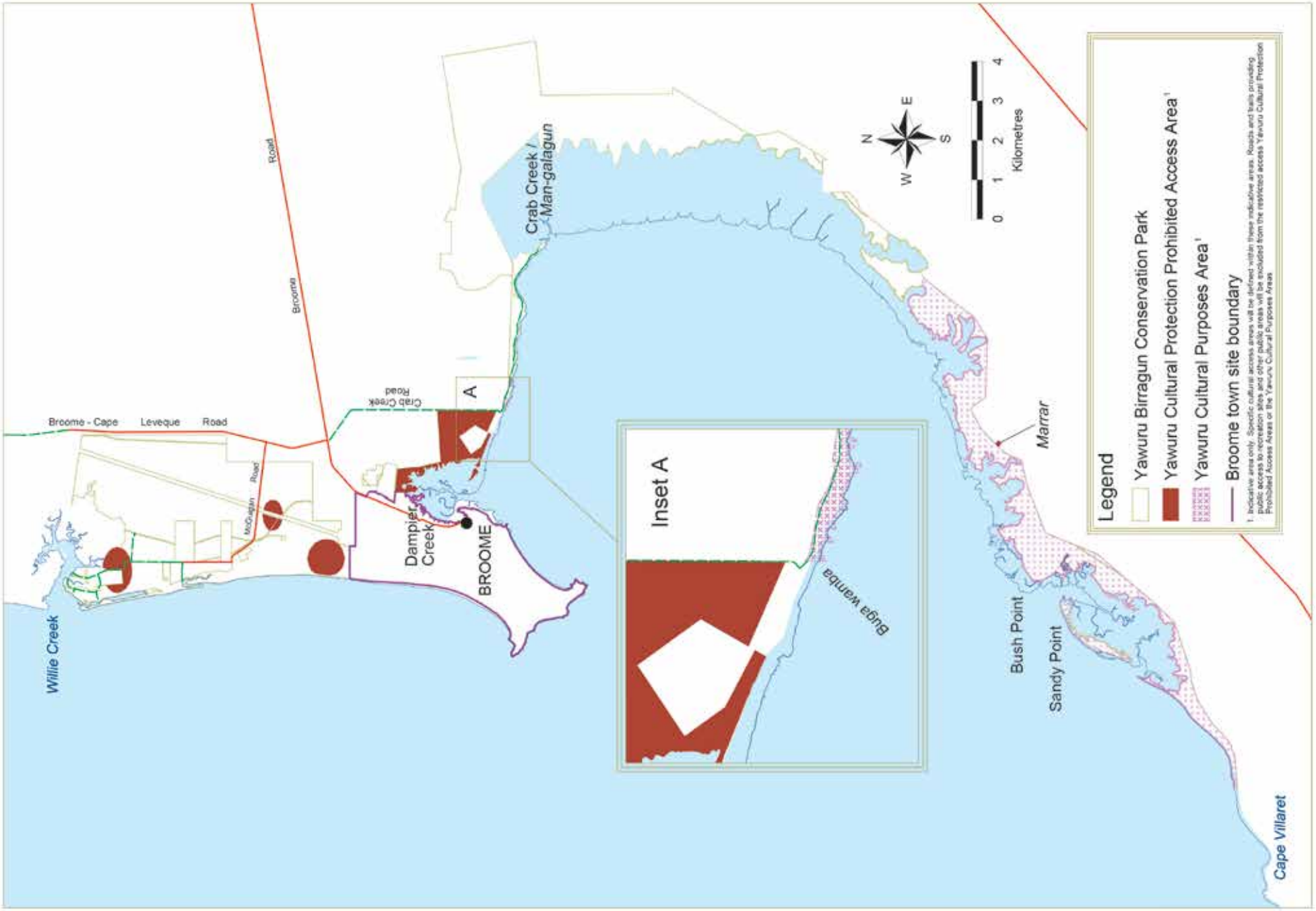
All other established roads and tracks in the Yawuru Birragun Conservation Park, other than those needed for public access to park recreation sites, will be retained for management purposes or authorised access only, or closed if not required for these purposes.

There are currently no provisions for vehicle-based management access to the southern part of the Yawuru Birragun Conservation Park and this will need to be negotiated and developed.

6.1.5 Access for visitors with disabilities

The joint management partners wish to improve access to services, information and facilities for people with disabilities. Disability access issues will be considered and addressed during detailed recreation site planning and development. There may be practical constraints in providing access for people with disabilities to some of the more natural and remote recreation sites within the Yawuru Birragun Conservation Park. However, it will generally be possible to provide universal access at larger modified sites.

Map 6 – Special cultural access arrangements



Summary of access management arrangements

Management objective	To provide access for recreation, cultural and management purposes.	
Management strategies	1. Use legal mechanisms (e.g. notices under the CALM Act) and other measures (e.g. signage, fences and gates, development of basic facilities) as required to give effect to the cultural restricted access areas established within parts of the Yawuru Birragun Conservation Park indicated on Map 6.	H–KMS
	2. Maintain roads and tracks open to the public and those needed for management purposes.	H–KMS
	3. Negotiate and develop access to the southern part of the Yawuru Birragun Conservation Park for management and cultural purposes.	H–KMS
	4. Ensure that people are provided with information about access restrictions within the Yawuru Birragun Conservation Park.	H–KMS
	5. Implement access restrictions as necessary to help meet management objectives (e.g. use of temporary control areas under section 62 of the CALM Act to provide seasonal protection to fauna).	H
	6. Issue infringements for non-compliance with access restrictions where necessary.	H
	7. Carry out drainage management and other road works to limit the worsening of erosion along the northern shores of Roebuck Bay.	H
	8. Close and (where feasible) rehabilitate unnecessary or inappropriate access routes (i.e. those not required for public access or management purposes).	H
	9. Provide designated vehicle access and other facilities to support launching of small boats at *Gurlbanwila* (Dog Rock).	M
	10. Where practical and appropriate, ensure that recreation site developments provide facilities for people with disabilities or limited mobility (e.g. wheelchair accessible toilets, walkways, special parking areas).	M
	11. Develop an alternative alignment for the east–west road providing access to the Broome Bird Observatory and recreation areas along the northern shores of Roebuck Bay, when feasible, subject to detailed assessment of impacts on natural, cultural and other values.	L

6.2 Introduced species management

6.2.1 Introduced flora management (KPI)

Weeds have the potential to degrade culturally significant and environmentally-sensitive areas by out-competing native species, by changing vegetation structure, by changing habitat for fauna and by increasing the intensity of bushfires.

To help set priorities for weed management, Parks and Wildlife initiated an updated assessment of weeds in each departmental region. The first stage of this assessment used available knowledge to identify weed species considered to be of high impact, rapidly invasive and still at a population size that was feasible to eradicate or control. Through the Kimberley region species-led invasive plant prioritisation process, 37 introduced plants known to occur in the region have been identified as high ecological impact species (DEC 2009a), and of these the following have been recorded from within or near the Yawuru Birragun Conservation Park (DEC 2012):

- bellyache bush (*Jatropha gossypiifolia*)
- buffel grass (*Cenchrus ciliaris*)
- neem (*Azadirachta indica*)
- stinking passionflower or wild passionfruit (*Passiflora foetida*)
- *Merremia dissecta*).

Eradication of weeds is feasible if the infestation is small and the commitment to control can be continued until all weeds are destroyed and the soil stored seed is exhausted. Containment and slowing the rate of spread are alternative strategies to be considered if eradication is not feasible.

Several species included in the Kimberley region environmental weed list are declared pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), and these are subject to particular legislative requirements for control. Of the declared pests on the regional environmental weed list only bellyache bush has been formally recorded near the Yawuru Birragun Conservation Park.

The second stage of Parks and Wildlife's regional weed assessments will identify high value assets and the weed infestations that pose a threat to those assets. This will provide site-based weed prioritisation and give guidance on where control measures will have the greatest benefit. In addition, management of weeds within the Yawuru Birragun Conservation Park will be considered in the context of any local priorities that may not be reflected in regional weed assessments. For example, rubberbush (*Calotropis procera*) is present but not yet widespread in the Broome area, and as there is still a high feasibility of gaining control of this invasive species in the conservation estate it is therefore a local weed management priority. In addition, the various wetlands within the Yawuru Birragun Conservation Park are of particularly high conservation and cultural value and therefore assessment and management of weeds with the potential to significantly affect wetland values will be important. Similarly, assessment and management of weeds with the potential to significantly affect melaleuca thicket warrants special consideration, as it has a very limited extent and associated values may therefore be vulnerable to weed threats. The stinking passionflower is one weed species that can be particularly problematic in this habitat (Kenneally *et al*. 1996).

Top: Stinking passionflower (*Passiflora foetida*). Photo – Parks and Wildlife
Above: Neem tree (*Azadirachta indica*). Photo – Parks and Wildlife

The Yawuru Birragun Conservation Park receives many new introductions and reintroductions of weeds via the adjacent gardens and users of the bushland for recreation. Engagement and support of the community and adjacent landholders is vital for effective weed control.

6.2.2 Introduced fauna management

Introduced animals have the potential to seriously affect ecosystems by predation of or competition with native species, alteration of habitat and introduction of disease. Introduced animals can degrade cultural values by adversely affecting native species of particular cultural importance, or by degrading cultural sites or the environment. Several species of introduced predators and herbivores occur on Yawuru conservation estate. However, feral cats, foxes, dogs, cattle and horses are currently considered to present the most significant threat to the values of the Yawuru Birragun Conservation Park.

Priorities for action include pest species declared under the BAM Act and introduced fauna that have the potential to significantly affect threatened or priority species or important habitats.

Feral cats, foxes and dogs have dramatic effects on Western Australia's native fauna. Control of feral predators in the Yawuru Birragun Conservation Park is important, but complicated in areas where domestic dogs and cats can easily enter from adjacent residential areas. Effective control of feral predators in these areas will require a concurrent program to encourage responsible pet ownership and reduce the number of unwanted pets being bred. The *Dog Act 1976*, administered by local government, provides for the control and registration of dogs. With the introduction of the *Cat Act 2011*, requirements for registration, identification and sterilisation of cats apply. A new cat bait to be trialled in the Kimberley could possibly be considered to help with cat control in the Yawuru Birragun Conservation Park over the life of this plan, but this is subject to outcomes of the trial and risk assessments.

In the Yawuru Birragun Conservation Park the effects of cattle are most obvious in melaleuca thickets and other sensitive wetland areas where they commonly congregate to escape the heat and access water. Cattle trample and compact the surface and vegetation, introduce and spread weeds, and alter water quality through concentration of nutrients (Semeniuk Research Group 2011). In addition

Above: The invasive cane toad. Photo – Parks and Wildlife

to feral cattle, a proportion of cattle within the Yawuru Birragun Conservation Park may be stock that has strayed from adjacent areas. The managers of Roebuck Plains Station have commenced undertaking complementary planning that considers measures to reduce any negative impacts that cattle operation activities may have on the Yawuru conservation estate.

The cane toad (*Rhinella marina*), a species introduced into Queensland to control sugar cane pests, has now become one of the country's most invasive alien species. Despite extensive effort to prevent it entering Western Australia it now occurs in the north-east Kimberley. Cane toads are toxic to most Australian wildlife that eat them and can rapidly increase their populations, having an impact on food and other resources available to native fauna (DEC 2009 b, Pearson *et al*. 2008). There is potential for the cane toad to establish colonies in the Broome area (DEC 2009 b), and therefore surveillance and awareness-raising measures are important to try and minimise the likelihood of cane toad populations becoming established in the area.

Summary of introduced species management arrangements

Management objective	Protect threatened and other species and communities of special conservation significance, and habitat of high conservation value from adverse effects because of: • significant increases in populations of existing introduced flora and fauna species • new introductions of weed and feral animal species.	
Management strategies	1. Evaluate the threat presented by introduced plants and animals to the values of the Yawuru Birragun Conservation Park and develop and implement weed and feral animal control plans, placing a high priority on high risk species and areas.	H–KMS
	2. Monitor and evaluate the extent and effects of weeds and feral animals and the effectiveness of control measures, placing a high priority on protection of high risk species and areas.	H–KMS
	3. Engage with the community and adjacent landholders to raise awareness of introduced flora and fauna management issues and gain support for management of these issues.	H–KMS
	4. Employ hygiene management and surveillance measures as necessary to reduce the likelihood of other weed and feral animal species becoming established (e.g. entry clean down of machinery used in the conservation estate, assessing weed risks of imported soils and other materials, use of cameras to reveal feral predator behaviours).	H–KMS
	5. Consider measures to exclude introduced fauna from sensitive areas (e.g. temporary fences) if necessary and feasible.	M
Performance measure	1. Availability of baseline data and report documenting environmental weed species at priority locations within the Yawuru Birragun Conservation Park. 2. The extent of environmental weed species at priority locations (rated as 'high' or local priority).	
Target	1. Baseline data and report documenting environmental weed species at priority locations within the Yawuru Birragun Conservation Park is available by 2018. 2. No increase from baseline levels in the extent of environmental weed species at priority locations rated as 'high' or local priority (attributable to management activities or lack of appropriate management activities).	
Reporting requirements	Every two years.	

6.3 Fire management

Yawuru people traditionally used fire for a wide variety of purposes. The application of fire to the landscape in accordance with seasonal knowledge and customary burning practices is likely to have resulted in a mosaic of numerous small burnt and unburnt patches, and reduced the risk of fires ignited by lightning from developing into large, intense bushfires (Kenneally *et al*. 1996). Fires were purposefully lit in carefully selected seasons and restricted areas (Kenneally *et al*. 1996). With the departure from traditional Aboriginal burning practices and many irreversible modifications to the environment that have occurred since European colonisation, fire regimes have changed. Large, high intensity, late dry season fires have become more common and present a significant hazard to human life, community assets, cultural values and biodiversity.

Much of the area now included within Yawuru conservation estate was until recently unallocated Crown land. Since the area has been managed by Parks and Wildlife and Yawuru, fire management has focused on strategic protection measures such as prescribed burns to manage fuel levels, and the maintenance of strategically located fire breaks and fire management access tracks around public assets such as Coconut Wells, Broome Bird Observatory and the 12 Mile community. Suppression of late-season fires has also been undertaken regularly as necessary, in conjunction with Shire of Broome Bushfire Brigade units and the Department of Fire and Emergency Services. The area of Yawuru conservation estate north of the Broome town site has in particular been subjected to frequent (i.e. approximately annual) late dry season bushfires. Areas surrounding *Kunin* have also been subject to relatively frequent dry season bushfires.

Species and communities vary in their response to fire. While many species are resilient to a range of fire regimes, others may have very specific fire regime requirements (e.g. some wetland species, flora that has relatively long juvenile periods and fauna that prefer medium to late successional stages of vegetation). Gaps in current knowledge require that fire management for biodiversity conservation focuses on avoiding frequent, large, hot, late dry season fires by creating and maintaining a spatial and temporal mosaic of functional habitats across the landscape. This will promote as much resilience as possible for ecosystems in the face of disturbance. Within this mosaic, the needs of individual threatened species, threatened ecological communities and significant

Above: Yawuru Rangers Jason Richardson (foreground) and Patrick Foley conducting an experimental regeneration burn on the threatened fringed firebush. Photo – Karen Bettink/Parks and Wildlife

Above: Yawuru Ranger Jason Richardson conducts fire management.
Photo – Karen Bettink/Parks and Wildlife

habitats that require specific fire regimes will be considered and accommodated. As information from research and monitoring increases (e.g. information about the vital attributes of species and their fire regime requirements) this knowledge will be incorporated into fire management planning and operations.

There is only limited information about the specific fire regime requirements of habitats within the Yawuru Birragun Conservation Park. One of the more dominant habitats within the park is pindan, for which the fire regeneration cycle is understood to span five to seven years (Kenneally *et al*. 1996). The pindan wattles rapidly recover after fire by rootstock suckering and/or prolific seedling regrowth (Kenneally *et al*. 1996). Kenneally *et al*. (1996) noted that while mistletoes are an important component of Australian savanna ecosystems, pindan acacias can be heavily infested and killed by mistletoes such as *Lysiana spathulata* and *Dendrophthoe acacioides* in the absence of fire. In very general terms it is understood that some flora and fauna species with very restricted distributions, for example those only found within or near permanent or ephemeral wetland areas, or species that use these habitats for breeding, may have very specific fire regime requirements. Specific or detailed knowledge of the fire regimes suited to most species of the Yawuru Birragun Conservation Park wetlands is not currently available.

The response of native flora and fauna to fire is also affected by the extent of fire and the interaction of fire with ecological disturbances such as weeds, feral predators and grazing by introduced herbivores. The best available knowledge about these issues is taken into account as part of fire planning and operations, although more research and monitoring is needed to improve understanding of these issues and their implications for management.

Fire poses a significant risk to the safety of firefighters, visitors, neighbours, local communities and a range of community assets. Measures to protect human life from fire are a priority. Identifying fire-vulnerable community assets within the Yawuru Birragun Conservation Park, and determining the risk, likelihood and consequences of bushfire on those assets, also helps with managing and further prioritising risk mitigation strategies for bushfires. In addition to fire management for conservation of biodiversity and cultural values, key areas for asset protection measures include:

- those parts of the Yawuru Birragun Conservation Park next to residential areas (e.g. residential areas at Coconut Wells, Morrell Park and northern parts of the Broome town site) and areas surrounding Broome Bird Observatory
- recreation sites, assets and other infrastructure within the Yawuru Birragun Conservation Park.

The major elements of bushfire risk mitigation are:

- managing fuel levels to reduce the consequence of unplanned fire events and promote more effective fire response capability
- maintaining a strategic system of protective fire breaks
- maintaining access for fire management
- maintaining fire response and fire suppression capability
- maintaining effective communication with other bodies that have fire management responsibilities and the local community.

Summary of fire management arrangements

Management objective	Fire management throughout the life of this plan that: • reduces the risk of adverse effects of bushfire on human life and community assets • promotes maintenance of habitat diversity and the persistence of 'fire regime specific' biota and habitats • promotes protection of cultural values and culturally sensitive areas.	
Management strategies	1. Strategic use of prescribed fire and complementary mitigation strategies (e.g. mechanical fuel management) to protect human life and community assets and help meet management objectives.	H–KMS
	2. Maintain a diversity of post-fire vegetation stages and use the best available information to determine the appropriate fire regimes for Yawuru Birragun Conservation Park.	H–KMS
	3. Carry out fire risk assessments and implement an asset protection plan.	H–KMS
	4. Maintain a strategic protection and fire management access system and implement emergency incident response plans as required.	H–KMS
	5. Ensure that fire management planning and operations include procedures for obtaining advice from Yawuru people on the protection of cultural values and assets from fire.	H–KMS
	6. Ensure that fire planning and operations take into account the best available knowledge about the interplay of fire with other ecological disturbances (e.g. weeds, introduced fauna).	H–KMS
	7. Monitor and record the effects of fire on the most important and vulnerable values and assets, and on habitats or species which may require specific fire regimes (e.g. wetland areas, threatened and priority species).	H
	8. Liaise with agencies and other groups with fire management responsibilities (e.g. Shire of Broome and the Department of Fire and Emergency Services) and communicate with the community about fire management issues as required.	H
	9. Develop and maintain fire operations plans or other documents as necessary to facilitate implementation of the management strategies above.	H

6.4 Information, education and interpretation

An information, education and interpretation program is indispensable to fulfilling the objectives of this management plan and helps to:

- increase public awareness and understanding of the natural and cultural values and management issues
- enhance visitors' experience
- foster a sense of community stewardship
- promote support for management.

Several information, education and interpretation needs have been expressed in strategies throughout this plan. Some communication topics and themes relevant to the Yawuru Birragun Conservation Park are:

- the park is one part of *Yawuru buru* (Yawuru country) and Yawuru people are the traditional owners who have had a long history of occupation and use
- the park has rich Yawuru cultural and heritage values
- Yawuru history, including the Yawuru journey for native title recognition and the joint management arrangements of today
- the Yawuru Birragun Conservation Park has a range of nature conservation values, including a variety of wetland habitats and Ramsar site values, including important migratory shorebird roosting and flatback turtle nesting areas
- history of the Yawuru Birragun Conservation Park including pearling lay-up camps and pastoral use
- information about access restrictions (e.g. Yawuru cultural access only areas)
- appropriate behaviour around wildlife that is sensitive to disturbance (e.g. roosting shorebirds).

These and other topics relevant to the Yawuru Birragun Conservation Park will be considered in the development of an integrated information, education and interpretation program that will apply to Yawuru conservation estate. Local groups such as the Broome Bird Observatory, the Roebuck Bay Working Group and commercial tour operators also provide information and education services to the local community and visitors, and opportunities to provide complementary and integrated approaches should be explored.

Above: Yawuru Ranger Jason Richardson providing community education. Photo – Parks and Wildlife

Summary of information, education and interpretation management arrangements		
Management objective	To enhance the recreational experience of visitors, increase understanding of the park's natural and cultural values and encourage behaviour that assists with management of the Yawuru Birragun Conservation Park.	
Management strategies	1. Develop and implement information, education and interpretation strategies (as part of an integrated program across the Yawuru conservation estate) that helps visitors to the Yawuru Birragun Conservation Park and other stakeholders: • increase their understanding and appreciation of the park's natural and cultural values • adopt appropriate behaviour sensitive to the conservation of natural and cultural values • comply with access restrictions and other regulations.	H–KMS
	2. Ensure that Yawuru people have a primary and active role in communication about their culture and heritage, that Yawuru intellectual property is recognised, and that the pertinent Yawuru cultural protocols are observed when developing the information, education and interpretation program.	H–KMS
	3. Liaise with other groups also providing information, education and interpretation in the area (e.g. Broome Bird Observatory, Roebuck Bay Working Group, nature-based commercial tour operators) to explore opportunities for integrated and complementary approaches as appropriate.	H

6.5 Public participation

Public and key stakeholder participation in conservation reserve management can help to build and sustain the community support that is important for effective implementation of this management plan. A range of mechanisms can be used to provide the community and key stakeholders with opportunities to contribute to and become informed about and involved in conservation reserve management. Involvement through volunteer projects, community advisory committees and various consultation events are commonly used mechanisms. These types of community and key stakeholder involvement programs can help extend management effort, reduce management costs, use valuable skills and knowledge, and build communication links between land managers and the community.

Summary of public participation management arrangements		
Management objective	To encourage and facilitate public and key stakeholder participation in the management of the Yawuru Birragun Conservation Park.	
Management strategies	1. Provide and promote opportunities for the public and key stakeholders to participate in management of the Yawuru Birragun Conservation Park.	H–KMS
	2. Maintain a record of public and stakeholder participation activities and events (e.g. volunteer hours and activities, community forums).	M

6.6 Research and monitoring

Research and monitoring are important aspects of conservation reserve management. Research is needed to deal with gaps in knowledge about the park's cultural, ecological and social values, and the factors that can affect these values. Monitoring allows timely detection of any deterioration in the condition or status of these values, helps identify where corrective actions are needed to prevent serious degradation, and helps with the evaluation of management effectiveness.

The joint management arrangement with Yawuru people provides opportunities to use traditional ecological knowledge in management of the Yawuru Birragun Conservation Park. Yawuru people, like all traditional owners across Australia, possess specialist knowledge about local plants and animals, ecological systems and processes, and environmental changes. This traditional ecological knowledge is an invaluable resource for scientists to develop a better understanding of the natural resources and biodiversity of the area.

A number of research and monitoring requirements have been expressed throughout this plan in the form of strategies and KPIs. These reflect priorities for addressing knowledge gaps and collecting information that will help in assessing the effectiveness of the management plan. The research and monitoring priorities for the Yawuru Birragun Conservation Park are centred on:

- determining whether key cultural values and sites are being adequately maintained
- whether the condition of certain restricted habitats of high conservation importance (including wetlands and melaleuca thickets) is being maintained
- determining the nature and level of threats to the above and other important values of the park (such as migratory shorebird roosts and turtle nesting habitat).

Because the Yawuru conservation estate is newly established, a significant amount of research and monitoring effort will initially be focused on collecting the baseline data needed to allow the condition of values to be monitored over and beyond the life of this management plan (performance assessment and monitoring is also discussed in Section 3).

Some of the important values that occur in the Yawuru Birragun Conservation Park – migratory shorebirds for example – are more strongly affiliated with other parts of Yawuru conservation estate, and therefore research and monitoring strategies for those values have been included in other management plans applicable to the Yawuru conservation estate as relevant. Research and monitoring priorities for the Yawuru Birragun Conservation Park will be considered in the context of research priorities across the Yawuru conservation estate and across conservation reserves elsewhere in the Kimberley (e.g. as described in *A strategic plan for biodiversity conservation research 2008-2017* [DEC 2008]).

The Yawuru Birragun Conservation Park has values that are attractive for research in a wide range of scientific disciplines, and the joint management partners will receive research proposals from a variety of organisations. Research and monitoring undertaken by or in partnership with external research groups or volunteers can help to extend and improve research efforts and reduce the costs of management. It is therefore desirable and appropriate for external organisations and volunteers to also play a role in research and monitoring activities in the park. Similarly, other government agencies have a role in research and monitoring in the Yawuru Birragun Conservation Park (the Department of Water, for example, has primary responsibility for monitoring availability and quality of water that sustains ecosystems in the conservation estate).

There are a number of approval and procedural requirements for anyone wishing to undertake research within the Yawuru Birragun Conservation Park. Prior approval of the Yawuru Birragun Conservation Park joint management partners is needed, and a number of legislative approvals need to be met. These vary depending on the specifics of the research project, but may for example include permits or approvals issued under the CALM Act, the Wildlife Conservation Act and the *Fish Resources Management Act 1994*. The Yawuru have also established a set of cultural protocols which include protocols about research on Yawuru country (described in the *Yawuru cultural management plan*).

These approvals and procedures ensure that research and monitoring is well coordinated and integrated, and allow the joint management partners to:

- maintain an understanding of research effort
- direct research effort, where necessary, so it is relevant to management
- collaborate with researchers where possible
- share research outcomes with others
- ensure that cultural protocols are observed
- ensure that any potential adverse effects on values are considered (e.g. the combined effects of many research projects could adversely affect values, as could research in culturally sensitive areas).

Summary of research and monitoring management arrangements

Management objective	1. To increase knowledge about and monitor changes in the condition of the most important values and ecological processes of the Yawuru Birragun Conservation Park. 2. To facilitate assessment of management effectiveness. 3. To promote research that can inform improved management of the Yawuru Birragun Conservation Park.
Management strategies	1. Develop and implement a research and monitoring program with a focus on: • acquiring baseline data for the most important values • addressing the most significant knowledge gaps, placing a priority on those values and issues for which KPIs have been identified • increasing knowledge about the nature and level of threats to the most important values. 2. Ensure that the research and monitoring program is designed to help with review and assessments of management effectiveness, and supports evaluation, monitoring and reporting of Ramsar site attributes relevant to the Yawuru Birragun Conservation Park. 3. Maintain a portfolio of evidence that can be used to assess implementation of this management plan and the effectiveness of management actions in the Yawuru Birragun Conservation Park. 4. Investigate opportunities for the integration of Yawuru traditional ecological knowledge with conservation science and land management, and provide opportunities for Yawuru people to be actively involved in research on Yawuru country. 5. Ensure that research and monitoring in the Yawuru Birragun Conservation Park is integrated with that to be undertaken in accordance with the *Yawuru cultural management plan* and other management plans for the Yawuru conservation estate. 6. Support external research groups and individuals to conduct research and monitoring in the park where possible (e.g. by providing financial and logistical assistance), particularly where this work can directly benefit management of the conservation estate. 7. Ensure that research and monitoring activities have the relevant legal permits and approvals (e.g. as required under the CALM Act, Wildlife Conservation Act and *Animal Welfare Act 2002*), have prior approval by the joint management partners and comply with the cultural protocols outlined in the *Yawuru cultural management plan*. 8. Ensure that the results of research and monitoring conducted by external organisations are forwarded to the joint management partners (e.g. by requiring this as part of research licence or other approval conditions). 9. Maintain a database of research and monitoring within the Yawuru Birragun Conservation Park. 10. Communicate research and monitoring needs and priorities to research organisations and funding bodies.

6.7 Patrol and enforcement

This management plan details a range of strategies relating to the restriction of particular human activities within the Yawuru Birragun Conservation Park. While users typically comply with management regulations once they understand why such controls have been established, there is always a need to monitor the level of compliance and take action to stop inappropriate or illegal behaviour. To achieve this, field presence by appropriately authorised CALM Act officers will be necessary. However, it is also necessary for users of the area to perform a self-regulatory and surveillance role.

Rangers employed in Yawuru conservation estate are in the process of becoming authorised officers under the CALM Act, *Local Government Act 1995* and the *Fish Resources Management Act 1994*. This will provide staff with the authorisations necessary to enforce compliance with this legislation throughout the Yawuru conservation estate.

Summary of management arrangements for patrol and enforcement		
Management objective	To maximise public compliance with regulations related to the management of the Yawuru Birragun Conservation Park.	
Management strategies	1. Develop and implement a patrol and enforcement program to promote compliance with access restrictions and other regulations.	H–KMS
	2. Continue to train and mentor Yawuru rangers to become authorised officers under relevant legislation.	H–KMS
	3. Maintain a database of compliance statistics and issues to help with management assessment.	M
	4. Investigate opportunities to appoint honorary enforcement officers under the CALM Act as appropriate.	L

6.8 Visitor safety

Some risks to visitor safety in the Yawuru Birragun Conservation Park are associated with:

- the possibility of sudden pindan cliff collapses should visitors stray from formal lookouts, recreation areas and walking trails
- weather events such as cyclones and severe storms
- some marine and coastal fauna (e.g. crocodiles, irukandji jellyfish).

Yawuru people view transgressions against the law as a cause of natural disasters and human tragedies and take seriously their cultural duty to ensure that Yawuru community members and 'strangers' do not place themselves and others at risk of harm. Yawuru cultural protocols include protocols that help Yawuru people fulfil their cultural responsibilities to look after anyone on Yawuru country e.g. protocols about access to culturally sensitive areas that Yawuru people believe are subject to powerful and dangerous forces (Yawuru RNTBC 2011).

Summary of management arrangements for visitor safety		
Management objective	To ensure that all reasonable and practical efforts are made to minimise safety risks to visitors to the Yawuru Birragun Conservation Park.	
Management strategies	1. Develop and implement a visitor risk management program which includes: • regular visitor risk assessments including inspections of all recreation sites and facilities • implementation of measures to mitigate safety risks as necessary • maintaining and implementing an incident or emergency response plan as required • providing information to raise visitors' awareness about the main and most serious safety issues.	H–KMS
	2. Ensure that Yawuru cultural protocols are taken into account.	H

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Copies of the *Yawuru cultural management plan* are available from:

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Yawuru language glossary

balyjarr	saltwater couch (*Sporobolus virginicus*)
Barrgana	Yawuru season: cold season; May
bilarra	wetland/spring
bilgin	water chestnut (*Eleocharis dulcis*)
birra	bush; bush country; inland country
Bugarrigarra	the Dreaming; Dreamtime; history before time began; derived from bugarri=dream and garra=more than one
bundu	saltmarsh (saline grasslands, samphire, mudflats)
Burdurr-bundurr	the red sandplains and vegetation known as 'pindan'
buru	one's country; traditional country; land/earth/dirt/ground; can also mean time/place/season
galji	the fine-grained soft carbonate mud that occurs around Broome
girrbaju	bush honey; sugar bag
gudurrwarany	brolga (*Grus rubicunda*)
gundurung	mangrove; and also in particular the light green leaf white mangrove (*Avicennia marina*)
gurlju buru	saline grassland/grassland
jarrmirdany	corkscrew pandanus (*Pandanus spiralis*)
jigily	Kimberley bauhinia (*Bauhinia cunninghamii*)
jila	'living water'; permanent freshwater sources
jinjalgurinyar	crab's eye bean (*Abrus precatorius*)
jurru	mystical being; serpent-like figure; snake
Laja	Yawuru season: late October/November-December
langurr	northern nail-tail wallaby (*Onychogalea unguifera*)
liyan	feelings that express emotional strength, dignity and pride
Man-gala	Yawuru season: December to March; wet season
Marrul	Yawuru season: April to May
Murrga-yirr-garnburr	melaleuca thicket
nagula	ocean; sea country
nirliyangarr	dune wattle (*Acacia bivenosa*)
rarrga-rarrga	beach spinifex (*Spinifex longifolius*)
niyamarri	beaches and dunes
rayi	spiritual essence; spirit being; child-spirit
rirrwal	white dragon tree (*Sesbania formosa*)
Wilburu	Yawuru season: warming up season; September to October
Wirn-gi	samphire; saltbush (*Frankenia ambita*)
Wirralburu	Yawuru season: May

Source: *Yawuru cultural management plan* (Yawuru RNTBC 2011)

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