GOVERNMENT OF WESTERN AUSTRALIA

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SECURING 5 MILLION HECTARES OVER 5 YEARS

Badimia parks and reserves

draft joint management plan

2024

GOVERNMENT OF WESTERN AUSTRALIA

Conservation and Parks Commission

Department of **Biodiversity, Conservation and Attractions**

Badimia Bandi Barna
Aboriginal Corporation (ICN 8765)

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September 2024

Warning: This plan may show photographs of, mention names, and/or refer to quotations from Aboriginal people who have passed away.

Badimia language words have been taken from Bednall (2014), BBBAC (2021a) and on advice from Badimia Bandi Barna Aboriginal Corporation. The spelling of some terms, such as for Country, places, flora and fauna, may vary in other resources.

Questions regarding this plan should be directed to:
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Front cover photos
Main: Mongers Lake. *Photo – Beverley Slater*
Top left: Worked stone artefact. *Photo – Kirrily Hastings/DBCA*
Top right: Gurdurdu Conservation Park. *Photo – Adrian Pinder/DBCA*

This document is available in alternative formats on request.

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Vision

The unique cultural landscape, wetlands, flora and fauna of the Badimia parks and reserves are protected, healed and looked after jointly by Badimia Traditional Owners and the Department of Biodiversity, Conservation and Attractions. Together we will walk and work on barna (Country) to maintain the rich biodiversity values and to ensure that future generations can share in keeping connections through ancestors, sites, stories, language and the Bimarra (Dreamtime creation serpent).

Mongers Lake and Pinyaling Hill. *Photo – Kirrily Hastings/DBCA*

Acknowledgements

The Department of Biodiversity, Conservation and Attractions (the department; DBCA) thanks the Badimia Traditional Owners for their support, enthusiasm and close involvement throughout the planning process of this joint management plan: for the on-Country visits, yarning and sharing of their traditional knowledge; and the guidance and direction provided by the Badimia Bandi Barna Aboriginal Corporation (BBBAC) through the Joint Management Body.

Thank you to the department's Midwest region, Murchison district and Wheatbelt region staff for their dedication and hard work in helping to develop this joint management plan and support in implementing joint management initiatives. Specialist branches have also made important contributions to this plan.

The *Badimia Barna Healthy Country Plan 2021* (BBBAC, 2021a) is acknowledged as a key resource contributing to the development of this joint management plan.

Perspectives on joint management of the Badimia parks and reserves

"Badimia have been here since the beginning of time when the earth was soft. We have survived the interruption of our culture, but we are still here to respect, protect and obey the lore of our land."

BBBAC member Beverley Slater

(Extract from BBBAC, 2021a)

"…out here they can be on Country, learn a bit about their Country, and feel proud you know? To be an Aboriginal person."

BBBAC Chair and Badimia Elder Darryl Fogarty

(Excerpt from Mitchell, 2021)

"Nhiyanha barna nganangu barna badimaya.
Nhiyanha badimaya barna ngaliming wagu.
Ngadhu dhulgabaya nhurra yaanangudi nganangu barnadi.
Buranymarda nganangu barna."

"This Country is my Badimia Country.
This Badimia Country is our home.
I'm happy to see you come to my Badimia Country.
This is good Country."

Badimia Elder, Warren Walsh

"Working with Badimia has fundamentally changed what we see when we look at Country. What we thought was just a hill, or a lake, or a plant now holds new meaning and significance. Without this shared knowledge, without joint management, we are blind."

Murchison District Manager, DBCA, Rowan Dawson

Contents

Welcome to Barna (introduction)

The management plan area

Badimia Barna

Badimia barna (Country) is a place of rich, red dirt and vast blue skies; of salt lakes and breakaways; of mulga Country; and of deep significance to the Badimia Traditional Owners (BBBAC, 2021a). There are few formal conservation reserves within this expansive and arid landscape, where pastoral and mining land uses have a long history. The creation of the Badimia parks and reserves (the planning area; refer also Maps 1 – 5; Appendix A) provides an important opportunity for the Badimia Traditional Owners to continue to connect with and protect their cultural heritage. The Badimia parks and reserves also protect highly significant natural values, especially threatened flora and fauna, Priority Ecological Communities (PECs) and vegetation associations that have previously had little to no representation in the conservation estate. Spectacular seasonal wildflower displays, remote outback wagu (camping) opportunities and the rich culture and heritage of these reserves also present opportunities to enhance tourism experiences in this area.

The Badimia parks and reserves have been created via the State Government's *Plan for Our Parks* initiative, which aims to expand the State's conservation estate by 5 million hectares; achieve reservation of many former pastoral lands with high conservation values; provide long-term employment and joint management outcomes to help support Badimia Traditional Owners' desire to manage barna; and respond to the growing demand for on-Country jobs for Aboriginal rangers.

Location

The Badimia parks and reserves comprise seven parcels of land totalling 292,725 hectares that extend across the Murchison, Yalgoo and Avon Wheatbelt bioregions under the Interim Biogeographic Regionalisation of Australia (IBRA) classification system (Map 1; Appendix A). They are located between 270 and 540km north-east of Perth.

Lakeside National Park (8490 hectares) and Lakeside Conservation Park (7077 hectares) were previously part of the former Lakeside pastoral station, which was purchased by the State Government for the conservation estate in 2008. These two reserves are located within the Shire of Cue, approximately 90km north-west and 62km north of the town of Mount Magnet, respectively (Map 2).

The Barnabinmah and Thundelarra conservation parks are wholly contained within the wider Karara Rangeland Park (see *Surrounding lands*) and their management will continue to be integrated within this area. Barnabinmah Conservation Park (59,967 hectares) is comprised of the entire former Burnerbinmah pastoral station, which was purchased in 1995 as part of the Sandalwood Conservation and Regeneration Project.

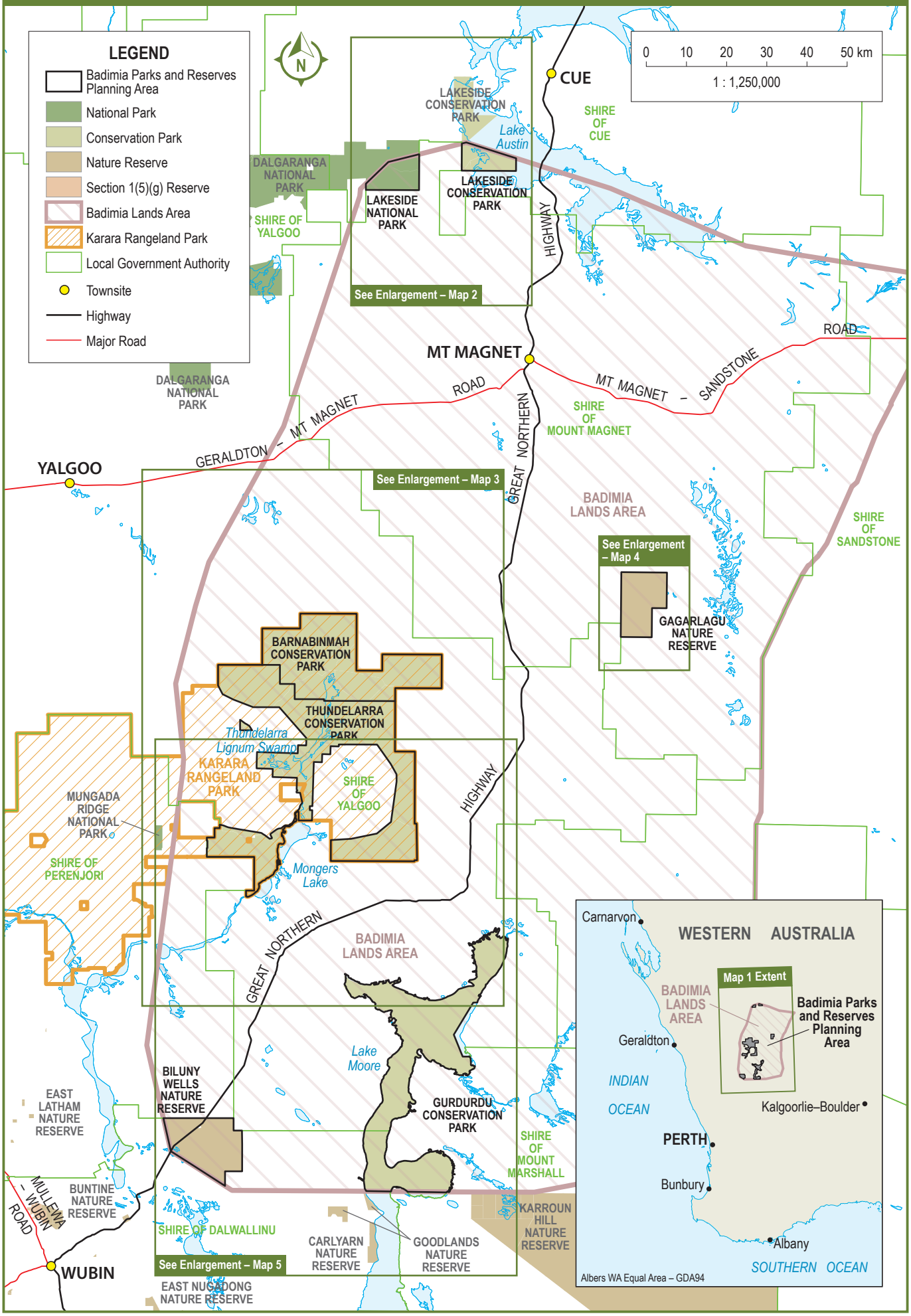
Thundelarra Conservation Park (100,107 hectares) is comprised of portions of the former Thundelarra and Warriedar pastoral stations that were purchased for inclusion in the conservation estate in 2007 and 2005 respectively. Both fall within the Shire of Yalgoo, between 100 and 130km south-west of the town of Mount Magnet (Map 3).

Gagarlagu Nature Reserve (15,702 hectares) was previously unallocated Crown land and has not been subject to agricultural use in the past, though may have been impacted by stray stock. The reserve is located within the Shire of Mount Magnet and is approximately 97km south-east of the town of Mount Magnet (Map 4).

Biluny Wells Nature Reserve (22,852 hectares) was previously part of the Jibberding pastoral station. This reserve has not been grazed for many decades since portions of the Jibberding lease were surrendered as unallocated Crown land in 1963, and the remainder in 2008. This reserve is located within the Shire of Dalwallinu approximately 245km south-west of the town of Mount Magnet and is dissected by the Great Northern Highway (Map 5).

Gurdurdu Conservation Park (78,530 hectares), covers the northern half of Lake Moore and was previously a water reserve and unallocated Crown land. It is located within the Shires of Yalgoo and Dalwallinu, approximately 144km south of the town of Mount Magnet (Map 5). Gurdurdu Conservation Park contains a protected area, declared under the *Aboriginal Heritage Act 1972*. Restricted access applies to this protected area.

MAP 1 – BADIMIA PARKS AND RESERVES PLANNING AREA



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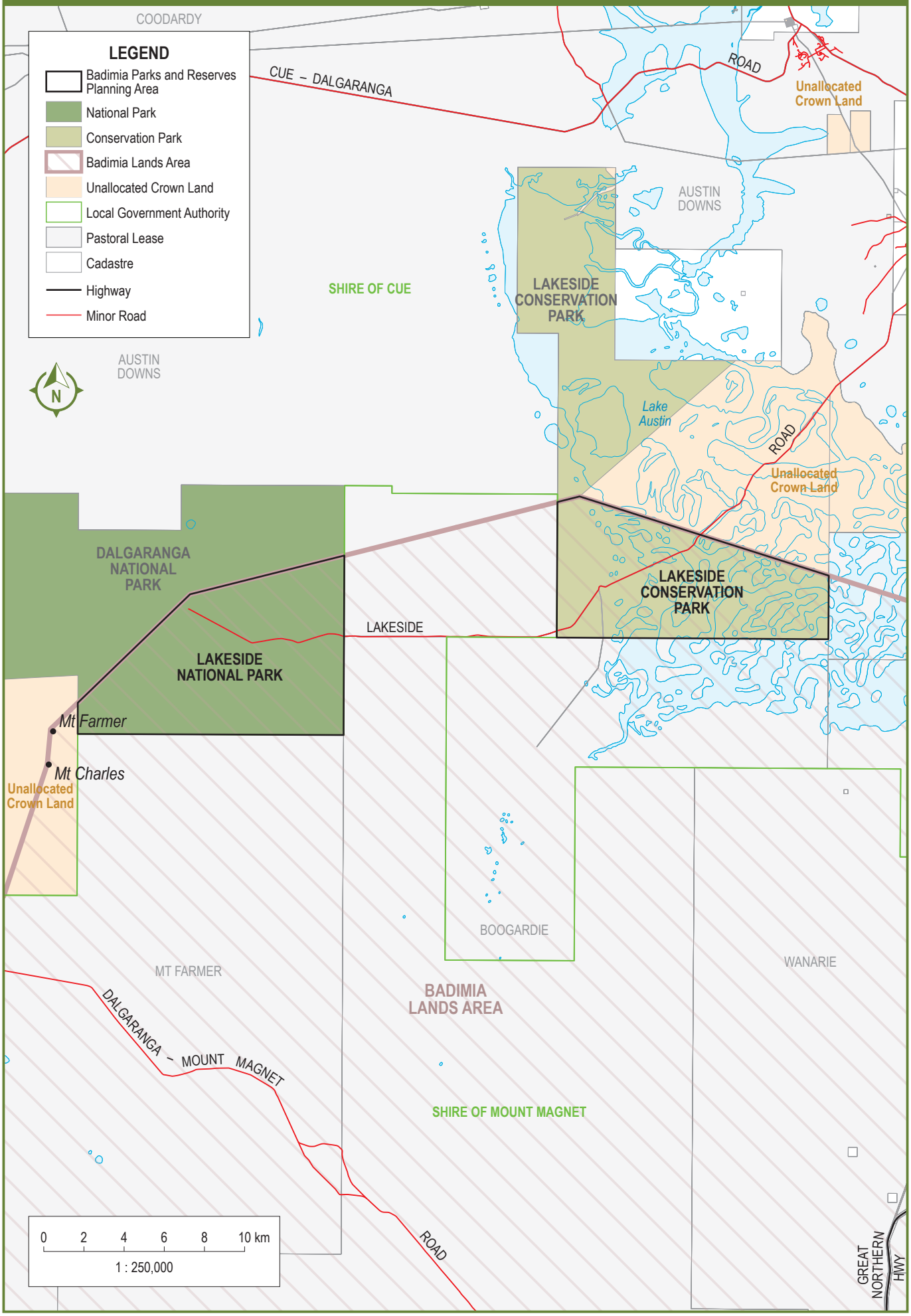
MAP 2 – LAKESIDE NATIONAL PARK AND LAKESIDE CONSERVATION PARK



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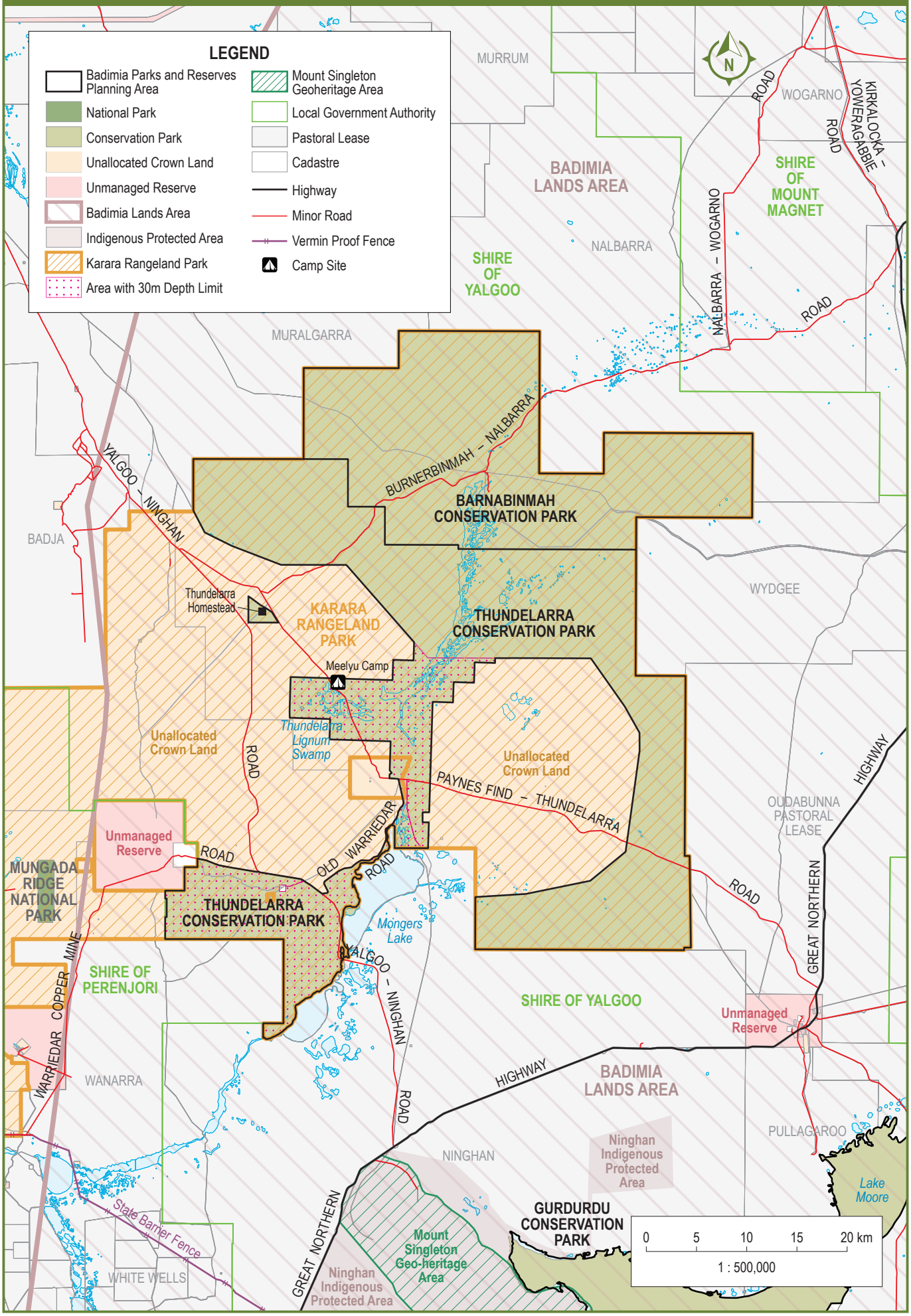
MAP 3 – BARNABINMAH AND THUNDELARRA CONSERVATION PARKS



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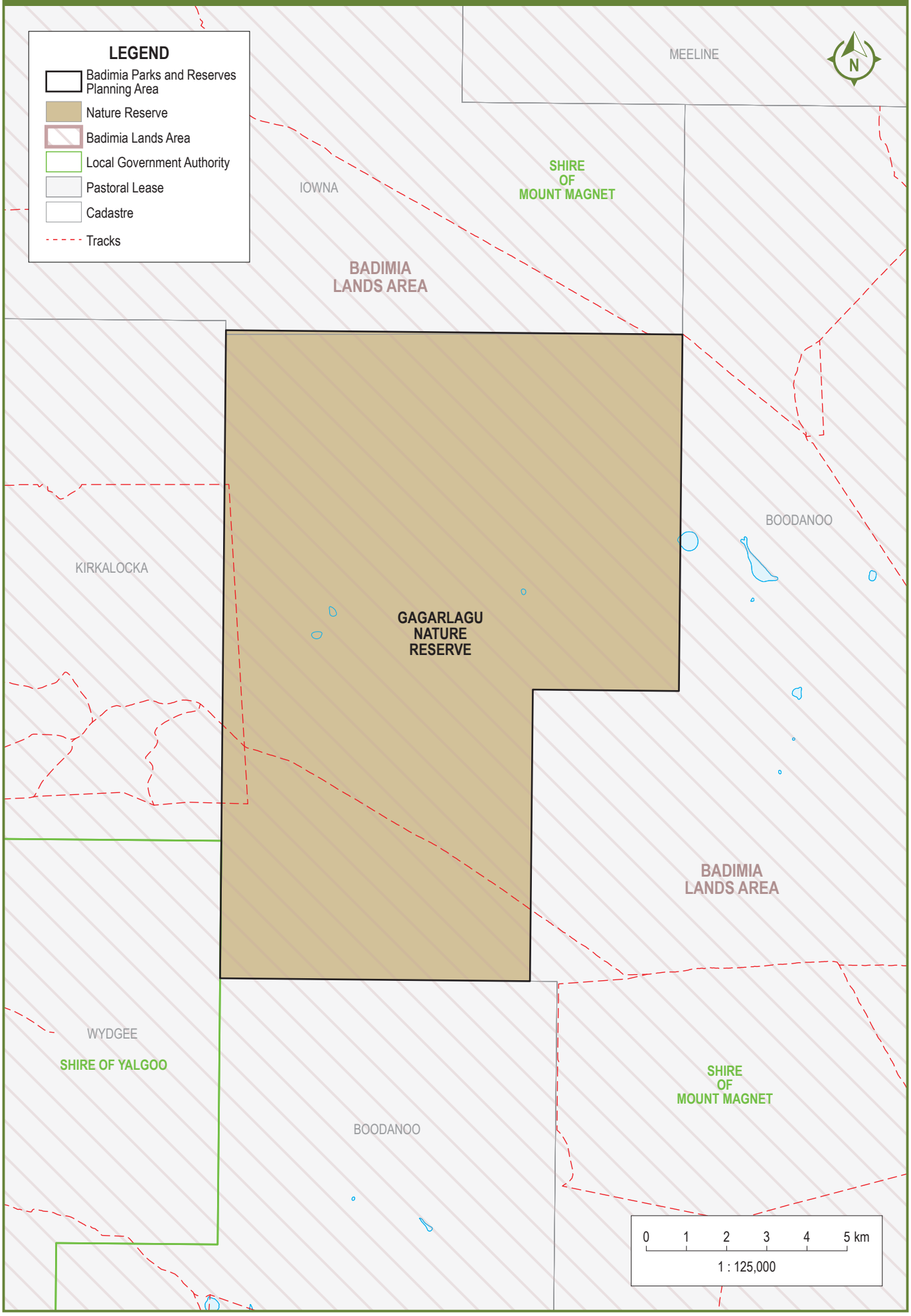
MAP 4 – GAGARLAGU NATURE RESERVE



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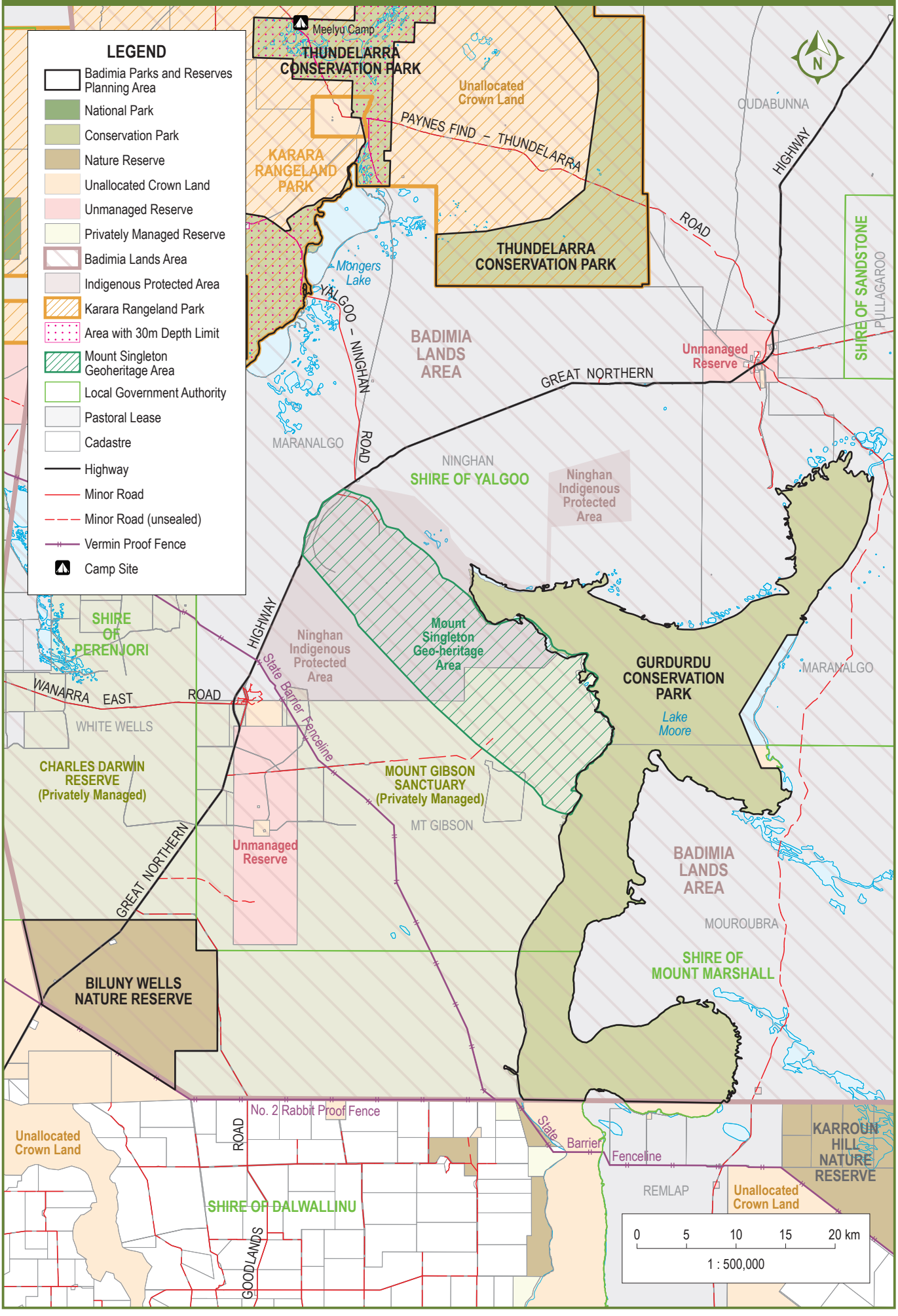
MAP 5 – BILUNY WELLS NATURE RESERVE AND GURDURDU CONSERVATION PARK



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Key values and management issues

Key values

This plan focuses on the protection and management of the significant natural, cultural, heritage, visitor use, economic and resource use values of the Badimia parks and reserves. Key values identified for this planning area include:

Badimia cultural heritage values

- Highly significant Aboriginal places and landscapes. Water places and rocky outcrops and breakaways hold particularly important spiritual and cultural importance for Badimia Traditional Owners.
- A wide variety of ceremonial, meeting, wagu (camping), hunting, birth and burial places, rock paintings, worked stone artefacts, quarries, structures and mythological places occur throughout the area.
- Culturally significant flora and fauna, for example, walarda (Western Australian sandalwood (*Santalum spicatum*)), bandi barna (honey ant), kangaroo, goanna, yalibirri (emu (*Dromaius novaehollandia*)), marun (quandong (*Santalum acuminatum*)), gambura (bush tomato (*Solanum orbiculatum*)), mulgu (bush onion (*Cyperus bulbosus*)) and gagurla (cogola bush (*Leichhardtia australis*)).
- An area rich in stories and songs, which have been passed down to current generations of Badimia Traditional Owners who are the custodians of this knowledge.

Shared heritage values

- A rich history of early European pastoral and mining use, including highly intact and authentic pastoral buildings and associated outbuildings from circa 1876, some of which have potential State Heritage Register significance.
- Highly significant historical pastoral and mining relics such as ruins, tracks, hand cut fences, mills and artificial waterpoints dating from the late 1800s.
- Stories and family connections to parts of the planning area that were previously pastoral stations.

Natural values

- Salt lakes, freshwater pools and wetlands, banded ironstone, granite/greenstone formations (including Mount Singleton geoheritage site), and arid sandplains provide important and varied habitats for flora and fauna.
- Thundelarra Lignum Swamp – a nationally important freshwater wetland.
- A transition area of the Eremaean (arid) and South-West (Mediterranean) botanical provinces, results in a rich intermingling of biological features.
- 28 vegetation associations, with only two that are adequately protected within the conservation estate.
- 21 priority and two threatened flora species and three priority flora communities.
- Four threatened, one priority, one migratory and one specially protected fauna species and one priority fauna community.

Visitor use

- Two and four-wheel drive touring and remote area wagu (camping); bushwalking; wildflower, bird and nature viewing; exploring relics of historical pastoral and mining industries; and appreciation of key geological features.
- Significant opportunities for expansion of tourism.
- Improved visitor facilities at Thundelarra Conservation Park.

Management issues

The key management issues within the Badimia parks and reserves are:

- very few cultural sites have been formally registered or documented.
- Badimia Traditional Owners have had limited access to barna since the establishment of pastoral and mining industries in the surrounding area.
- limited survey information exists, especially for fauna.
- roads/tracks have diverted water, altered hydrological regimes, and resulted in vegetation death.
- impacts from past grazing practices including feral goats (*Capra hircus*) and livestock such as dyiibu (sheep (*Ovis aries*)) and bulugu (cattle (*Bos taurus*)); altered wadyan (fire) regimes; habitat fragmentation, hydrological change and weeds have all resulted in a loss of understory and reduced vegetation condition.
- feral predators, particularly budyi (cats (*Felis catus*)), pose an ongoing threat to birds, reptiles and small mammals that may occur in the Badimia parks and reserves.
- impacts to natural, cultural and heritage values from inappropriate visitor access or behaviour (such as collection of firewood; compaction of lakes by vehicles; visitors taking artefacts as souvenirs).
- the remote location, weather conditions and disused infrastructure such as abandoned mine shafts in some areas can be a safety risk.
- unauthorised removal (poaching) and/or unsustainable harvesting of culturally significant flora (for example, walarda), birds, reptiles and other native species has occurred in the past.
- extensive mineral exploration continues to occur, which threatens high biodiversity, cultural and heritage values, especially on banded ironstone formation ranges.

Joint management arrangements

The State Government is committed to working with Badimia people to ensure the protection of Badimia cultural heritage values and sites, joint management, and ongoing use of barna for customary purposes.

This management plan enacts formal joint management with Badimia people through a *Conservation and Land Management Act 1984* (CALM Act) section 56A Joint Management Agreement (JMA) between the Department of Biodiversity, Conservation and Attractions (the department; DBCA) and the Badimia Bandi Barna Aboriginal Corporation (BBBAC) representing the Badimia Traditional Owners.

The BBBAC membership is based upon the Badimia claim group in *CG (Deceased) on behalf of the Badimia People v State of Western Australia (No 2)* [2015] FCA 507 and was established to represent the Badimia people in the absence of a positive determination of native title.

The JMA, attached to this joint management plan, outlines the establishment of the Joint Management Body (JMB) with representatives from BBBAC and the department.

The JMB will oversee the management of the Badimia parks and reserves, make management decisions, provide strategic input into how management strategies are implemented, and monitor the implementation of the plan in accordance with the JMA and the CALM Act.

In representing the Badimia community through joint management, BBBAC will engage and consult with the Badimia community, including the Badimia Lands Aboriginal Corporation. Operational responsibility will be coordinated by the department's Midwest Region, Murchison District and Wheatbelt Region.

Surrounding lands

Barnabinmah and Thundelarra conservation parks form part of the broader Karara Rangeland Park, which extends across Badimia and Yamatji Nation Country. This wider department-managed park area also includes:

- portions of the former Thundelarra and Warriedar pastoral stations that have not been reserved within the planning area due to mining interests (the Thundelarra portion is entirely on Badimia barna and the Warriedar portion traverses the boundary of Badimia and Yamatji Nation Country)
- three other former pastoral stations purchased for conservation (Kadji Kadji, Karara and Lochada) and are situated on Yamatji Nation Country
- four other existing reserves (Bowgada and Weelhamby Lake nature reserves and two unnamed timber reserves) entirely within Yamatji Nation Country.

On ground management of Barnabinmah and Thundelarra conservation parks will be integrated into the wider management framework for Karara Rangeland Park and will continue to be undertaken by the department jointly with Badimia Traditional Owners on Badimia barna.

Lakeside National Park and Lakeside Conservation Park are portions of land from the former Lakeside pastoral station that falls within Badimia barna. A small portion to the south-west of Lakeside National Park, which covers Mount Charles and Mount Farmer, has not been reserved and is not part of the planning area due to current mining interests. The balance of the former Lakeside pastoral station adjoins the northern boundaries of Lakeside National Park and Lakeside Conservation Park and includes Dalgaranga National Park (reserve 54419) and Lakeside Conservation Park (reserve 54420) on Wajarri Yamatji Country and unallocated Crown land on Yugunga-Nya Country. Lakeside Conservation Park and Lakeside National Park are also adjoined by pastoral land to the south and east.

All land areas that were purchased for conservation, transferred under pastoral lease title, or surrendered for the public purposes of conservation that remain as unallocated Crown land (unreserved) are managed by the department under formalised interim arrangements defined in a memorandum of understanding (MOU) with the Department of Planning, Lands and Heritage (DPLH). This includes the unreserved parts of the former Thundelarra, Warriedar and Lakeside pastoral stations on Badimia barna. These areas continue to be of interest to the department and contain important cultural, heritage and natural values.

Gagarlagu Nature Reserve is surrounded by pastoral land use. Barnabinmah Conservation Park, approximately 50km to the west, is the closest land parcel managed for conservation purposes. Barnabinmah and Thundelarra conservation parks also adjoin pastoral land to the north and east.

Two privately managed conservation areas directly adjoin Biluny Wells Nature Reserve. Charles Darwin Reserve operated by the Australian Bush Heritage Fund adjoins the north-western boundary while Mt Gibson Sanctuary, operated by the Australian Wildlife Conservancy adjoins the eastern boundary. To the south of Biluny Wells Nature Reserve lies unallocated Crown land on Yamatji Nation Country.

Gurdurdu Conservation Park is approximately 34km east of Biluny Wells Nature Reserve and is predominantly surrounded by pastoral lands including the Ninghan pastoral station (also located between Biluny Wells Nature Reserve and Thundelarra Conservation Park), which was purchased by the former Aboriginal and Torres Strait Islander Commission for the Pindiddy Aboriginal Corporation in 1993. An Indigenous Protected Area over part of this land was declared in October 2006. The station is managed for conservation, protection of Badimia cultural heritage and pastoral purposes by the Bell family, who are also Badimia Traditional Owners. A small portion of Gurdurdu Conservation Park is adjoined by an unvested class A Crown reserve (reserve 33532; 9.05 hectares) along the western boundary and Carlyarn Nature Reserve (reserve 26259; 2,722.73 hectares) at its south-western corner. South of Badimia barna, the broader Lake Moore remains as unallocated Crown land.

The close proximity and large area (309,678 hectares) of Karroun Hill Nature Reserve (reserve 36936), approximately 6km to the east of Gurdurdu Conservation Park and partially on Badimia barna, will provide a significant contribution to reserve connectivity. Neighbouring off-reserve lands also highlight an important strategic opportunity for collaborative cross-tenure management (see *Community involvement and collaboration*) and landscape connectivity.

Legislative context

This joint management plan has been prepared in accordance with the provisions of the CALM Act. It will guide management of the Badimia parks and reserves for 10 years from the date the plan is gazetted. During this time, amendments may be made to the plan under section 61 of the CALM Act, with any proposed changes first released for public comment. If the plan is not reviewed and replaced by the end of the 10-year period, this plan will remain in force until a new plan is approved.

The joint management plan has been prepared in the case of:

- national parks and conservation parks, to fulfil so much of the demand for recreation by members of the public as is consistent with the proper conservation of the natural environment, the protection of flora and fauna and the preservation of any feature of archaeological, historic or scientific interest; and
- nature reserves to conserve the natural environment, and to protect, care for, and promote the study of, flora and fauna, and to preserve any feature of archaeological, historic or scientific interest.

It has also been prepared to:

- protect and conserve the value of the land to the culture and heritage of Aboriginal persons, in particular from any material adverse effect caused by (i) entry on or the use of the land by other persons; or (ii) the taking or removal of the land's fauna, flora or forest produce; but in a manner that does not have an adverse effect on the protection or conservation of the land's fauna and flora.

In any instance where the former objectives conflict or are inconsistent with the latter objective, the latter prevails.

The *Biodiversity Conservation Act 2016* (Biodiversity Conservation Act), the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and other relevant legislation[1] and policies that apply to management of the Badimia parks and reserves are mentioned throughout this plan.

Several international conservation agreements are also applicable to the Badimia parks and reserves given the presence of migratory species (see *Fauna of conservation significance*).

The Conservation and Parks Commission is the statutory body responsible for periodic assessment of this management plan and will measure the success of this plan in accordance with section 19(1)(g)(iii) of the CALM Act. The department through the JMB will provide information to the Conservation and Parks Commission on request to enable an assessment of the plan's implementation as well as an assessment of how the plan is performing against the strategic and management objectives. The assessment may be carried out in conjunction with the JMB.

Although the MOU with DPLH (see *Surrounding lands*) does not apply to the Badimia parks and reserves, this management plan has arrangements in place consistent with the MOU to assist with operational management across the broader area of adjoining department-managed lands.

Plan framework

Structure

The structure that sets out the strategic framework for this plan is depicted in Figure 1 below, and is applied in each of the following chapters: *Connection to Barna, Looking after Barna, People on Barna, Using Barna and Understanding Barna*.

Figure 1: Strategic framework of the joint management plan

[1] Relevant legislation can be found at: WALW - Home (legislation.wa.gov.au)

Strategic objectives provide overarching direction for management of the Badimia parks and reserves and a link between the vision statement and management objectives. Management objectives have been developed to respond to key values and issues for each section of the plan and then the management strategies have been designed to deliver on the management objectives. A selection of the values and management issues have Key Performance Indicators (KPIs) assigned to them to measure performance and adequacy of the management plan (see *Performance assessment*).

Performance assessment

Monitoring and evaluating the outcomes of management strategies, and reporting against the Key Performance Indicators (KPIs[2]) are important components of an adaptive management framework that allows the implementation of the plan and management effectiveness to be assessed. In some cases, management direction may need to be altered if it is not successfully meeting management objectives.

A set of KPIs[3] has been chosen to target priority areas of management and are directly linked to objectives and strategies identified throughout the plan. These are presented with performance measures, targets and reporting requirements at the end of each section's strategies where applicable.

As newly created parks and reserves, the description of baseline conditions will be important in this initial plan. This is reflected in the plan, in that the included KPIs are focused on assessing achievement of management outputs (availability of baseline data and reports) as well as management outcomes (protection of a particular value).

The KPIs require data on the following areas:

- joint management
- protection of significant Badimia cultural heritage places, including sites
- Badimia traditional knowledge
- customary activities
- assessment of shared historical sites
- knowledge of important flora and fauna in Badimia culture
- restoring natural surface water flow where possible
- preventing visitor impacts on habitat of threatened fauna
- mapping and assessment of threats to PECs
- knowledge of flora and fauna diversity
- control of introduced herbivores
- control of weeds
- increasing visitation to the area
- managing access to culturally sensitive sites and places

[2] KPIs encompass a performance measure, target and reporting requirements.

[3] Refer to Position Statements | Guiding our decision making | Conservation Commission for guidelines relevant to performance assessment of CALM Act management plans.

Management objective: To protect and conserve the Badimia parks and reserves under effective joint management arrangements.

Management Strategies

1. Jointly manage the Badimia parks and reserves with the Badimia Traditional Owners in accordance with the JMA attached to the final joint management plan.
2. Follow Badimia cultural protocols (for example, involve Badimia elders) in joint management and providing cultural advice.

Key performance indicators

Performance measure	Target	Reporting
Opportunity for Badimia Traditional Owners to discuss and make decisions about the management within the Badimia parks and reserves	JMB meetings are conducted in accordance with the JMA	Annually

Connection to Barna (cultural and heritage values on Country)

Strategic objective

To identify, protect and conserve the cultural and heritage values of the Badimia parks and reserves for future generations, while supporting customary activities.

Badimia cultural heritage

The Badimia people

Prior to European settlement, the Badimia people lived and moved across this barna sustainably using the resources of the complex and harsh arid environment for many thousands of years (BBBAC, 2021b). As well as being adept at finding gabi dhaa (water hole; rock hole) in the landscape, they also created and maintained them over long periods of time and were referred to as 'the rock hole people'. The Badimia Traditional Owners have continued to have a long and significant connection to barna, which extends beyond the planning area and includes the major features of Mt Magnet, Yalgoo, Warrdagga Hill, Morawa, Mongers Lake and Lake Austin (Keiller and Rye, 2021).

European influence over the Murchison area had a profound effect on the Badimia Traditional Owners and came in three waves: the missionaries of the 1840s combined with the start of walarda (sandalwood) harvesting, pastoralists in the 1850s, and the gold rush of the 1890s (BBBAC, 2021a). Pastoral use dominated into the current time, and from the early days led to major landscape, ecological and social changes, such as widespread clearing and loss of traditional food resources for Badimia people as well as their own displacement from barna (BBBAC, 2021a). Many Badimia Traditional Owners who survived the disease, violence and upheaval of the early settlement period became stockmen, shepherds, trackers, maids or housekeepers on pastoral stations (BBBAC, 2021a). These Badimia Traditional Owners were pivotal to the early successes of the pastoral industry as they understood the land and its resources, and often trained or shared knowledge with their white counterparts (Mitchell, 2006).

There are many ways that Badimia Traditional Owners retain important connections to barna that includes but is not limited to, hunting, gurriya (collecting) of bush tucker and bush medicine, as well as stories and songlines that connect components of the landscape (BBBAC, 2021a). These connections form part of the Badimia social surroundings (EPA, 2016).

Reconnecting more Badimia Traditional Owners with their barna, participating in joint management of the Badimia parks and reserves, and ensuring access and protection of culturally significant sites, resources and social surroundings are important steps being made in protecting Badimia cultural heritage, reconciling the past generations of disenfranchisement and looking forward towards a more positive future. The BBBAC has developed a Healthy Country Plan to assist in managing their land and cultural heritage. Implementation of this joint management plan provides opportunities to the Badimia Traditional Owners to assist in delivering identified KPIs in their Healthy Country Plan for the Badimia parks and reserves. The department and the Badimia people will work together in joint management to care for Badimia barna.

The rock hole people

"The old people used to call us 'the rock hole people' and the station owners would also refer to us as the 'rock hole people'. Our Country was all within the granite Country, and it ran right past Dalwallinu, nearly as far as Cue and halfway to Sandstone. All that Country was the rock hole Country. Our people, when they travelled through this area and came to a place to stay awhile, they would stay there only long enough so as not to deplete the food source there. While they were there, they would choose a nice little spot in the granite they thought would be able to catch water – and they would build a nice big fire on it. When the fire was hot, they would throw water on it to cool it – or pee on it if they didn't have water, and the next day they would pull some rocks out of the base of it to make it a larger rock hole, and they would do that each time they would visit that Country. They would also make the sides of the rock hole smooth by grabbing a rock and rubbing the sides of the hole. That's what they did."

Badimia Elder Vince Jones

A gabi dhaa (rock hole) at Biluny Wells Nature Reserve that has been filled with rocks.
Photo – Kirrily Hastings/DBCA

A gabi dhaa at Barnabinmah Conservation Park.
Photo – Kirrily Hastings/DBCA

Dreamtime and traditional lore

For the Badimia Traditional Owners, the Bimarra is the Dreamtime creation serpent that created all the gabi dhaa (water holes), marda (hills) and rock outcrops while moving through Badimia barna, and is also the guardian of these places. Bimarra is very important to the Badimia Traditional Owners (BBBAC, 2021a and BBBAC, 2021b) and the Bimarra still inhabits water places today, which hold very special cultural and spiritual significance. The flora and fauna that live in or around water places are also highly valued as they were placed there by the Bimarra. These include turtles, marrgan (frogs), dragon flies, waterbirds, paperbarks, salt bushes and lignum (BBBAC, 2021a). It is of utmost importance to Badimia Traditional Owners that waterways are respected and well cared for and gabi dhaa are maintained and bilygi (clean). It was customary that specific people were given important roles as protectors of the Bimarra and there are still today Badimia elders with this role.

The Bimarra and the importance of looking after water places

When the world was made by the Dreamtime beings the Bimarra was given care of the water needed by people and animals. Under the Badimia Country the Bimarra made and still uses great underground waterways. When there was need for good water the Bimarra would come up to the surface and make a water hole. The people of the land had to care for the water hole and share its gifts. Misuse or lack of care of the water hole would be punished by the Bimarra who could dry that water or turn it salty. Bimarra is still living under that Country and guarding the water.

Adapted extract from Roche, 1992

A waterway at Barnabinmah Conservation Park.
Photo – Kirrily Hastings/DBCA

Childhood recollections of a Bimarra caretaker

"……So they took me up the waterfall and they were singing in language, and we had a big drought, and me grandmother and I went up the waterfall, and dug down in the sand until we got to water and we got this tin, and got the water out and threw it all around the cave. And then next morning I woke early in the morning, and I could hear this noise and it was frogs! And then you could hear the waterfall roaring and I looked out and the dam was overflowing and the water running down the lake…."

Badimia Elder and Bimarra caretaker Allan Leggerini

Excerpt from Mitchell, 2021

Traditional knowledge and culturally significant flora and fauna

Badimia Traditional Owners have passed on extraordinary survival skills from one generation to the next over many thousands of years. A wide variety of flora and fauna are used across the seasons and different parts of the landscape (Appendix B). Women and children gurriya (collect) walgaly/gara (seeds), yalibirri ngawu (emu eggs), bardi (grubs from the witchetty bush (*Acacia kempeana*)), bandi barna (honey ants) and fruits of the marun (quandong) and gagurla (cogola bush). Men hunt yalibirri (emu), marlu (red kangaroo (*Macropus rufus*)), bigurda (euro; hill kangaroo (*Macropus robustus*)) and guwiyarl, quoelle, barn.ga, bungarra (different species of goannas).

Some fauna have special cultural importance, like totems, but are not eaten. These include the warrida (wedge-tailed eagle (*Aquila audax*)) and meelyu (western spiny-tailed skink (*Egernia stokesii badia*)). Many flora species are also used specifically for medicinal purposes.

Guwiyarl (goanna) are hunted for bush tucker. *Photo – Kirrily Hastings/DBCA*

Flannel bush (*Solanum lasiophyllum*) is a traditional food source. *Photo – Kirrily Hastings/DBCA*

Badimia people are concerned that some culturally important flora and fauna are no longer plentiful in the landscape with decline being partially due to unauthorised use of flora and fauna in the Badimia parks and reserves (see *Using flora and fauna*). For example, historical overharvesting and poaching of walarda (see *The Sandalwood cutters*) have resulted in this species disappearing from many parts of the planning area. Where individual trees remain, there is very little evidence of regeneration since walgaly/gara (seed) dispersal by small marsupials, such as the woylie, is no longer occurring and winter rainfall patterns have changed and reduced. These fauna species previously collected and buried walarda walgaly/gara but have long been absent from the landscape due to the combined impacts of feral predators and the loss of understory vegetation (FPC, 2017). Similarly, the totem meelyu (western spiny-tailed skink) has been impacted by unauthorised collection of firewood and habitat degradation as well as being at risk from potential poaching. It is a threatened species (endangered) (see *Fauna and fauna communities of conservation significance*). Collection, and especially unauthorised or unsustainable harvesting, of certain traditional species from within the Badimia parks and reserves for pharmaceutical or other commercial purposes also concerns Badimia Traditional Owners, as this represents an exploitation of Badimia traditional knowledge with no reciprocal benefits.

Desert People

Out in the desert where the goannas crawl,
The tribes go a wandering looking for them all,
Sharpened are the spears which they clasp in their hands,
And off they go a runnin' in the hot desert sands
Run little goanna get out of here,
The hunters are a comin' with sharp pointed spear,
And if you get caught by the fierce Badimia,
You'll end up roasting on the flaming fire.

Extract from Roche, 1992

Significant lore and cultural sites

A wide range of sites as well as places, flora, fauna and other values important in Badimia cultural heritage (social surroundings) have been identified in the planning area, demonstrating prolonged and ancient use of barna by Badimia Traditional Owners (BBBAC, 2021a). Keiller and Rye, 2021 outline the pattern of sites in association with key features of the area. Artefact scatters have been found close to rivers, creeks, permanent pools and gabi dhaa (rock holes), rocky outcrops, and ridgelines. Man-made structures, such as stone arrangements used for navigation and hand smoothed/enlarged rock holes have also been recorded. Rock paintings that feature hand stencils, fauna tracks and mythological stories have also been found at rock shelters and overhangs where pigments have been protected from weathering. Mythological sites in the Badimia parks and reserves are associated with specific prominent geographic features, including marda (hills) and waterways, and these follow songlines passed down through generations. Other important sites include ceremonial, meeting, wagu (camping) and burial, hunting areas, birth places, grinding patches, quarries, modified trees, ochre sources, and other culturally important natural features such as water and rock shelters. These are important for understanding the daily life of Badimia ancestors.

Many culturally important places have not been documented or registered, and some of these are associated with gender restrictions. Further cultural surveys to identify, map and protect sites across the Badimia parks and reserves has been identified as a key priority for action (BBBAC, 2021a). In some cases, public access and publication of details including mapping will not be culturally appropriate given the importance or sensitivity of these places.

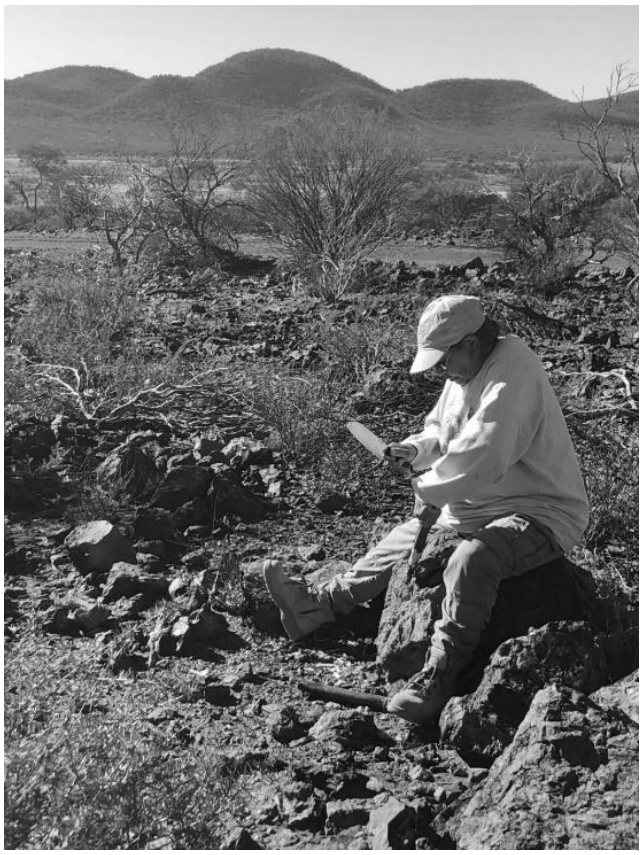
Damage to cultural heritage sites has occurred throughout Badimia barna through visitors taking artefacts for souvenirs, graffiti or damage to rock art, or driving cars on lake beds and marda. For these and other cultural reasons, many Badimia sites and places have not been specifically identified in this plan. Feral goats have damaged some culturally important landscape features and some sites have also been lost through various development approvals. All Aboriginal sites, registered or otherwise, are protected under the *Aboriginal Heritage Act 1972*. Ensuring the protection and management of important Badimia cultural heritage sites, places and social surroundings within the Badimia parks and reserves are important outcomes from this plan.

Enjoyment of Barna and customary activities

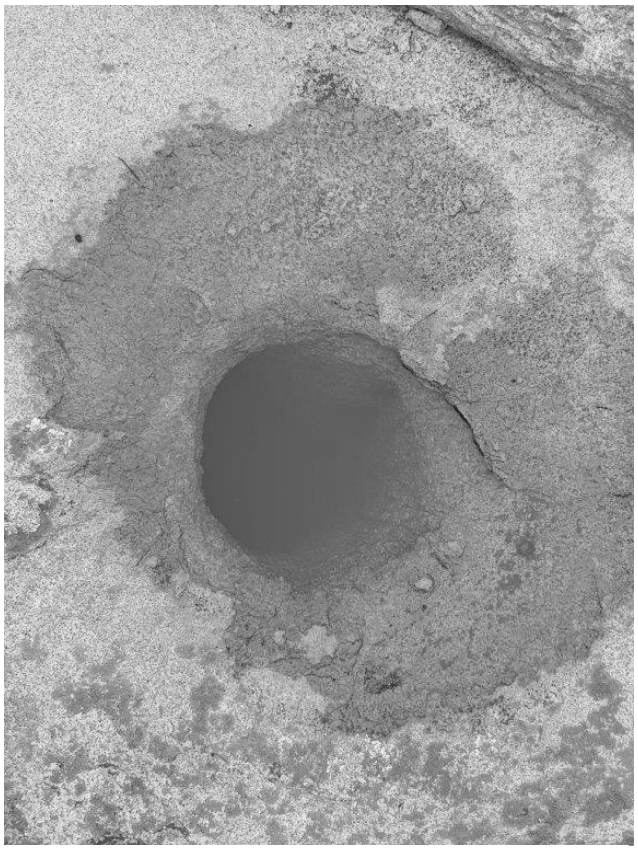
Many Badimia Traditional Owners continue to hunt and gurriya (collect) bush tucker and bush medicine; make musical instruments and tools from local flora; conduct ceremonies; and bilygi (clean) gabi dhaa (rock holes) on Badimia barna (BBBAC, 2021a). Ongoing access to, and support for the conduct of customary activities within, the Badimia parks and reserves is essential to maintain Badimia cultural and spiritual connections to barna.

It is also important to continually evaluate how current management approaches and resource development proposals within the Badimia parks and reserves may impact on the ability of the Badimia Traditional Owners to safely undertake customary activities. For example, goannas are important Badimia bush tucker, highly resistant to poisons such as 1080 used in baiting programs and may be attracted to these baits as a food source. Badimia people are concerned about a potential risk of secondary poisoning where these goannas are being consumed by their families.

Customary activities must be carried out safely and be consistent with this management plan, relevant legislation (such as the use of wadyan (fire) and firearms) and Policy Statement No. 86 *Aboriginal customary activities* (DPaW, 2015) and Corporate Guideline No. 22 *Guidelines regarding Aboriginal customary activities* (DPaW, 2016a). More information is available in the *Guide to Aboriginal customary activities on Parks and Wildlife-managed lands and waters* (DPaW, 2016b).



Badimia Elder Gloria Fogarty making a clapping stick. *Photo – Kirrily Hastings/DBCA*



Gabi dhaa were traditionally kept bilygi (clean). *Photo – Johannes Human/DBCA*

Management objective: To protect and conserve Badimia cultural heritage values of the parks and reserves for future generations, while supporting customary activities.

Management Strategies

1. Support Badimia Traditional Owners to identify, record, protect, monitor, maintain and/or restore culturally important values in the Badimia parks and reserves.
2. Ensure that Badimia traditional knowledge and cultural heritage informs management.
3. In consultation with Badimia Traditional Owners, ensure that identified threats to culturally important sites and other cultural values in the Badimia parks and reserves are appropriately managed and monitored.
4. Support the Badimia Traditional Owners to maintain their connection to, and responsibilities for, barna through on-Country trips and the conduct of customary activities.
5. Assess factors that may inhibit the rights of Badimia people to access and enjoy barna and maintain customary practices; and explore management interventions to address issues as necessary.
6. Ensure that Badimia place names and translations are integrated into visitor interpretation and signage, acknowledging Badimia Traditional Owners and supporting the retention and use of Badimia language.
7. Support Badimia Traditional Owners to identify employment, business and training opportunities for Badimia people within the Badimia parks and reserves.

Key performance indicators

Performance measure	Target	Reporting
Protection of significant cultural and heritage places	A systematic and strategic process to identify and manage threats to important sites and places in the Badimia parks and reserves is initiated and is active over the life of the plan	Within 1 year
Knowledge of culturally important flora and fauna	Culturally important flora and fauna in the Badimia parks and reserves continue to be identified and recorded	Annually
Level of Badimia Traditional Owner satisfaction that traditional knowledge is being considered and adopted into management	Badimia Traditional Owners (through the JMB) are satisfied that traditional knowledge is being considered and adopted as appropriate into management of the Badimia parks and reserves	Annually
Level of Badimia Traditional Owner satisfaction with access to Badimia parks and reserves and custodianship of barna and culture	Badimia Traditional Owners (through the JMB) are satisfied that they have adequate access to the Badimia parks and reserves for the purposes of carrying out customary activities, visiting sites and transferring knowledge to younger generations	Annually

Shared heritage

The sandalwood cutters

Walarda (Western Australian sandalwood) is a slow-growing semi-parasitic[4], tree which occurs in the southern two thirds of Western Australia. It grows naturally in many parts of the Badimia parks and reserves. Traditional owners have used this resource sustainably for thousands of years, understanding its healing properties and its use as a food source (FPC, 2017). *Santalum* species have been harvested in other parts of the world and used in places such as India and China for hundreds of years, mainly within incense for ceremonial use (Talbot, 1983).

Sandalwood cutters were likely to have been the first Europeans to spend time in the Badimia area when harvesting commenced in about 1845 (DBCA, 2019a). Walarda is one of the oldest export industries in Western Australia (FPC, 2017) and in the early stages of export, was literally as precious as gold. It was exported as a fixative for cosmetics, for medicinal purposes, prior to the discovery of penicillin and for incense. During the early 1800s Britain already had plantations of Asian sandalwood in India and was exporting it at high prices to Singapore (Talbot, 1983). It was this market that spurred the start of the walarda industry in Western Australia when it was discovered growing in the Avon Valley in 1843 (Talbot, 1983).

The lasting effects and physical reminders of early walarda harvesting in the wider planning area is the overall depletion of this species. The former Burnerbinmah pastoral station (now Barnabinmah Conservation Park) was purchased in 1995 as part of the Sandalwood Conservation and Regeneration Project and at that time supported healthy stands of walarda. There is serious concern that adequate regeneration of walarda is not occurring naturally, and that this species is becoming difficult to find owing to past overharvesting and ecological decline. The department's *Santalum spicatum (Sandalwood) Biodiversity Management Programme 2023* (DBCA, 2023a) sets out how walarda (excluding plantation sandalwood) will be conserved, protected and managed on Crown and private lands, outlining processes for ecologically sustainable use now and into the future, consistent with the Biodiversity Conservation Act.

Early European exploration

The first European description of Lake Moore was recorded in 1846 and was described as "…an immense salt marsh or dry lake, extending to the north-east and south-west to the horizon, but narrowing to about three miles at the point we came to it." (Gregory and Gregory, 1884). An attempt to cross the salt lake resulted in the horses becoming bogged and a struggle to reach firm ground again. The party eventually reached "…a large granite rock …and on the rock some small pools of rainwater". From the summit it was reported "…an extensive view" (Gregory and Gregory, 1884).

Mitchell (2006) describes Robert Austin's 1854 expedition across Badimia barna with a party of ten men, including two Aboriginal people and 21 horses. He intended to identify land, navigable water or minerals that may be of use to the colonialists. The party experienced great hardship during the expedition with many horses dying after eating 'poison weed' south of the Mount Magnet landform. Further north, on what is now Wooleen pastoral station, a teenager named Charles Farmer died after accidentally shooting himself in the arm. Austin named Mount Farmer, Mount Charles (located adjacent to Lakeside National Park) and Mount Narryer after Charles Farmer and the Aboriginal guide named Narryer who had tried to save him. He also named Lake Austin (see *Water places – salt lakes*) and the Mount Magnet landform. Austin's party eventually reached Northampton, after running out of water and with only four horses remaining.

[4] A plant that is parasitic to another host plant under natural conditions but also photosynthetic to some degree.

Pastoral history

Pastoral use of the Murchison region commenced during the 1860s and within a few decades the wool produced from the Murchison was regarded as among the world's finest, fetching the highest prices in London (Nixon and Lefroy, 1988). Aboriginal station hands were pivotal to the success of the pastoral industry in these areas as they had intimate knowledge of the land and its resources, enabling the use of natural water holes as stock watering points and successfully tracking livestock (Mitchell, 2006; Outback Pathways, 2023).

Prosperity of the region fluctuated with the rise and fall of wool prices, the impact of the first and second world wars, improved communications, accessibility, and transport during the 1950s and severe weather events especially bunyarri (drought), resulting in overgrazing and significant land degradation (Nixon and Lefroy, 1988; Mitchell, 2006; Outback Pathways, 2023). A number of stations have since been acquired by the department for conservation purposes, with assistance from government-funded (State and Federal) grant programs.

The Badimia parks and reserves contain many reminders of early pastoral use, including ruins, tracks, fences, mills and artificial waterpoints dating from the late 1800s. Thundelarra pastoral station was first leased in 1872 by SJ Eakins and SF Moore. Today, the homestead and its associated outbuildings form a highly intact and authentic historical pastoral station precinct that offers an insight into the way of life of early Midwest pastoralists and has potential State-level heritage significance (Palassis Architects, 2014). Anecdotally, the old stone shearing shed at Thundelarra (circa 1876) is thought to be one of the oldest buildings in the Murchison. Significant resources are required to restore and maintain this suite of heritage buildings and structures spanning over 100 years of construction and improved evaluation. Recognition, preservation and interpretation of these heritage values is also a key priority for management (see *Visitor information, education and interpretation*). Pastoral buildings from the balance of the planning area have been lost to wadyan (fire), deterioration or demolition.

Left: Hand-cut stock yard fence at Jumbo Well, Barnabinmah Conservation Park.
Photo – Kirrily Hastings/DBCA

Old shearing Shed (circa 1876), Thundelarra Conservation Park. *Photo – Kirrily Hastings/DBCA*

Jackaroos' quarters, Thundelarra Conservation Park. *Photo – Michelle Rumball/DBCA*

Old Thundelarra Homestead, Thundelarra Conservation Park. *Photo – Kirrily Hastings/DBCA*

Badimia barna is also central to the historic efforts in preventing the incursion of feral rabbits (*Oryctolagus cuniculus*) from the eastern seaboard into the western agricultural areas of Western Australia, through the construction of the Rabbit Proof Fence (Heritage Council of Western Australia, 2022; Heritage Council of Western Australia, 2019), the State Barrier Fence and other vermin proof fences. These fences were later modified to address additional agricultural pressures from ngubaanu (*Canis familiaris* (dingo)) and wild dogs, bagudyi (European red fox (*Vulpes vulpes*)), yalibirri (emu) and various grazing herbivores (Heritage Council of Western Australia, 2019). The State Barrier Fence abuts the south-west corner of Gurdurdu Conservation Park and traverses Badimia barna to the north-west between Biluny Wells Nature Reserve and Thundelarra Conservation Park. The Rabbit Proof Fence No. 2 runs east-west along the southern boundary of Biluny Wells Nature Reserve before trending north to meet the State Barrier Fence west of Badimia barna. The Murchison Regional Vermin Council Fence No. 1 aligns with the eastern boundary of Badimia barna, replacing a portion of the historic Rabbit Proof Fence No. 1 (Shire of Yalgoo, 2024).

Mining history

There is a long and continued history of mining throughout the Badimia area. In 1854 explorer Robert Austin noted the high potential for mineral perspectivity, yet the area was not actively explored for gold for another 40 years. The early discoveries of significant gold deposits in Nannine (1890), Mount Magnet (1891) and Cue (1892) (Mitchell, 2006) spurred the gold rush, which lasted until the 1930s (Murray et al., 2011). The gold rush period brought a large influx of European people into the Murchison, including onto lands within the planning area. During this period hundreds of prospectors would often set up wagu (camp) literally within days of a new claim being pegged, soon to be followed by hotel and storekeepers. More than 120 Western Australian town sites arose from the gold rush period, and while many of these did not continue as settlements (Murray et al., 2011), they retain important historical features that provide focal points of interest to many visitors to the local area. These range from ghost towns with abandoned buildings to lonely gravesites and scattered remnants of equipment and foundations. The planning area, and its surrounds, contains many such reminders and is located along the 'Miner's Pathway' outback self-drive heritage trail (Mitchell, 2006) (see *Visitor Activities*).

Useful material from most old mining settlements has long been removed and re-purposed over time by passing visitors or pastoral station owners (Murray et al., 2011). Remaining buildings, infrastructure, artefacts, graves, and other remnants with historical value have varying requirements of protection and restoration over time. Numerous disused open mine shafts also present significant safety hazards within the planning area, and these require progressive management over time, particularly as visitor use increases (see *Safety*).

Management objective: To conserve and protect shared heritage values and support communication of historical knowledge relevant to the Badimia parks and reserves.

Management strategies

1. Evaluate the heritage values of the Thundelarra Homestead precinct and, for significant components, nominate these for inclusion on the Shire of Yalgoo Municipal Register of Heritage Places and, where relevant, the State Register of Heritage Places.
2. Restore and maintain the buildings and infrastructure within the Thundelarra Homestead precinct that are of high historical significance.
3. Where practicable and appropriate, retain ruins and remnants of past land use that have high historical importance throughout the Badimia parks and reserves (such as ruins, hand-cut fences, stock yards, mills and artificial watering points from the late 1800s and early 1900s), including evidence of past use where buildings are demolished.
4. Ensure that historical values of the Badimia parks and reserves inform and guide management.
5. As resources allow, identify, research, document, map and maintain database records of historical values across the Badimia parks and reserves.

Key performance indicators

Performance measure	Target	Reporting
Assessment of heritage values of buildings within the Thundelarra Homestead precinct	Completion of a detailed heritage assessment of the buildings within the Thundelarra Homestead precinct and implementation of restoration plans	Within five years

Looking after Barna (natural values on Country)

Strategic objective

To identify, protect and conserve the natural landscapes, wetlands, flora, fauna and ecological communities of the Badimia parks and reserves while supporting customary activities within them.

The Badimia landscape

Climate and climate change

The Badimia parks and reserves lie across two climatic regions of Western Australia. The arid zone in the north (Eremaean Botanical Province) has an unpredictable rainfall and long, hot, dry, periods while the South-West Botanical Province has a Mediterranean climate, though with only 250 – 500mm of annual rainfall, mainly in winter (BOM, 2017). The merging of the two climatic regions results in rich and intermingled biological characteristics, with many species occurring at their range extent (see *Native flora and fauna*). In the arid north where rainfall is unpredictable in timing and amount, spatial changes in vegetation associations are less strongly tied to graduations in rainfall (isohyets) compared with those in the South-West Botanical Province (Beard, 1995).

The intergovernmental panel on climate change has noted a greater observed and predicted warming for the central Australia area of climate reporting compared to coastal areas, in addition to a predicted increase in heavy rainfall and gadharra (flooding) of rivers (IPCC, 2021). These changes may impact on biodiversity values, as geographically restricted species with narrow climatic tolerances may be impacted by changes in rainfall and temperature. In addition, pest animals and plants that are favoured by warmer conditions and increased episodic rainfall may be able to colonise new habitats. Other important changes may include variations in flowering times, migration patterns and changes to wadyan (fire) regimes. Species and communities potentially most impacted by climate change include those that are dependent on climate refugia habitats (such as granite outcrops, banded ironstone formations and freshwater wetlands), those occurring in highly fragmented/patchy habitats with small populations or are otherwise geographically restricted and those that are migratory.

Further research will be important in better understanding climate change impacts at a species and community level. Management should be adapted in response to these findings and as the general climate change knowledge improves.

Charles Darwin Reserve, which adjoins Biluny Wells Nature Reserve, is the focus of a long-term climate observation research project to develop a better understanding of the ways in which climate change is impacting on the ecological values of these landscapes (Bush Heritage Australia, 2024).

Management of the conservation reserve system can support climate change mitigation and adaptation through carbon sequestration and emissions reduction. Carbon farming refers to a change in management practices aimed at increasing the amount of carbon stored in vegetation and soil (sequestration) or a reduction in the amount of carbon being released into the atmosphere (emissions avoidance). Carbon farming opportunities to increase vegetation-based carbon storage through changes to the management of the conservation reserves system should be considered where it can improve conservation outcomes consistent with reserve management objectives while mitigating the impacts of weeds and feral herbivores. In the planning area, carbon farming has the potential to contribute to reducing and absorbing greenhouse gas emissions as well as achieving enhanced conservation outcomes and creating opportunities for the Badimia Traditional Owners.

Geology, landforms and habitats

The Badimia parks and reserves are located on the Yilgarn Craton, an ancient and eroded landscape containing rocks that are more than 2.5 billion years old (Western Australian Museum, 2015). About 320 – 280 million years ago the Yilgarn Craton was covered in thick ice, which eroded the surface of the landscape, flattening the topography of the area. The sea has not since covered this area again, nor has there been any mountain building or glacial activity, leaving the land here to slowly weather over millions of years (Western Australian Museum, 2015).

Although a relatively flat country, the Badimia parks and reserves encompass a diverse range of landforms with 38 different land systems described (Appendix C). Low granite marda (hills), breakaways and belts of greenstones are separated by vast, flat, alluvial sandplains that are interspersed with a mosaic of salt lakes (Curry et al., 1994). Granite outcrops and rocky breakaways hold very important cultural and spiritual importance for the Badimia Traditional Owners. The shallow and sandy soils are mainly underlain by red-brown siliceous hardpan. Freshwater wetlands and pools are scarce, and where they occur provide vital freshwater habitat and resources (Patrick, 2002) that also have important cultural significance for the Badimia people.

The main categories of landforms and their associated habitats are described below.

The sandplain Country

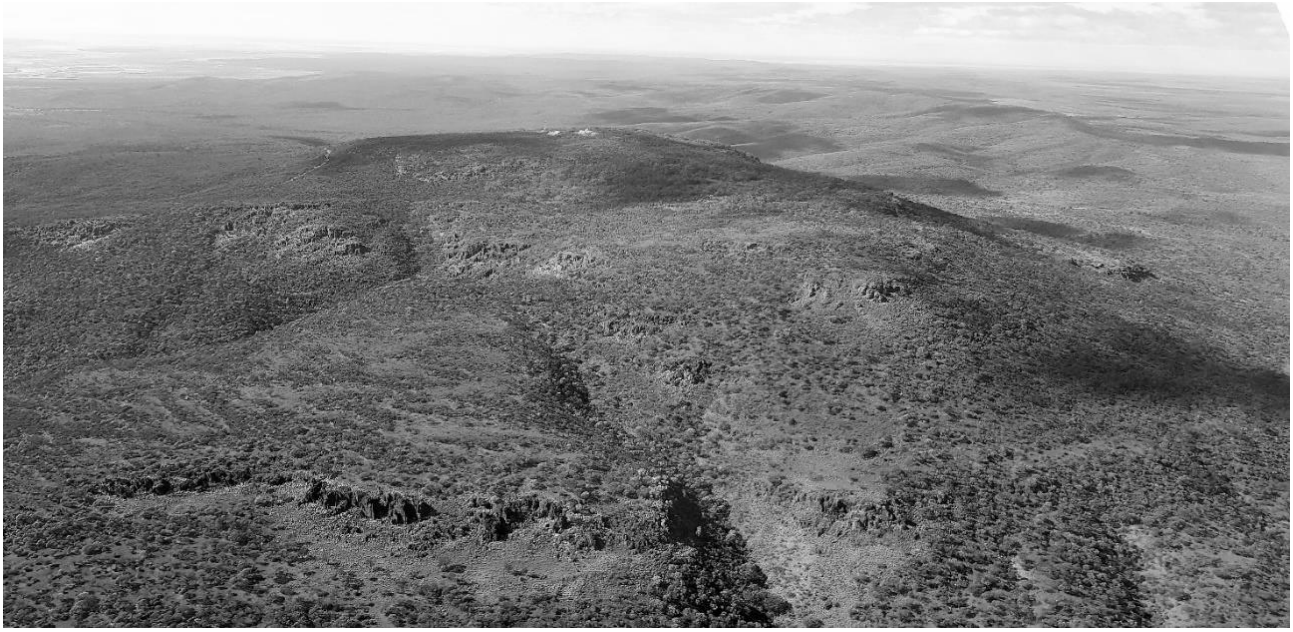
The majority of the planning area comprises wide, flat, sandplains, many of which contain red soils caused by the presence of iron oxides (Burnside et al., 1995). The name ‘Barnabinmah’ (and the formerly named Burnerbinmah Station) is the Badimia term for ‘red ground’ (Patrick et al., 1997). The irregular rainfall pattern of the area has led to a high diversity of flora communities on these plains as different species have adapted a range of strategies over time to survive the long and unpredictable dry periods and relatively infertile soils (Burnside et al., 1995). In the south at Biluny Wells Nature Reserve, these sand plains are predominantly yellow and graduate to deeper loams that support Eucalypt woodlands.

Sandplain and shrubland at Lakeside National Park. *Photo – Johannes Human/DBCA*

The marda (hill) Country

The marda Country, which includes numerous granite outcrops and breakaways, banded ironstone and greenstone ranges are regarded as plentiful lands by traditional owners, providing important food, water and shelter.

Greenstone refers to the green colour of the volcanic rock (basalt or gabbro), which is high in magnesium and iron (Meissner and Coppen, 2014). These ridges, marda and foot slopes partially extend into the edge of Lakeside, Thundelarra and Gurdurdu conservation parks. The latter occurrence is part of the prominent landscape feature of Gunduwa (Ninghan Hill/ Mount Singleton) (679 m), a registered geoheritage site[5], predominantly located on Ninghan and Mount Gibson pastoral stations. Gunduwa is also a place of ecological and cultural importance. The portion of this geoheritage site that occurs on the Ninghan pastoral station is covered by the broader Ninghan Indigenous Protected Area (see *Surrounding lands*).



Gunduwa (Ninghan Hill/Mount Singleton). *Photo – Shane Heriot/DBCA*

[5] A geoheritage site has geological features considered to be either unique or of outstanding scientific and educational value within Western Australia (DEMIRS, 2024).

The Warriedar Fold Belt is a series of low marda of banded ironstone and basalt (Meissner and Coppen, 2014) that lie across portions of Thundelarra Conservation Park at Bullajungadeh Hills or '*The Sisters'* as they are known locally (Syme et al., 2008). The Warriedar Fold Belt is associated with a high number (23 species) of priority flora as well as flora communities with a restricted range (see *Flora and flora communities of conservation significance*) (Meissner and Coppen, 2014). The flora communities found at Bullajungadeh Hills also differ to those found in other parts of the Warriedar Fold Belt.

Rocky outcrops and ranges, including the many breakaways that occur throughout the Badimia parks and reserves provide unique and refugial habitats often associated with high local species diversity (Withers, 2000) and highly restricted flora communities.

A breakaway at Barnabinmah Conservation Park is inspected by Badimia Elder David Clinch. *Photo – Kirrily Hastings/DBCA*

Water places – salt lakes

The arid inland of Western Australia supports the highest concentration of salt lakes in the country (Gregory et al., 2002). These are remnants of ancient drainage systems from 56 – 34 million years ago (the Eocene) when more rain fell across the landscape, cutting river channels that drained internally (Western Australian Museum, 2017). Today these remarkable lake systems support unique and diverse species, many of which occur nowhere else in the world. Most inland salt lakes are normally dry, sometimes for years at a time, but after heavy rains they are transformed into wetlands of abundance that provide vital refuge for local and migratory species. These events activate resting (dormant) eggs of small fauna, flora walgaly/gara (seed), and spores and cysts of algae and bacteria (DEC, 2014). Marrgan (frogs) and turtles that can aestivate (rest in a dormant state) for extended periods of time also respond to these events along with waterbirds that descend on the lakes in great numbers to feed and breed (DEC, 2014). Salt that has accumulated in the ground for hundreds of thousands of years dissolves into water as the lakes fill and concentrates back in the soil again as the lakes slowly evaporate. These harsh, hugely varied, and unpredictable conditions have led to incredible adaptions in the flora and fauna that inhabit these lakes.

Portions of Lake Austin and its associated dune systems, islands and fringing salt marshes extend across much of Lakeside Conservation Park. It is usually dry, though it fills to some extent every few years and gadharra (flooding) occurs about once a decade (Vellekoop, 2002). When this occurs the lake and its network of islands provide important habitat for waterbirds, many of which are migratory (Douglass et al., 2019). Most of Lake Austin that lies within the boundary of the former Lakeside pastoral station, was never formally used for grazing and therefore is in better overall condition than portions on surrounding areas (see *Flora and flora communities*).

Mongers Lake is a large and regionally significant salt lake that spans a distance of some 200 – 300km. It partially extends into Barnabinmah and Thundelarra conservation parks. The lake has special significance for Badimia people as a mythological site.

Mongers Lake, Thundelarra Conservation Park. *Photo – Kirrily Hastings/DBCA*

Gurdurdu Conservation Park.
Photo – Adrian Pinder/DBCA

Gurdurdu Conservation Park is part of the broader Lake Moore salt lake (114,854.43 hectares), the entirety of which forms one important cultural site. Within it and surrounding it, there are many individual features, places and/or sites of cultural significance and social surroundings (BBBAC, 2021a). Gurdurdu Conservation Park contains a small portion of the broader Mount Singleton geoheritage site (see *The marda (hill) Country*) and other important natural values, including species and an ecological community with conservation significance. Physical disturbance of Gurdurdu Conservation Park can create long-term ecological impacts and is culturally inappropriate, so access and management will require careful consideration for this reserve.

Other smaller salt lakes also occur within Lakeside and Barnabinmah conservation parks and Gagarlagu and Biluny Wells nature reserves.

Water places – freshwater lakes and pools

There are few freshwater sources in the Badimia parks and reserves, with many of these being confined to gabi dhaa (rock holes in granite outcrops where water gathers). Where larger freshwater sources occur, these provide vital fauna refuge habitat and are also culturally very important to the Badimia people as mythological sites.

Thundelarra Lignum Swamp, Thundelarra Conservation Park. *Photo – Kirrily Hastings/DBCA*

Thundelarra Lignum Swamp, located in Thundelarra Conservation Park, is listed as a nationally important freshwater wetland. It is the largest of a few known canegrass-dominated swamps on Badimia barna (Pinder pers comm, 2023) and is probably the largest lignum swamp in south-western Australia (Environment Australia, 2001). It was also nominated as 'a wetland of outstanding ornithological importance' for the register of the national estate in south-west Western Australia, based on its importance for rare waterbirds (Raines et al., 1995). The swamp covers an area of 135 hectares and receives intermittent flow from a creek system 15-30km to the north-west. Although it is often dry, when it fills with water it provides important breeding habitat for a wide range of waterbird species.

It also supports a large area of lignum canegrass shrubland community (dominated by *Duma florulenta* and *Sporobolus ramigerus*), which is very sparsely represented in Western Australia.

Palm Well, adjacent to the Thundelarra Homestead, is a permanent freshwater pool providing habitat for waterbirds and turtles. Barnabinmah Conservation Park also contains important permanent freshwater resources.

Management objective: To identify, protect and conserve significant landforms and habitats such as salt lakes, freshwater pools, granite outcrops and breakaways, particularly those of cultural or conservation importance.

Management objective: Explore opportunities to support key values in a changing environment.

Management strategies

1. Monitor marda, outcrops, breakaways or water places with important natural or cultural values and identify requirements for restoration, management or appropriate access modifications.
2. Support the Badimia Traditional Owners to restore damage to cultural sites and values and/or undertake appropriate cultural maintenance to important sites and values (such as keeping gabi dhaa bilygi (clean)).
3. Undertake carbon feasibility assessments for the Badimia parks and reserves and where identified as feasible, implement accordingly.

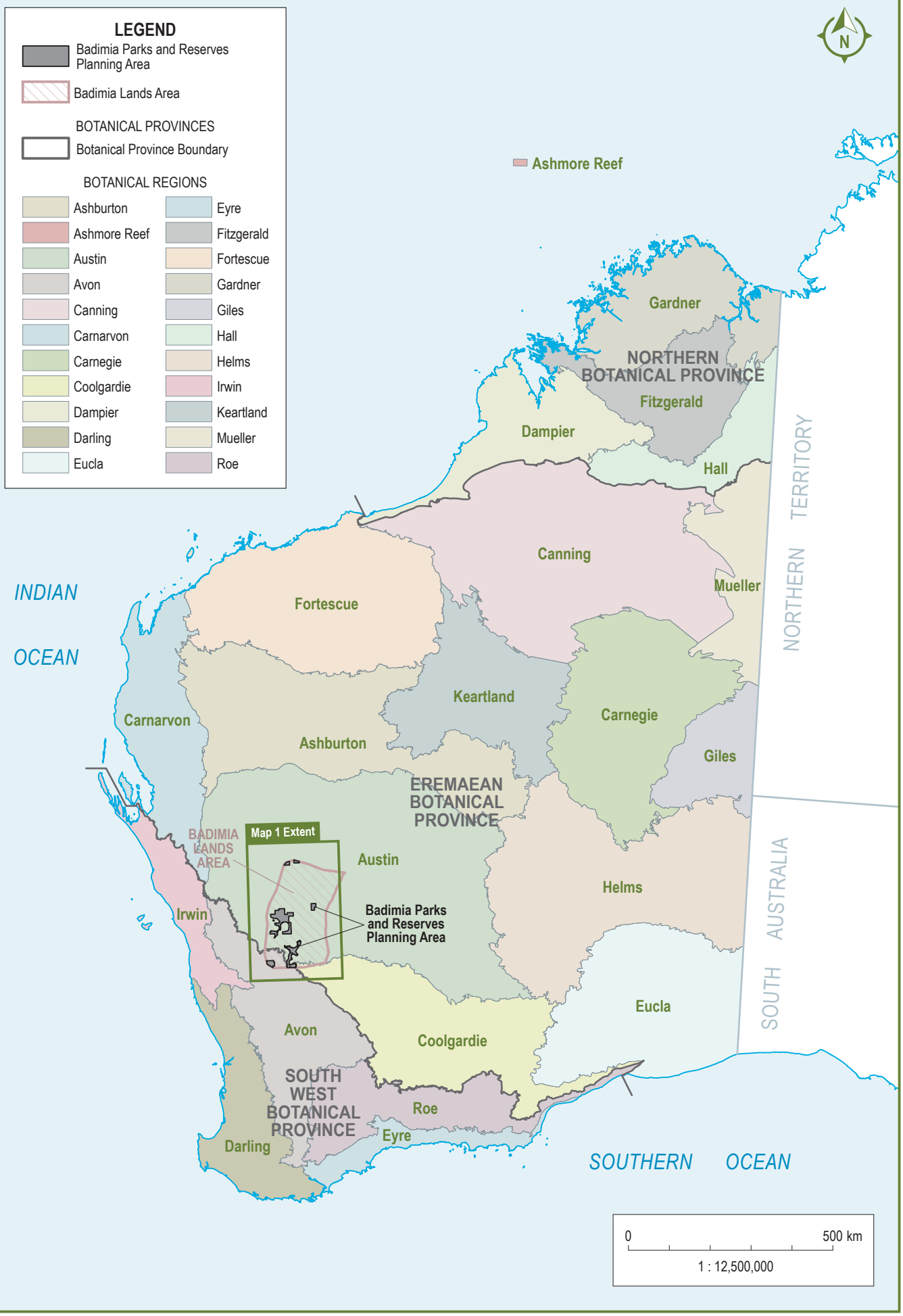
Flora and fauna

Flora and flora communities

The planning area occurs across a transition zone between the Eremaean Botanical Province and the South-West Botanical Province, the latter of which is also recognised as an international biodiversity hotspot (Map 6). Mulga (*Acacia aneura*) dominates the arid shrublands of the Eremaean Botanical Province and is replaced by other species of *Acacia* and finally eucalypts with increased rainfall further south (Meissner and Coppen, 2014). This change in vegetation is known as the Mulga-Eucalypt line (Beard, 1995), crossing Badimia barna midway between Thundelarra Conservation Park and Biluny Wells Nature Reserve. Here, many species are at their range extent.

Mulga (*Acacia aneura*) in Barnabinmah Conservation Park. *Photo – Kirrily Hastings/DBCA*

MAP 6 – BOTANICAL PROVINCES AND REGIONS IN WESTERN AUSTRALIA



Albers Equal Area WA – GDA94

19th August, 2024

A key driver for the creation of the Badimia parks and reserves was to improve the protection and management of bioregions and subregions under the IBRA classification system (Thackway and Cresswell, 1995) and vegetation associations that have little to no representation within the conservation reserve system (Appendix D). Three bioregions (Murchison, Yalgoo and Avon Wheatbelt) and four subregions (Western Murchison, Eastern Murchison, Tallering and Merredin) occur within the planning area and all four subregions are poorly reserved.

Of the 28 vegetation associations occurring within the Badimia parks and reserves, only two were adequately represented[6] within the conservation reserve system prior to the creation of the reserves. Twelve vegetation associations were unprotected; four had little to no protection (<1%); five had little protection (<5%) and five were inadequately protected (<15%) (Appendix D). The Badimia parks and reserves make particularly important contributions to the protection of vegetation associations where a large portion occurs within them (for example, Gurdurdu Conservation Park is almost entirely comprised of vegetation association 125), or where the statewide extent is restricted, small and/or otherwise occurs on other lands (for example, vegetation associations 395, 1127, 338 and 357 all have localised extents around Lakeside National Park, Lakeside Conservation Park, Gagarlagu Nature Reserve and Gurdurdu Conservation Park, respectively).

Vegetation within the Badimia parks and reserves is in considerably better condition than on surrounding pastoral lands. Gagarlagu Nature Reserve and Gurdurdu Conservation Park are not former pastoral properties and have not been subject to historical and sustained grazing by introduced herbivores. The remaining parks and reserves were previously grazed but have benefited from destocking and control of feral herbivores following the cancellation of the pastoral leases and reverting to unallocated Crown land. This has allowed some regeneration to occur over the past few decades, especially at Biluny Wells Nature Reserve where grazing has been absent the longest. At the time of purchase, departmental records indicated that the former Lakeside pastoral station was in surprisingly good condition owing to low stocking rates, which also resulted in very little soil erosion; the former Burnerbinmah pastoral station was in relatively good condition (considering its long history of grazing), with degradation mainly limited to areas around watering points, tracks and buildings; and vegetation condition on the former pastoral stations Thundelarra and Warriedar was varied, though still considered to be better than average for pastoral stations in the rangelands.

Parts of the Badimia parks and reserves have been negatively impacted by hydrological change. For example, wider landscape changes arising from the combined impacts of grazing and the presence of roads and tracks, has diverted surface water flow in some areas, resulting in ‘surface water shadows’ and contributing to vegetation death. An evaluation of this issue is underway at Thundelarra and Barnabinmah conservation parks and is required at Lakeside Conservation Park. It is not yet known whether this issue is present at Gagarlagu Nature Reserve.

[6] Based on 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (DBCA, 2019b).

Flora and flora communities of conservation significance

There are 23 flora species of conservation significance within the Badimia parks and reserves. Two are threatened species, the critically endangered native foxglove (*Dasymalla axillaris*) and the vulnerable *Stylidium scintillans*, and 21 are priority flora species (Appendix E). Many of these have a very restricted range and are likely to benefit from improved long-term protection as part of the formal conservation reserve system. A recovery plan exists for the native foxglove.

The critically endangered native foxglove (*Dasymalla axillaris*) occurs in Gurdurdu Conservation Park. *Photo - DBCA*

Floristic surveys have confirmed that the banded ironstone ranges (see *Geology, landforms and habitats*) of the Midwest are ancient species refuge habitats, as well as supporting more recent species refuge and divergence (Gibson, 2009). As the climate became drier these ranges are likely to have provided cooler habitats with more reliable water supply, eventually supporting groups of flora that do not occur elsewhere as well as protecting species vulnerable to the effects of burning and bushfires. Today, many banded ironstone ranges support endemic or threatened flora species, particularly where they occur close to the boundary separating the South-West and Eremaean botanical provinces (Gibson, 2009).

There are two priority 1 ecological communities, both of which comprise shrublands and woodlands of banded ironstone formations in the Yilgarn (Appendix E). The 'Lake Austin vegetation complexes (banded ironstone formation)' has only two occurrences, and part of one occurrence falls within Lakeside Conservation Park. This community is otherwise not protected within the conservation reserve system. Two occurrences of the 'Warriedar Hill/Pinyalling vegetation complexes (banded ironstone formation)' occur in the southern part of Thundelarra Conservation Park.

While banded ironstone formation ranges are associated with high flora endemicity and restricted flora communities, they are also highly prospective for iron ore exploration and mining (Meissner and Caruso, 2008). Mining and minerals exploration is a key threat to both banded ironstone formations.

The 'Eucalypt woodlands of the Western Australian Wheatbelt' is a priority 3 ecological community that partially occurs within Biluny Wells Nature Reserve (Appendix E). It also extends across Badimia barna to the south-western and southern boundary of Gurdurdu Conservation Park. This ecological community is listed under the EPBC Act as a critically endangered threatened ecological community (TEC). The presence in the canopy layer of eucalypt trees – most commonly salmon gum (*Eucalyptus salmonophloia*), York gum (*E. loxophleba*), red morrel (*E. longicornis*), or gimlet (*E. salubris*) defines these woodlands. Several of the other emergent eucalypt species which may be present as a defining species (such as Kondinin blackbutt (*E. kondininensis*), small-fruited gum (*E. myriadena*), salt river gum (*E. sargentii*), ornamental silver mallet (*E. ornata*) and ridge-top mallet (*E. singularis*)) are found only in the Western Australian Wheatbelt. There are six occurrences of this PEC (of 87,231 statewide) within Biluny Wells Nature Reserve. Threats to this PEC include altered hydrology, grazing, altered wadyan (fire) regimes, vegetation clearing, exotic species, soil cultivation and fertilization.

Eucalypt woodland in Biluny Wells Nature Reserve. *Photo – Johannes Human/DBCA*

Thundelarra Lignum Swamp supports a large area of lignum canegrass shrubland community (dominated by *Duma florulenta* and *Sporobolus ramigerus*). This community is very sparsely represented in Western Australia, though it was removed from the list of threatened or priority ecological communities due to a lack of available information to define it.

Fauna

There have been limited fauna surveys within the Badimia parks and reserves, and those undertaken have largely focused on birds, with some reptiles and bats recorded. Most surveys have not been repeated more than once, and many have been limited to specific locations associated with mining, meaning there is little long-term species data for these parks and reserves, especially for mammals (Desmond et al., 2001). Management of fauna values will, therefore, need to consider the potential occurrence of species based on data from nearby areas that have comparable habitats, and be refined as more locally specific survey data becomes available. Increased survey effort for all fauna values is a key management requirement for the Badimia parks and reserves. Feral predators are an ongoing threat to vulnerable fauna that may occur in the planning area (small birds, reptiles and mammals), with feral budyi (cats) far more prevalent than bagudyi (foxes) (see *Feral predators*). In some areas disused pastoral fences obstruct fauna movement. Poaching of some nesting birds and reptiles have also occurred.

Mammal species that have been identified by past surveys include the carnivorous marsupials kultarr (*Antechinomys laniger*), Wooley's false antechinus (*Pseudantechinus woolleyae*), and Wongai ningaui (*Ningaui ridei*). Other mammals known to occur include the marlu (red kangaroo), bigurda (euro; hill kangaroo), fat-tailed dunnart (*Sminthopsis crassicaudata*) and gunduwa (echidna (*Tachyglossus aculeatus*)). Past surveys of Biluny Wells Nature Reserve found this area to be rich in bats, with seven species recorded (Burbidge et al., 1989).

Rocky outcrops and mulga provide important habitat for reptiles in the Badimia parks and reserves. In addition to the meelyu (western spiny-tailed skink) (see *Fauna and fauna communities of conservation significance*), the regionally endemic spotted mulga (Butler's) snake (*Pseudechis butleri*) has been recorded at Thundelarra Conservation Park, and numerous small dragons and skinks such as the central netted dragon (*Ctenophorus nuchalis*), western netted dragon (*C. reticulatus*) and lozenge-marked dragon (*C. scutulatus*) have also been recorded there and in Barnabinmah Conservation Park. The wider planning area supports the arboreal stripe-tailed or line-tailed pygmy monitor lizard (*Varanus caudolineatus*). Reptiles that have been recorded close to the planning area and may also occur within the Badimia parks and reserves include larger monitor lizards such as the quoelle (Gould's monitor (*V. gouldii*)), yellow-spotted monitor (*V. panoptes*) and perentie (*V. giganteus*) as well as the vulnerable gilled slender blue-tongue skink (*Cyclodomorphus branchialis*). Reptiles also occur around wetland areas. The flat-shelled turtle (*Chelodina steindachneri*), recorded at Barnabinmah Conservation Park, is well adapted to the arid climate and aestivates in the ground during the dry periods, sometimes for long periods and comes to the surface after heavy rain (Wilson and Swan, 2010). This species is close to the southern limit of its known range in Western Australia.

A wide variety of birds have been recorded in the Badimia parks and reserves (Desmond et al., 2001). Waterbirds frequent the salt lakes when they intermittently fill after heavy rains, and some are known to breed at Thundelarra Lignum Swamp (Environment Australia, 2001), including:

- blue-billed duck (*Oxyura australis*) (P4)
- freckled duck (*Stictonetta naevosa*)
- hoary-headed grebe (*Poliocephalus poliocephalus*)
- pink-eared duck (*Malacorhynchus membranaceus*)
- Eurasian coot (*Fulica atra*)
- whiskered tern (*Chlidonias hybrida*)
- red-kneed dotterel (*Erythrogonys cinctus*)
- little grassbird (*Megalurus gramineus*)

Fauna and fauna communities of conservation significance

Four threatened and one priority species have been recorded in the Badimia parks and reserves (Appendix E). Recovery plans are in place for two of these species: meelyu (western spiny-tailed skink) and wabarl (malleefowl (*Leipoa ocellata*)).

The endangered Australian painted snipe (*Rostratula australis*) was recorded as a single opportunistic sighting at Thundelarra Lignum Swamp. This species occurs in shallow freshwater wetlands where dominant lignum species provide important habitat. Future surveys at suitable wetlands within the Badimia parks and reserves may result in further records of the Australian painted snipe.

The endangered Lake Goorly shield-backed trapdoor spider (*Idiosoma kopejkaorum*) is a short-range endemic species recorded at Biluny Wells Nature Reserve. This species occurs in a very small area and is at risk from mining and minerals resource development. Females of this species can live up to and beyond 20 years, and burrows have a 'moustache-like' arrangement of twig-lines (Rix et al., 2018). Known burrows are located close to and within a road reserve, and these require monitoring and protection from works such as road maintenance and wadyan (fire) management.

There has been limited species-specific surveys on trapdoor spiders, and there is potential for more individuals to be located within the planning area as well as additional species, based on pending taxonomic work.

Lake Goorly shield-backed trapdoor spider (*Idiosoma kopejkaorum*). *Photo – Mark Harvey*

Nest of the Lake Goorly shield-backed trapdoor spider. *Photo – Mark Harvey*

The vulnerable meelyu (western spiny-tailed skink) occurs in Thundelarra Conservation Park, and suitable habitat has also been identified within Barnabinmah Conservation Park (DBCA, 2017). This species occurs in open eucalypt woodlands and Acacia-dominated shrublands, sheltering in logs, in cavities in the trunks and branches of shrubs, and among ruins, especially accumulations of old corrugated iron (Pearson, 2012). Firewood collection is a particular threat to this species in the planning area, along with impacts to its wider habitat such as feral herbivores, altered (discontinued) wadyan (fire) regimes, clearing for mining activities and hydrological change. Poaching for the illicit pet trade may have occurred in the past, and the removal of alternative refugia such as rubbish piles, and disused pastoral buildings and infrastructure are also likely to have impacted this species (Pearson, 2012).

The meelyu (western spiny-tailed skink (*Egernia stokesii badia*)) is a culturally important species to Badimia Traditional Owners and is also a threatened species. *Photo – Holly Bradley.*

The Meelyu story

"My Dad told me this story back when we were young and he was talking about what we call meelyu, it's a western spiny-tailed skink, that's what people know it as. Dad and his cousin, they happened to get hold of one and they were thinking about cooking it and eating it and, I don't know whether they were playing with it, but they lit a fire and, somehow, they got caught out and Nanna happened to catch them. I don't know whether they actually cooked the lizard or not, but he reckons it was the biggest flogging he ever got from Nanna, and afterwards, well when she caught them she said 'you can't eat them, don't you ever think about eating one of them or hurting one, or killing one, because they're like a pet to us'. And that's why he said – 'whenever you see one in the bush always make sure you don't hurt him, kill him or anything like that. You got to look after him because he is like a pet to us'. So that's sort of like a totem to us. And as far I know he hasn't ever tried to eat one since, but that's the story about the meelyu. There are two different types, but they are both a part of the Badimia culture."

Badimia Elder Darryl Fogarty

The wabarl (malleefowl) occurs within Barnabinmah, Thundelarra and Gurdurdu conservation parks, Biluny Wells Nature Reserve and surrounding areas. Wabarl are predominantly ground-dwelling birds that rarely fly unless alarmed, although they roost in trees at night to escape predators. This well camouflaged and hard to spot species is the only mound-building bird in Western Australia, and one of only three in Australia (DBCA, 2016). The mounds are used to enable the ambient temperature of the surrounds to incubate eggs. Key strategies that will benefit this species in the Badimia parks and reserves are reducing predation, preventing vegetation decline, ensuring wadyan (fire) management is appropriate and improved monitoring (Benshemesh, 2007).

A wabarl (malleefowl (*Leipoa ocellata*)) pictured in Kalbarri National Park. *Photo – DBCA*

Wabarl mound on Badimia barna. *Photo – Lance King/DBCA*

The vulnerable gilled slender blue-tongue skink has been recorded in locations close to (but outside) the boundaries of reserves in the south and west of the planning area. Given the limited fauna surveys conducted in the area, this species is considered as a likely occurrence.

The blue-billed duck (priority 4) has been recorded in Thundelarra Conservation Park, and Gurdurdu Conservation Park contains a record of the specially protected peregrine falcon (*Falco peregrinus*) and the migratory gull-billed tern (*Gelochelidon nilotica*). Although outside the planning area, the broader part of Lake Moore as well as parts of Lake Austin and Mongers Lake, all support other migratory species when they fill after heavy rain (Appendix E). These birds are highly mobile, so are considered as likely occasional occurrences within the Badimia parks and reserves where these salt lake systems occur.

Australia is a signatory to bilateral agreements with China (China–Australia Migratory Bird Agreement; CAMBA), Japan (Japan–Australia Migratory Bird Agreement; JAMBA) and the Republic of Korea (Republic of Korea–Australia Migratory Bird Agreement; ROKAMBA) to provide a collaborative framework for the protection of habitats of migratory birds within the East Asian–Australasian Flyway.

There is a historical record of the lesser stick-nest rat (*Leporillus apicalis*) from Barnabinmah Conservation Park though this species is now extinct within Western Australia. There are also numerous examples of old nests of this species throughout Badimia barna located within rocky breakaways. Recent re-introductions of the closely related greater stick-nest rat (*Leporillus conditor*) have recently been undertaken at the nearby Mount Gibson Sanctuary (Leue, 2018).

Gurdurdu Conservation Park contains a portion of the priority 1 ecological community Maranalgo west calcrete assemblage type on Moore Palaeodrainage on Maranalgo Station (Appendix E). It is a unique assemblage of invertebrates that has been identified in the groundwater calcretes and is threatened by hydrological changes associated with mining.

Management objective: To identify, protect and conserve flora, fauna, ecological communities and habitats, particularly those of cultural or conservation significance.

Management strategies

1. Identify knowledge gaps and undertake or support surveys of flora, fauna and ecological communities across the Badimia parks and reserves to develop baseline information for management; confirm the presence or range of species and communities of conservation significance; and for monitoring purposes.
2. Evaluate the potential for re-introduction and translocation of fauna and flora species in the planning area as required.
3. Contribute to the development, review and implementation of recovery plans for threatened and priority flora and fauna and manage populations of, and threats to, species that do not yet have recovery plans in place; including (but not limited to) the following:
    a) Identify and map suitable habitat for meelyu (western spiny-tailed skink), wabarl (malleefowl) and Lake Goorly shield-backed trapdoor spider; undertake surveys to identify occurrences and monitor populations of these species, including visitor impacts on individual populations and habitat.
    b) Ensure firewood is not collected from identified meelyu habitat in the planning area.
    c) Undertake, or refer to existing, pre-disturbance surveys of the Lake Goorly shield-backed trapdoor spider prior to any proposed works within the Biluny Wells Nature Reserve (including for prescribed burning and utilities/services) and encourage neighbouring land managers to follow the same process.
    d) Identify and map the extent and condition of the PECs within the planning area.
4. Identify and rehabilitate priority areas of degraded habitat.
5. Monitor the condition of vegetation at selected sites within the planning area and, where possible, identify factors leading to declines in vegetation condition.

6. Identify priority locations where altered hydrology is damaging landscape and vegetation in the planning area; plan for and implement actions to restore the surface water balance at these locations.
7. Continue to support efforts to regenerate and protect culturally significant flora such as walarda (sandalwood), marun (quandong), gaya/kiya (desert kurrajong (*Brachychiton gregorii*)), medicine bush and fauna across the Badimia parks and reserves (see *Traditional knowledge and culturally significant flora and fauna*).
8. Manage barriers to fauna movement (such as removal of old pastoral fences) and fauna welfare.

Key performance indicators

Performance measure	Target	Reporting
Changes in quality and extent of vegetation impacted by visitor activities, with a focus on meelyu habitat	No visitor-induced decrease in the extent or quality of vegetation cover at selected wagu (camping) or day use areas over the life of the plan	Every 3 years
Knowledge of PECs	PEC boundaries are mapped, condition is monitored and major threats are identified	End of 2025
Adequate biological survey of the Badimia parks and reserves	Baseline biological surveys have commenced in each park and reserve in the planning area	Within 5 years
	Priority biological surveys are identified and commenced	
Efforts to restore a natural surface water flow at priority locations	Surface water restoration processes are progressed at selected priority locations	Every five years

Introduced species

Feral herbivores

Parts of the Badimia parks and reserves were grazed by dyiibu (sheep) for over 100 years from the late 1800s to between 1995 and 2007, when destocking was undertaken following purchase of the pastoral stations for conservation purposes. Goats that were introduced to the wider rangelands area became naturalised and caused significant grazing damage across Badimia barna, including within the Badimia parks and reserves. These combined pressures resulted in reduced vegetation condition; altered ecology; soil erosion and fouling of water resources (DBCA, 2020).

While control of goats has been undertaken using exclusion fencing at Barnabinmah Conservation Park and is supported with partial fencing across the broader planning area, goats are still present on lands surrounding the Badimia parks and reserves, attracted to water sources including those associated with mining activities or pastoralism. Long-term management for goats is required as their populations increase when control measures are relaxed. Fencing in particular, requires ongoing maintenance where it exists (DBCA, 2020).

A goat-proof fence in Barnabinmah Conservation Park. *Photo – Greg Kitson/DBCA*

Rabbits are also present in the Badimia parks and reserves and occasionally escaped bulugu (cattle), brumbies (*Equus caballus*) (near Thundelarra) and camels (*Camelus dromedarius*) have been sighted too. At Gagarlagu Nature Reserve the presence of feral herbivores is unknown.

Feral predators

Feral budyi (cats) and bagudyi (foxes) have had a particularly severe impact on critical weight range fauna in the mid-west and south-west of Australia (Warburton, 2014), resulting in widespread loss of many species from these areas. More than 50 percent of the mammals that originally occurred in the Yalgoo region are now regionally extinct, and for the Murchison region this figure is more than 40 percent (McKenzie et al., 2002).

Anecdotally, feral budyi are common across the Badimia parks and reserves and may be at sufficiently high populations to make control very difficult unless multiple adjoining land managers and owners are dedicated to working together. Trials to evaluate the control of feral budyi are underway on the privately managed Charles Darwin Reserve and Mount Gibson Sanctuary, which both directly adjoin Biluny Wells Nature Reserve. Given the existing action on adjoining land areas, achieving a collaborative effort towards the control of feral budyi across wider tenure may be more achievable in the surrounding areas of this reserve than in the balance of the planning area, however effective control of feral budyi is likely to remain extremely challenging.

In 2019 feral budyi became a declared pest in Western Australia under the *Biosecurity and Agriculture Management Act 2007* (Biosecurity and Agriculture Management Act), though biosecurity groups are still resourced through farmers to undertake control of agricultural pests only. Bagudyi occasionally occur, though there has been limited monitoring. Feral budyi and bagudyi populations have been found to be lower in areas with higher numbers of ngubaanu (dingoes) (see *Ngubaanu (dingoes) and wild dogs*), although any targeted control program is likely to influence the balance of feral predator numbers.

Invasive weeds

In the Badimia parks and reserves, weeds are mainly concentrated around infrastructure such as roads, homesteads, watering points and mine sites (DBCA, 2020). Some species respond vigorously to the removal of grazing pressure and can outcompete recovering native vegetation. ruby dock (*Rumex vesicarius*) has invaded most roadside verges across the Badimia parks and reserves and is spread via road maintenance works, though control of this species is no longer considered to be feasible. Date Palm (*Phoenix dactylifera*) planted at the Thundelarra Homestead are valued by some as a historical reminder to early pastoral times, however they have spread into the adjacent creek system and are now impacting on natural surface water flows. Management of other weeds across the Badimia parks and reserves requires regular monitoring to identify new occurrences and establish control or maintenance programs.

The risk of weeds spreading into and throughout the Biluny Wells Nature Reserve is heightened due to the presence of informal wagu (camping) grounds and the Great Northern Highway, where invasive plant species are already present along margins. Maintenance of powerlines that dissect the reserve is also a potential source of weed incursion if appropriate hygiene measures are not utilised.

Management objective: To minimise the impact of introduced animals and weeds on natural, cultural, recreation and tourism values.

Management strategies

1. Where practicable, and as required, collaborate with neighbouring landholders and non-government organisations to undertake coordinated control of introduced herbivores, predators and/or weeds and evaluate the effectiveness of management.
2. Monitor the condition of boundary fences and consider additions where there are high conservation values to reduce the incidence of feral herbivores and stray stock (see *Pastoralism*) entering the planning area.
3. Identify priority weeds and monitor for new occurrences.
4. Implement and promote hygiene practices within the Badimia parks and reserves to prevent new introductions and spread of weeds and disease.

Key performance indicators

Performance measure	Target	Reporting
Feral herbivore populations	Baseline surveys of feral herbivores are undertaken	Within 5 years
Feral herbivore abundance	Feral herbivore numbers do not increase over the life of the plan	After 10 years
Goat numbers at Barnabinmah Conservation Park	Barnabinmah Conservation Park remains low in goat numbers and fences are maintained to prevent incursions	Every 3 years
Mapping of weeds	A systematic and strategic weed mapping program is initiated and is active over the life of the plan	Within 1 year and then annually

Wadyan (fire)

Wadyan is an important natural component of ecosystem function and is one of several factors that influences biodiversity and ecosystem health, function and condition. However, large and intense bushfires are a potential threat to biodiversity, life, property such as homesteads, cultural and historical sites as well as natural values. Effective wadyan management relies on an integrated cross boundary management approach between all landholders and managers of Badimia barna.

Wadyan ecology

The department is working to improve the understanding of wadyan behaviour within each of the Badimia parks and reserves, and what will burn under which conditions. For example, mulga-dominated vegetation usually occurs as a sparse shrub layer within broad expanses of spinifex grasslands. It is fire-sensitive, can be long-lived and requires 5-15 years after germination to set viable walgaly/gara (seed). Contrastingly, sandplain spinifex is more fire-prone. In reserves such as Gagarlagu Nature Reserve where both vegetation types occur, careful wadyan management is required to prevent spinifex taking over mulga where edge effects may occur from frequent or intense wadyan. Inappropriate wadyan regimes are a risk given limited knowledge of wadyan ecology and this knowledge needs to be developed over time with further research.

Recent wadyan history

The area covered by the Badimia parks and reserves does not have a complete and detailed history of wadyan. However, wadyan in the area are mostly infrequent, started by lightning, and managed remotely through satellite detection or observed by field staff. Wadyan are often more frequent and larger in size in years following higher than average summer and winter rainfall.

There are no records of large bushfires within the Badimia parks and reserves in recent years and no prescribed burning has been carried out to date. Some burning has been used on the Australian Wildlife Conservancy's Mt Gibson property to the south of the planning area to assist regeneration of threatened flora populations.

Wadyan and flora/fauna

Sensitive species and communities that are typically associated with less flammable parts of the planning area such as wetlands, granite outcrops and woodlands, can be vulnerable to long term loss of species diversity, vegetation structure and habitat value because of inappropriate wadyan regimes. It is particularly important to protect threatened species and ecological communities from bushfires and, where appropriate, use planned wadyan to maintain habitat quality for threatened fauna and regenerate threatened flora.

The meelyu (western spiny-tailed skink) may be impacted by altered wadyan regimes since the long-term exclusion of wadyan may inhibit the germination of some flora species that contribute to forming some of its habitat in the form of hollow logs (Yates et al., 1994 cited in Pearson, 2012). In contrast, the wabarl (malleefowl) needs dense shrub with an abundance of *Acacia* species and leaf and twig litter for nest mound building (Benshemesh, 2007). This requires long unburnt areas, though complete absence of wadyan, is also undesirable since aging *Acacia* shrublands become less suitable for wabarl as understorey and litter cover peak 25 to 30 years post-fire and then decline (Parsons and Gosper, 2011). Lake Goorly shield-backed trapdoor spiders also require leaves and twigs for their burrows and to support their litter-dependent invertebrate food source (Avon Catchment Council, 2007), so is similarly impacted by wadyan.

Wadyan management

Priorities for wadyan management are dependent on adjacent values and associated risks to life, property, environment and cultural heritage. Wadyan in the Badimia parks and reserves is generally infrequent, started by lightning and remotely managed. Further research into the role of wadyan and its impacts on rangeland ecosystems will underpin the refinement of wadyan management approaches.

Biluny Wells Nature Reserve is dissected by the Great Northern Highway, which is a major communications and arterial travel route through the region. The bushfire risk posed to this critical infrastructure may require some risk reduction activities to be undertaken such as prescribed burning to reduce adjacent fuels. The 'Eucalypt woodlands of the Western Australian Wheatbelt' PEC and the endangered Lake Goorly shield-backed trapdoor spider will be important considerations in determining wadyan management for this reserve. In general, wadyan in the sandplain flora communities is more frequent and larger. This may require more intensive wadyan management in the sandplain flora communities and would ideally aim for different fuel ages, wadyan frequency and wadyan intensity.

The balance of the planning area is classified as 'remote' from a wadyan management perspective, therefore prescribed burns will not likely be undertaken for bushfire risk management purposes. These could be undertaken for other reasons, such as for cultural or ecological purposes.

Owing to past displacement of Badimia people from barna, there is now very limited knowledge and understanding of the ways in which Badimia people undertook cultural burning in the landscape, thus limiting opportunities for the integration of traditional wadyan management into current practices.

Future wadyan management programs will need to be based on a careful assessment of key values that are vulnerable to wadyan in the Badimia parks and reserves and would initially concentrate on strategic access, water points and protection burning.

Management objective: To protect and conserve key assets and values of the Badimia parks and reserves, as well as neighbouring lands, from bushfires while addressing the key management issue of altered wadyan regimes.

Management strategies

1. Develop an adaptive wadyan management framework, consistent with legislation, policies, guidelines and relevant recovery plans and which adequately integrates traditional and scientific wadyan knowledge and techniques.
2. Using established monitoring sites, investigate wadyan ecology interactions and requirements, including post-fire weed control where applicable.
3. Undertake wadyan management that protects infrastructure and significant places of culture and heritage and supports the known ecological wadyan requirements of species, communities and habitats.
4. Identify and maintain strategic wadyan access tracks within the Badimia parks and reserves.
5. Discuss planned wadyan management with the JMB and identify options to minimise or avoid impacts on values of the Badimia parks and reserves.

People on Barna (tourism, recreation and community on Country)

Strategic Objective

Promote visitor appreciation of the remote landscape, natural, cultural and heritage values of Badimia parks and reserves by supporting and enhancing compatible recreation and tourism experiences within them.

Visitor planning and management

Visitor experience and numbers

Visitors are attracted to the Badimia parks and reserves for two and four-wheel drive touring and remote area wagu (camping); bushwalking; wildflower, bird and nature viewing; exploring relics of historical pastoral and mining industries, appreciation of key geological features (lakes, gorges, breakaways); and (previously) prospecting/fossicking. The experience of visitors to this area is one of wilderness and of outback remote wagu and recreation typified by relative freedom from the constraints of formalised areas. This experience is considered typical of the Murchison region and anecdotally, is particularly valued by existing visitors. Many visitors are en-route to other destinations that are more widely known (Clegg pers comm, 2021). The area has been identified as a strategic node suitable for increased future tourism in the Midwest (Evolve Solutions, 2014) and has potential to benefit surrounding communities through increased economic opportunities.

Visitation to Badimia parks and reserves has been low over the past few years (Figure 2), owing to a low (but growing) public awareness of the area, and is mainly concentrated at Thundelarra Conservation Park. There are significant opportunities to increase visitor numbers to the area, particularly given the area's rich wildflower displays in spring and the diversity of ephemeral flora combined with a proximity to Perth.

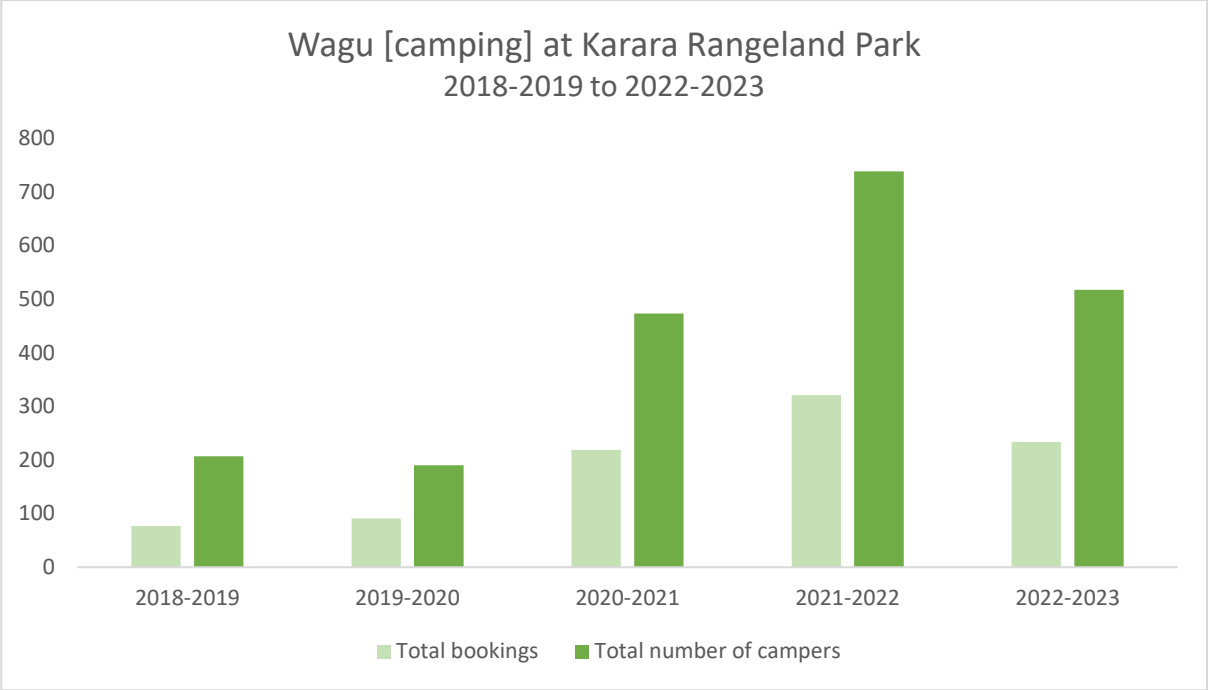


Figure 2: Wagu (camping) visitation to Karara Rangeland Park[7]

Reliable data regarding visitor numbers and use patterns that are specific to the Badimia parks and reserves are limited. The number of campers staying at Karara Rangeland Park (Figure 2) has generally increased in recent years and can be used as a proxy to indicate the level of visitation to Thundelarra Conservation Park. In recent times there have been more people choosing to stay for longer than two nights, implying that as awareness of the area is growing, it is starting to be used for more than just an overnight resting point. From March 2020, there was a sharp increase in visitation to Karara Rangeland Park likely associated with COVID 19 border restrictions leading to a higher demand for intrastate wagu and promotion of the park in travel magazines. The State border reopened to interstate and international visitors in March 2022. Visitation to Lakeside National Park, Lakeside, Barnabinmah and Gurdurdu conservation parks and Gagarlagu Nature Reserve is likely to be very low, though has not been measured to date. Collection of baseline and ongoing visitation data for the wider planning area will help focus management response to changes in visitation over time.

Historically, informal wagu has also occurred at three locations within Biluny Wells Nature Reserve. One of these occupies a large area adjoining the Great Northern Highway that is a popular overnight stop for travellers, though no formal data regarding visitor numbers has been collected to date. While wagu is not usually permitted within nature reserves (except for customary activities), it can be facilitated for the broader community through this management plan providing that appropriate recreational planning and management of impacts occurs over time.

Facilities

There are very few facilities for visitors or management staff in the Badimia parks and reserves and visitors need to be self-sufficient, with ample supplies of their own water, food, firewood, and fuel as well as removing all their own rubbish.

[7] Campsite booking data has been extracted from DBCA's online booking system *ParkStay* and is the property of the Department of Biodiversity, Conservation and Attractions. Figures do not represent total use.

Investment in facilities and rangers has commenced with a draft Recreation Master Plan developed for the Karara Rangeland Park (covers Barnabinmah and Thundelarra conservation parks) including an accommodation precinct and operations base for departmental staff, proposed to be developed in Thundelarra Conservation Park, approximately 1km west of the homestead precinct. The establishment of wagu grounds, entry points, information bays, four-wheel drive trails, navigational signage is also included in the Recreation Master Plan. The potential need for operational infrastructure to be established in other reserves will be considered during the life of this joint management plan.

The Thundelarra Shearers' Quarters and shared kitchen have been refurbished as accommodation and are available for use by the public, community education groups, departmental staff and researchers. These upgraded facilities, combined with enhanced interpretation and promotion, are expected to increase visitation; improve public awareness of important values and facilitate future research opportunities. Toilets are likely to be needed in wagu grounds and day use sites in the future as visitation increases. An improved management presence will also aid in managing undesirable visitor activities, which in the past has included illegal shooting and hunting; vandalism; rubbish dumping; and unmanaged four-wheel drive activities.

A shed remains at Lakeside National Park which is still occasionally used as basic shelter by campers. The rest area at Biluny Wells Nature Reserve has picnic tables, campfire pits and basic signage. This area is used by overnight travellers but has been encroaching into the nature reserve (previously unallocated Crown land) over a long period of time. There are no existing visitor or management facilities available at Lakeside and Gurdurdu conservation parks or Gagarlagu Nature Reserve.

Access

Access to and within the Badimia parks and reserves is primarily by car on dedicated (or gazetted) public roads, which are separate Crown land road reserves managed by either Main Roads Western Australia or relevant local government authorities. Biluny Wells Nature Reserve is dissected by the Great Northern Highway, so has the best sealed road access of all the Badimia parks and reserves. The Yalgoo – Ninghan Road, which is sealed in some sections, provides the arterial access for Thundelarra Conservation Park via Paynes Find – Thundelarra Road, and to Barnabinmah Conservation Park via Burnerbinmah – Nalbarra Road (both unsealed). All other roads that provide access into and around the planning area are unsealed including a well-maintained local government road used to access Lakeside National Park and Lakeside Conservation Park. Direct access to Gurdurdu Conservation Park and Gagarlagu Nature Reserve is via tracks passing through neighbouring pastoral stations. Long-term future access arrangements to these areas will need to be negotiated with surrounding pastoral leaseholders during the early phase of implementing this plan.

Unsealed roads and tracks within the Badimia parks and reserves that are managed by the department are generally two-wheel drive accessible, but conditions can vary with weather and may require a four-wheel drive. The Miner's Pathway traverses Badimia barna (see *Self-drive trails*), passing through, and alongside, parts of the Badimia parks and reserves while other roads and tracks provide access for visitors to specific features and sites. Many tracks provide access that is important for management.

The creation, use and maintenance of roads and tracks in the Badimia parks and reserves have potential to impact on natural, cultural and heritage values through erosion, disturbance to the surface hydrology and physical disturbance. Departing from defined roads and tracks can cause soil compaction, damage vegetation, spread diseases and weeds and damage sites of cultural importance. Some ecologically sensitive areas include granite outcrops and wetlands, where vehicle tracks can cause severe damage and long-lasting visual impacts. There are some parts of the planning area that require adherence to cultural access protocols to ensure cultural safety and respect as well as protection of cultural places.

Better definition and control of access is needed where tracks are unsuitable or have potential to create adverse impacts. This may include restricted access for the general public where cultural values are highly sensitive to, or inappropriate for, general visitation.

Normal road rules apply to all vehicles entering the Badimia parks and reserves including that all vehicles must be registered/licensed under the *Road Traffic Act 1974* and all drivers must possess a current driver's licence. Unlicensed, unauthorised and 'off-road vehicles' (including off-road trail bikes) as defined under the *Control of Vehicles (Off-road Areas) Act 1978* are not permitted on CALM Act lands.

Safety

Natural destinations, remote locations and old infrastructure can pose hazards to visitors and these must be carefully managed. The Badimia parks and reserves are all located in an arid and remote environment where no drinking water is available for visitors. There are many unsealed roads that may become slippery and boggy in wet conditions, and in some cases inaccessible. Access is complex and when roads are closed due to wet conditions campers can become isolated. There are challenges in communicating with visitors within the Badimia parks and reserves in an emergency (such as a bushfire) due to limited mobile phone range and a historic pattern of informal use. As a result of the combination of these issues, there is a heightened need to ensure that visitors are adequately prepared to ensure their own safety.

Unsealed roads within the Badimia parks and reserves can be unsuitable for driving in wet conditions. Thundelarra Homestead precinct.
Photo – Michelle Rumball/DBCA

While mining heritage provides a point of interest to visitors, the long historical association with mining also creates a unique safety issue. There are numerous (possibly hundreds) disused mine shafts throughout Thundelarra Conservation Park (and adjacent unallocated Crown land) that present significant safety hazards. In locations close to amenities, such as wagu (camp) grounds and walk trails, open mine shafts are progressively being sign posted and/or closed in accordance with the established visitor risk management plan, though it is not possible to ensure all open shafts within the planning area are closed, or even located/mapped. Those that remain open pose a risk to people traversing remote parts of the Badimia parks and reserves.

Abandoned mine shafts exist throughout the Badimia parks and reserves.
Photo – Michelle Rumball/DBCA

Visitor information, education and interpretation

Visitor information and culturally appropriate interpretation helps to enhance visitor experience and safety. Given the significant preparation required for visits to remote areas such as the Badimia parks and reserves, pre-visit safety information forms an important part of communication to visitors. This can be provided online (the department's *Explore Parks WA* website) or via printed material.

There is significant opportunity to provide interpretive information on-site, digitally or via printed material, highlighting the unique cultural, historical, natural and landscape values of the Badimia parks and reserves. The development of an interpretation plan prior to implementation can ensure that Badimia Traditional Owners determine the content of cultural information shared to the public.

Visitor activities

Day use

Day use sites within the Badimia parks and reserves provide opportunities for nature appreciation (such as viewing wildflowers and wetlands); taking in scenery from lookouts; discovering outback gabi dhaa (rock holes) and landforms; as well as learning about Badimia cultural heritage, the pastoral history and the walarda (sandalwood) and mining industries. Some parts of the planning area have had a long history of particular use, and in some cases, these uses may not be compatible with preservation of the values over time or are no longer permissible under the new tenure (see *Prospecting and fossicking*).

Day use facilities such as picnic areas and walking/cycling tracks are gradually being added within the Barnabinmah and Thundelarra conservation parks and are planned for via a wider recreation master plan. Additional interpretation will also add value to these facilities.

Some locations within the planning area may be suitable for guided cultural tours, and these may help to ensure that Badimia cultural heritage values are protected and respected, while also providing employment opportunities (see *Commercial operations*).

Remote wagu (camping) and caravanning

Thundelarra Conservation Park

Wagu is available in Thundelarra Conservation Park at Meelyu (formerly Meleya) Camp (refer Map 3). Groups of up to 20 people can also be accommodated in the old Shearers' Quarters at Thundelarra Homestead precinct, with advance bookings. The Shearers' Quarters has bedrooms, toilets, showers, and a basic kitchen and dining room for group purposes. Caravan and wagu facilities are also being planned near the Thundelarra Homestead precinct, and other remote wagu areas may be identified during the life of this plan.

The intent in managing future wagu at Thundelarra Conservation Park is to retain the remote, natural experience of 'open' wagu, but minimise the impacts on natural, cultural and heritage values of the area.

Low-impact wagu will continue to be permitted in designated parts of Thundelarra Conservation Park for small numbers of campers, subject to:

- a booking system
- campers being self-sufficient and adopting ‘leave no trace’ principles (removing all toilet waste and rubbish)
- no collection of firewood
- no disturbance of wildlife, biodiversity, cultural or heritage values
- monitoring of the impacts of wagu and making changes to management based on monitoring outcomes.

Meelyu (formerly Meleya) Camp, Thundelarra Conservation Park. *Photo – Nick Detchon/DBCA*

Biluny Wells Nature Reserve

There is an existing rest area at Biluny Wells Nature Reserve that falls partially on the road reserve of Great Northern Highway (managed by Main Roads Western Australia) and partially within the nature reserve. It is often used as an overnight stop by travellers and has several campfire pits, rubbish bins, picnic tables and a fenced well. Future management of this area requires planning as well as liaison with Main Roads Western Australia.

A fenced dam within the Biluny Wells rest area and informal wagu (camp) ground. *Photo – Kirrily Hastings/DBCA*

Wagu elsewhere in the Badimia parks and reserves

Informal wagu has occurred in the past at Lakeside National Park and an old shed that is sometimes used as basic shelter by campers remains the only built structure in the park. An evaluation of the need for wagu facilities and appropriate levels of management for campers needs to be undertaken for this area.

Wagu facilities are not available, and are not planned to be provided, at Lakeside, Barnabinmah and Gurdurdu conservation parks or Gagarlagu Nature Reserve.

Campfires

Campfires are permitted from April to October, except where the fire danger rating (FDR) is 'High' or above. Firewood must be brought into the Badimia parks and reserves by visitors and used appropriately in portable fire pits or formal campfire rings where provided. Collection of firewood within the Badimia parks and reserves is not permitted. In the past, collection of firewood has damaged the condition of vegetation near wagu sites in Thundelarra Conservation Park and is particularly detrimental to the meelyu (western spiny-tailed skink). Where specifically identified, small ground fires may be permitted in designated remote camping areas.

Prospecting and fossicking

Prospecting and fossicking are not permitted within the Badimia parks and reserves as the Miner's Right permit issued in Western Australia does not authorise these uses on land reserved for conservation. This activity has been popular on adjacent unallocated Crown land, and within the planning area prior to tenure change. Ensuring that maps of the Badimia parks and reserves are easily available will help park users to understand where this activity can be legally undertaken nearby. Exploration activities undertaken as part of a live mining exploration tenement is covered under *Minerals exploration and development*.

Domestic animals

As domestic animals (dogs and cats) may impact on wildlife, they are generally not allowed in national parks or conservation parks aside from in a designated area and are never permitted in nature reserves. Approved assistance dogs (guide dogs) and specially trained dogs for search and rescue operations, security or educational purposes or feral animal control are the exception.

Domestic animals have potential to impact on key values in the Badimia parks and reserves, particularly wildlife such as breeding waterbirds and other small fauna. In addition, baits used to control ngubaanu (dingoes) and wild dogs present a significant risk to the safety of domestic animals. For these reasons domestic animals (aside from the above exceptions) will not be permitted in the Badimia parks and reserves.

Self-drive trails

Approximately 500km of the Miner's Pathway outback trail traverses Badimia barna passing through the small community of Paynes Find and the towns of Yalgoo (via Thundelarra Conservation Park), Mount Magnet and Cue. The trail continues north to Meekatharra and to Sandstone in the east. There are 23 interpretive sites across this trail associated with outback towns, historic mining and infrastructure, cemeteries, museums, lookouts, greenstone belts and other geographic features (Mitchell, 2006).

Visitors are attracted to the Badimia parks and reserves during the wildflower season. *Photo – Nick Detchon/DBCA*

Horseriding

Horseriding is not undertaken in the Badimia parks and reserves, though there have been recent approaches by horseriding groups to access department-managed land for this purpose. An evaluation of the level of demand, risks and likely benefits of allowing this use in the planning area is needed and can be undertaken during the implementation phase of this plan.

Shooting of wildlife

Unless undertaken as part of customary activities or otherwise authorised under the CALM Act and approved by the JMB, shooting of wildlife is not permitted in the Badimia parks and reserves (see *Using flora and fauna*).

Waste management

Visitation to the recreation sites within the Badimia parks and reserves generates waste, including human waste. Inappropriate waste disposal from wagu (camping) grounds or day use sites can pollute the environment within and adjacent to the planning area. Visitors are asked to take their rubbish with them when they leave.

Management objective: To increase visitation, enhancing safe and culturally appropriate opportunities for visitors to experience, appreciate and understand the values of Badimia parks and reserves.

Management strategies

1. Through the JMB, continue to plan for, develop and/or upgrade visitor destinations within the Badimia parks and reserves, including day use, wagu (camping) and recreation facilities, at appropriate locations while ensuring these do not have unacceptable impacts on natural, cultural and heritage values.
2. Work with local government authorities and other key tourism stakeholder groups to further identify, develop and promote travel routes and drive trails that incorporate the Badimia parks and reserves.
3. Enhance visitor experience by developing and implementing an information and interpretation program that enriches visitor experience and develops an appreciation and understanding of cultural, natural and historical values and their protection, visitor safety and Leave No Trace principles.
4. Ensure that Badimia Traditional Owners have a primary and active role in communication about their cultural heritage.
5. Collect visitor use data to improve planning for visitor management.
6. Continue to implement the visitor risk management plan that covers the Badimia parks and reserves.
7. Provide and maintain access for two and four-wheel drive vehicles to parts of the planning area.
8. Provide information to visitors about the access standards they are likely to encounter in the Badimia parks and reserves and who to contact regarding potential seasonal road closures.
9. Identify locations and inform visitors where cultural access protocols apply.
10. Identify locations where it may be appropriate to manage or restrict public access to protect culturally and/or ecologically sensitive places.
11. Where necessary, temporarily, permanently or seasonally close roads and tracks and/or restrict access to the wider public (while allowing access for traditional owners) subject to approval by the district manager and appropriate signage, provision of information and conditions of usage.
12. Negotiate long term access arrangements for Gagarlagu Nature Reserve and Gurdurdu Conservation Park.
13. Promote and manage suitable visitor activities within the Badimia parks and reserves including:
    - wagu
    - drive trails
    - cultural experiences
    - nature and landscape appreciation
    - walk trails
    - cycling.
14. Subject to demand, evaluate and support other opportunities for recreation and tourism consistent with the protection of cultural, heritage and natural values.
15. Allow overnight wagu at designated areas within conservation parks and/or national parks in the planning area consistent with department policy and guidelines.
16. Subject to relevant Shire prohibited burning periods, allow campfires in designated campfire rings or portable above-ground fire containers. Ground fires may be permitted in designated remote camping areas.
17. Undertake recreational planning to rationalise and manage the existing informal wagu grounds at Biluny Wells Nature Reserve.
18. Monitor visitor activities and manage these to minimise impacts.
19. Prohibit domestic animals (dogs and cats) in the Badimia parks and reserves.
20. Prohibit private quad bikes and any other off-road vehicle use in the Badimia parks and reserves.
21. Prohibit recreational prospecting and fossicking in the Badimia parks and reserves, consistent with the *Mining Act 1978*.

Key performance indicators

Performance measure	Target	Reporting
Visitation in the Badimia parks and reserves	An overall increase in visitation to the Badimia parks and reserves	Every two years
Level of Badimia Traditional Owner satisfaction of public access management to sensitive cultural sites	Badimia Traditional Owners (through the JMB) are satisfied that an appropriate process is in place and adequate consultation is occurring to manage public access to culturally sensitive sites	Annually

Commercial operations

Licensed commercial operators can provide a range of activities and opportunities for visitors including general sightseeing, cultural, heritage and nature-based tours. With approval from the JMB, the department may also grant leases for the purpose of providing appropriate facilities and services for visitor use and enjoyment. There are no existing licensed commercial operators or leases in the Badimia parks and reserves. Given the strong and growing interest in outback cultural tourism in Western Australia, there are significant opportunities for Badimia people to be involved in the development of commercial tourism operations that showcase the values of the Badimia parks and reserves. Such opportunities could provide additional employment enabling Badimia families to remain on barna.

Management objective: To promote commercial opportunities and activities that are compatible with cultural, heritage, natural and other recreation values of the Badimia parks and reserves.

Management strategies

1. Support commercial operators and particularly Badimia Traditional Owner enterprises that meet the objectives of protecting and conserving the natural, cultural and heritage values of the Badimia parks and reserves (for example, cultural heritage tours, language courses, passing on traditional knowledge and lore to the younger generations and nature-based tours).
2. Encourage commercial operators to maximise opportunities for business, partnerships, employment and training with Badimia Traditional Owners within the Badimia parks and reserves.
3. Through the JMB, manage commercial operations within the Badimia parks and reserves to ensure compliance with licence or lease conditions.

Community involvement and collaboration

Involving non-government organisations, education and research institutions and the wider community is integral to the development and implementation of this plan. It increases the capacity to undertake works programs, research and monitoring, and fosters communication links, sense of place and understanding within the community.

Management issues arising within the Badimia parks and reserves may also be influenced by land use activities beyond and adjoining the planning area boundary (see *Using Barna* chapter). The isolated nature of some of the parks and reserves makes them particularly vulnerable to altered landscape scale pressures involving hydrology, weeds, feral animals and wadyan (fire). Some of these pressures and their management may vary between the parks and reserves in response to differing adjoining land uses (for example see *Introduced species*). A coordinated and integrated approach with neighbouring land managers and other stakeholders is necessary for management to be effective.

Parts of the planning area that adjoin, or are in close proximity to, other lands managed for conservation (for example, Charles Darwin Reserve, Mount Gibson Sanctuary and Ninghan Indigenous Protected Area) have enhanced opportunity to achieve greater efficiencies with collaborative on-ground works, monitoring and interpretive programs. Adjoining pastoralists also have potential to contribute to shared outcomes through open communication and integrated land management practices.

The Badimia people have already established productive working relationships with a range of organisations and neighbouring land managers including Bush Heritage Australia, Australian Wildlife Conservancy, and Gunduwa Regional Conservation Association. Continuing to collaborate with these organisations has potential to improve future management across the broader landscape, supporting key cultural, heritage and conservation outcomes within the Badimia parks and reserves, while potentially generating increased employment opportunities for Badimia people on barna.

Management objective: To foster ongoing community and stakeholder collaboration and involvement in management of the Badimia parks and reserves.

Management strategies

1. Continue to support community involvement in management activities in the Badimia parks and reserves.
2. Liaise with local government authorities, adjoining land managers and pastoralists, non-government organisations and other stakeholders to facilitate complementary and collaborative management on adjoining lands and across the broader Badimia barna to help meet the objectives of this management plan.

Using Barna (resources on Country)

Strategic Objective

To minimise the impacts of using resources such as flora, fauna, water and minerals on the values of the Badimia parks and reserves.

Using flora and fauna

Taking flora and fauna, including for firewood, wildflower collection, hunting or for commercial purposes, is not permitted within the Badimia parks and reserves unless it is for customary purposes or otherwise authorised under the CALM Act and approved by the JMB. Subject to approval by the JMB, flora and fauna may be taken by Badimia Traditional Owners for the purposes of supporting commercial cultural tourism if these activities are undertaken in a manner consistent with protecting and conserving the value of the land to the culture and heritage of Aboriginal persons and does not have an adverse effect on the protection or conservation of the land's fauna and flora.

Firewood must be brought in by visitors and used appropriately (see *Campfires*).

The department administers an apiary authority system that allows professional and recreational apiarists to gain access to land managed by the department under the CALM Act and certain other Crown lands (unallocated Crown land and pastoral leases) for the purpose of beekeeping activities. Numerous apiary sites occur in the southern part of Badimia barna, including within Biluny Wells Nature Reserve. Apiary permits and licences are conditional and will be subject to review and ongoing approval from the JMB where they occur in the Badimia parks and reserves.
There is a need to protect the traditional knowledge and flora resources associated with bush tucker and bush medicine, particularly with the increasing demand for its use in biotechnology and genetic engineering, hospitality and health industries. Any use of traditional knowledge and/or flora resources (including genetic material) from the Badimia parks and reserves will require approval from the JMB, with a continuing sharing of benefits to the traditional knowledge holders.

Management objective: To protect flora and fauna resources and associated traditional knowledge within the Badimia parks and reserves.

Management strategies

1. Manage the taking of, and the public or commercial use of, flora and fauna in accordance with relevant legislation, policies and guidelines, JMB approvals and licensing/permit systems.
2. Prohibit harvesting of walarda (sandalwood) from the Badimia parks and reserves.
3. Ensure any use of traditional knowledge and/or flora resources (including genetic material) is only by JMB approval with continuing sharing of benefits with traditional owners.

Water resources

Water resource use is regulated under the *Rights in Water and Irrigation Act 1914* (Rights in Water and Irrigation Act), which is administered by the Department of Water and Environmental Regulation (DWER). There are no proclaimed surface water areas in the Badimia parks and reserves, which would require licensing for certain uses. Surface water resources are very limited, and any permanent soaks and pools are supported by groundwater. There are permanent waterways and pools in Thundelarra and Barnabinmah conservation parks with important natural, cultural, heritage and recreation/tourism values that have potential to be impacted by unsustainable groundwater extraction.

Under the Rights in Water and Irrigation Act, proponents are required to obtain a licence from the DWER to extract water from the East Murchison groundwater proclamation area, which covers the area of all Badimia parks and reserves except Biluny Wells Nature Reserve and the southern third of Gurdurdu Conservation Park. Allocation limits do not apply to the East Murchison area though conditions can cover measurement and monitoring responsibilities as well as ensuring environmental impacts are acceptable and downstream flows are maintained to meet ecological and social water requirements. Biluny Wells Nature Reserve and the southern third of Gurdurdu Conservation Park occur within the Karri groundwater area, which is not a proclaimed groundwater area. Groundwater in the Karri and East Murchison areas is variable in terms of supply and quality. The local aquifers that may be available in these areas are described as fractured rock, alluvium, calcrete, or paleochannel. If good quality water is found, usually the supply is limited.

Mining companies operating in the vicinity of the Badimia parks and reserves require access to water supplies for worker accommodation complexes; exploration, mining and processing activities; and dust suppression. Some companies have accessed external groundwater supplies that are piped to site while other companies source water supplies from bores in the immediate vicinity of their operations.

Local government authorities also use water resources during the maintenance of roads that cross or adjoin the planning area. Those seeking a groundwater licence for a large volume of water would be required to undertake investigations to understand the potential impacts of pumping.

Extraction of groundwater within or adjacent to the Badimia parks and reserves has potential for adverse effects on biodiversity values in groundwater-dependent ecosystems through the lowering of water tables. Artificial waters such as dams and troughs can attract pest herbivores such as goats, and can also allow kangaroo populations to reach unsustainable levels. Most artificial watering points in the planning area have been decommissioned for this reason.

Management objective: To ensure water resource use has minimal impact on values of the Badimia parks and reserves.

Management strategies

1. Liaise with, and/or provide advice to, the DWER (or equivalent), local government authorities, adjacent mining tenements and adjacent land managers regarding the minimisation of impacts of water extraction.
2. Identify potential water sources for management purposes.

Mineral exploration and development

There is a long history of mining on Badimia barna with the area being a focus of the 1890s gold rush of the Murchison area. The former Warriedar pastoral station and a large portion of the former Thundelarra pastoral station have been subject to extensive mining, exploration and prospecting in the past.

There are mining tenements across the Badimia parks and reserves, except for Gagarlagu Nature Reserve. Unfortunately, many of the mining tenements occupy areas that are rich in biodiversity values as well as prospectively, particularly where banded ironstone formations occur. Mining of these banded ironstone formations would result in severe impact or loss of unique communities and would be likely to put species at risk (DEC, 2007). Ensuring the impacts of exploration (or future mining) activities are assessed, managed and regulated is a key objective of this management plan.

The greenstone surrounding the Warriedar Fold Belt, outside of the planning area, has given rise to a number of significant mining operations for copper, lead, zinc, gold, silver and iron. Further resource discoveries in the area are being actively explored/developed over time. Some areas of unallocated Crown land adjacent to the Badimia parks and reserves remain under management of the department. Continued referral of resource use proposals in the adjacent areas is appropriate given the impacts of transport, services and water extraction have potential to impact on the Badimia parks and reserves.

Part of the former Warriedar pastoral station is listed on the Contaminated Sites Register, as awaiting classification. This area partially extends into the Thundelarra Conservation Park. The site was reported as a suspected contaminated site in 2007 given it is near a disused goldmine.

The possibility of soil contamination (metals and mercury) has been raised in the original referral document. Advice from DWER is that there are no plans to classify this site as it is regarded as a low priority.

Management objective: To minimise the impacts of mineral exploration and development on values of the Badimia parks and reserves.

Management strategies

1. Review and advise Government (including the Conservation and Parks Commission) on potential (and cumulative) impacts of resource development proposals and activities upon key values (including social surroundings) within the Badimia parks and reserves.
2. Liaise with Department of Energy, Mines, Industry Regulation and Safety (or equivalent) on their monitoring of existing exploration and/or development activities within and adjacent to the Badimia parks and reserves and request they take any necessary action where conditions are breached.
3. Make exploration or development proponents aware of their legal obligation to refer proposals for assessment under the EPBC Act.
4. Ensure that any use of basic raw materials minimises impacts on the values of the Badimia parks and reserves and is free of weeds, pest animals and diseases so these are not introduced to the planning area.
5. Assess, rehabilitate and monitor any contaminated sites that may be identified over the life of the plan.

Utilities and services

There are few utilities and services within the Badimia parks and reserves, and the absence of infrastructure and telecommunications contributes to the remote values and sense of place for these reserves. Powerlines dissect Biluny Wells Nature Reserve and provide power to the nearby Mount Gibson Mine (not currently operational). The Great Northern Highway also passes through this reserve, while other local government roads pass through Thundelarra, Barnabinmah and Lakeside conservation parks and Lakeside National Park.

The VHF radio network within the broader Karara Rangeland Park is currently under improvement to provide operational communications for park staff. Development of additional services and utilities within the Badimia parks and reserves will be considered with regard to potential impacts to values, including the sense of place; extent to which these impacts can be managed appropriately; and the extent to which additional services contribute to visitor experience and/or public safety and amenity.

Management objective: To minimise the impacts of utilities and services on values of the Badimia parks and reserves.

Management strategy

1. Through the JMB, contribute to planning, assessment and implementation of utilities and services proposals to ensure that impacts on the values of the Badimia parks and reserves are minimised; including ensuring departmental licence or lease arrangements with appropriate conditions are in place.

Pastoralism

Stray stock

The majority of the planning area directly adjoins pastoral stations that stock bulugu (cattle), though a few station operators have indicated an interest in returning to dyiibu (sheep) farming in the future. Boundary fencing is not complete around the entirety of the planning area and requires ongoing maintenance where it exists. Stray stock accessing the planning area can damage vegetation, much of which is still recovering from historical pastoral grazing impacts. Boundary fence management is discussed in *Introduced species – Feral herbivores*.

Ngubaanu (dingoes) and wild dogs

The ngubaanu is Australia's largest wild mammalian predator and retains a unique status in Australia as they are considered both a native animal and an invasive pest, particularly on pastoral properties. In this regard, wild dogs (that is ngubaanu, feral dogs and their hybrids) are declared pests for the whole of Western Australia under section 22 of the Biosecurity and Agriculture Management Act and accordingly are managed by DPIRD. Ngubaanu are also recognised as a native species under the Biodiversity Conservation Act; however, an exemption is in place so that no licence is required to take them as part of pest control activities for agricultural protection purposes.

The ngubaanu holds special cultural significance to the Badimia people. Recent genetic research indicates that ngubaanu hybridisation with feral dogs in Western Australia is significantly lower than previously thought (Cairns, et al., 2022) and it is therefore important to acknowledge that control activities are almost certainly targeting ngubaanu as opposed to feral dogs and hybrids. There is some evidence that ngubaanu contribute to suppressing or displacing feral budyi (cats) and bagudyi (foxes) (Johnson, 2006; Claridge and Hunt, 2008; Kennedy et al., 2012) as well as being effective in controlling the densities of goat and kangaroo populations in the rangelands (Caughley et al., 1980).

Management of wild dogs within the Badimia parks and reserves will need to balance the cultural importance of ngubaanu to Badimia people and their beneficial ecological function as predators with the need to support protection of livestock in neighbouring pastoral operations from wild dogs. There is concern about the non-selective nature of baiting and trapping techniques as well as the potential for secondary poisoning to Badimia people when undertaking customary hunting activities (see *Enjoyment of Barna and customary activities*).

Further consideration and discussion with relevant stakeholders is required to determine a suitable strategy for wild dog management in the Badimia parks and reserves, where it is deemed necessary.

Management objective: To protect the values of Badimia parks and reserves and adjoining pastoral properties through good neighbour relationships and collaborative efforts to address cross-boundary land management issues.

Management strategies

1. Monitor for, and control, stray stock within the Badimia parks and reserves.
2. Where control is required, liaise with biosecurity groups and DPIRD through the JMB to determine an appropriate wild dog management approach for the Badimia parks and reserves that:
   a. is consistent with the protection of natural and cultural values;
   b. adheres to best practice guidelines for wild dog control; and
   c. does not place Badimia people at risk when undertaking customary activities.

Understanding Barna (research and monitoring)

Strategic Objective

Enhance understanding of the values of the Badimia parks and reserves, in collaboration with research partners, to guide and improve management.

Research

Research and monitoring are essential components of management and are required to successfully implement this plan. Research leads to improved knowledge and a better understanding of the values of the Badimia parks and reserves. Well-designed research and effective monitoring are an essential component of adaptive management. As there have been few biological surveys in the Badimia parks and reserves, there are significant gaps in knowledge regarding its values and threats. Through the implementation of this plan, the department will collaborate with other agencies, universities, and other research organisations to address these gaps, with a focus on those with the highest priority for research. Research that is strategic and informs and improves management of the Badimia parks and reserves will be prioritised. Priorities for further investigation includes (but is not limited to) the following research areas:

- Biological surveys that provide information on range extensions (especially for threatened species); improve knowledge of the fauna that occupy the Badimia parks and reserves; and/or delineate the boundaries of threatened species.
- Taxonomic research on trapdoor spiders and flora.
- Investigation of sub-fossil evidence to help determine former ranges of native fauna species.
- Groundwater-dependent ecosystems and adaptive management approaches in response to findings.
- The relationship between landscape condition and rainfall, herbivory and history of degradation.
- The impacts of past land uses on surface and groundwater.
- The distribution of pre-pastoral vegetation associations.
- Improving understanding of the relationships between native fauna, ngubaanu (dingoes), feral budyi (cats) and bagudyi (foxes).
- Clarifying the impact of feral budyi on wabarl (malleefowl) breeding success.
- Evaluating the behaviour, impacts and ecological role of wadyan (fire) on different vegetation associations and the role of wadyan in vegetation health.

Monitoring

Long-term monitoring should inform adaptive management and performance assessment against the objectives of the management plan (see *Performance assessment*). Monitoring should also include measurement of pressures so that the condition of the value can be linked to impacts from natural or human influences. Linking cause-effect relationships is a key requirement of effective monitoring and is needed for evidence-based adaptive management. If there are declines in key values then knowing why (natural variation, climate change or local human pressures) will assist in determining whether a management response will be effective in mitigating the impact.

With multiple land managers in the area, integration, coordination and information sharing between the department, other government agencies, research organisations and other relevant stakeholders will be required to achieve best practice environmental management and in determining the success of this plan. Other organisations may be able to help in the facilitation of this data sharing and research communication between the department and other stakeholders.

Management objective: To increase understanding of the values and management issues of the Badimia parks and reserves, and gain knowledge to guide, adapt and improve management.

Management strategies

1. Identify research and monitoring priorities for the Badimia parks and reserves and continue to update these over time.
2. Subject to available resources, conduct integrated research and monitoring programs that implements components of research priorities identified for the Badimia parks and reserves.
3. Wherever possible encourage and support external agencies and individuals where their research is focused on research priorities identified for the Badimia parks and reserves.
4. Ensure that traditional knowledge about barna informs research and monitoring programs so they are culturally appropriate.
5. Advocate for the involvement of Badimia Traditional Owners in the research and monitoring carried out in the Badimia parks and reserves.
6. Ensure relevant information gained through research, monitoring and experience is available to the JMB (especially where there has been traditional owner involvement) and the department in regional and district office libraries/databases.
7. Update management strategies in response to key findings from research undertaken in, or relevant to, the Badimia parks and reserves.

References

Avon Catchment Council (2007). *Shield-backed trapdoor spider (Idiosoma nigrum) conservation plan 2008 – 2013*. Avon Catchment Council, Western Australia.

BBBAC (2021)[a]. *Badimia Barna Healthy Country Plan*. Badimia Bandi Barna Aboriginal Corporation, Western Australia.

BBBAC (2021)[b]. *Badimia Barna, Our Way*. Badimia Bandi Barna Aboriginal Corporation website. Badimia Country, Our Way | Badimia Bandi Barna Aboriginal Corporation (badimiabandibarnaac.org). Accessed 6 March 2024.

Beard, J.S. (1995). *Plant Life of Western Australia*. Kangaroo Press, Kenthurst, New South Wales.

Bednall, J. (2014). *Badimaya dictionary: An Aboriginal language of Western Australia.* Bundiyarra-Irra Wangga Language Centre, Geraldton, Western Australia.

Benshemesh, J. (2007). *National Recovery Plan for Malleefowl Leipoa ocellata*. Department for Environment and Heritage, Adelaide, South Australia.

BOM (2017). http://www.bom.gov.au/jsp/ncc/climate_averages/climate-classifications/index.jspClimate classification maps, Bureau of Meteorology (bom.gov.au). Bureau of Meteorology website. Australian Government. Accessed 6 March 2024.

Burbidge, A., Dixon, K., and Fuller, P. (1989). *The flora and fauna of vacant Crown land at White Well, Shire of Dalwallinu, Western Australia*. Technical Report No. 24. Department of Conservation and Land Management, Western Australia.

Burnside, D., Holm, A., Payne, A., and Wilson, G. (1995). *Reading the rangeland – a guide to the arid shrublands of Western Australia*. Department of Agriculture, Western Australia.

Bush Heritage Australia (2024). *Climate change.* Bush Heritage Australia official website. Climate Change & Conservation - Bush Heritage Australia. Accessed 6 March 2024.

Cairns, KM., Crowther MS., Nesbitt, B., and Letnic, M. (2022). The myth of wild dogs in Australia: are there any out there? *Australian Mammalogy*. 44: 67–75.

Caughley, G., Grigg, G.C., Caughley, J., and Hill, G.J.E. (1980). Does dingo predation control the densities of kangaroos and emus? *Australian Wildlife Research*. 7: 1–12.

Claridge, A.W., and Hunt, R. (2008). Evaluating the role of the dingo as a trophic regulator: Additional practical suggestions. *Ecological Management and Restoration*. 9 (2): 116–119.

Clegg, C. (2021). Personal Communication. Department of Biodiversity, Conservation and Attractions, Western Australia.

Curry, P., Payne, A., Leighton, K., Hennig, P., and Blood, D. (1994). *An inventory and condition survey of the Murchison River catchment, Western Australia*. Technical Bulletin No. 84. Department of Agriculture, Western Australia.

DBCA (2016). *Malleefowl Leipoa ocellata fauna profile.* Department of Biodiversity, Conservation and Attractions, Western Australia.

DBCA (2017). *Targeted fauna survey of Egernia stokesii badia at Karara Rangeland Parks*. Department of Biodiversity, Conservation and Attractions, Western Australia.

DBCA (2019a). *Karara Rangeland Park visitor guide*. Department of Biodiversity, Conservation and Attractions, Western Australia.

DBCA (2019b). *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report).* Current as of March 2019. Department of Biodiversity, Conservation and Attractions, Western Australia. https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

DBCA (2020). *Badimia reserves pilot carbon project invasive species control plan* (draft). Department of Biodiversity, Conservation and Attractions, Western Australia.

DBCA (2023a). *Santalum spicatum (Sandalwood) Biodiversity Management Programme*. Department of Biodiversity, Conservation and Attractions, Western Australia.

DBCA (2023b). *Conservation category definitions for Western Australian fauna and flora*. Department of Biodiversity, Conservation and Attractions, Western Australia. Nominations for listing | Department of Biodiversity, Conservation and Attractions (dbca.wa.gov.au). Accessed 5 March 2024.

DBCA (2024). *Conservation category definitions for Western Australian ecological communities*. Department of Biodiversity, Conservation and Attractions, Western Australia. Nominations for listing | Department of Biodiversity, Conservation and Attractions (dbca.wa.gov.au). Accessed 5 March 2024.

DEC (2007). *Strategic review of the banded iron formation ranges of the midwest and goldfields*. Department of Environment and Conservation, Western Australia.

DEC (2014). *A guide to managing and restoring wetlands in Western Australia*. Department of Environment and Conservation, Western Australia.

DEMIRS (2024). *Geoheritage.* Department of Energy, Mines, Industry Regulation and Safety website. Geoheritage (dmp.wa.gov.au). Accessed 6 March 2024.

Desmond, A., Cowan, M., and Chant, A. (2001). *Murchison 2 (MUR2-Western Murchison subregion) in A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002*. Department of Conservation and Land Management, Western Australia.

Douglass, L., Booth, C., Kennedy. S., and Turner, J. (2019). *An extraordinary natural legacy: An assessment and recommendations for the proposed expansion of Western Australia's conservation reserve system*. Summary Report. Commissioned by The Pew Charitable Trusts. Centre for Conservation Geography.

DPaW (2015). *Policy Statement No. 86 Aboriginal customary activities*. Department of Parks and Wildlife, Western Australia.

DPaW (2016a). *Corporate Guideline No. 22 Guidelines regarding Aboriginal customary activities*. Department of Parks and Wildlife, Western Australia.

DPaW (2016b). *Guide to Aboriginal customary activities on Parks and Wildlife-managed lands and waters*. Department of Parks and Wildlife, Western Australia.

Environment Australia (2001). *A Directory of Important Wetlands in Australia, Third Edition.* Environment Australia, Canberra.

EPA (2016). *Environmental factor guideline: Social surroundings*. Environmental Protection Authority, Western Australia.

Evolve Solutions (2014). *Mid west tourism development strategy*. Report prepared for the Mid West Development Commission, Regional Development Australia, the Department of Planning and the Mid West Tourism Alliance, Western Australia.

FPC (2017). *Native sandalwood industry strategy for Western Australia: Six steps for a valuable, sustainable industry in regional WA*. Forest Products Commission, Western Australia.

Gibson, N. (2009). *Floristic surveys of the Banded Ironstone Ranges*. Information Sheet 23/2009 Science Division. Department of Environment and Conservation, Western Australia.

Gregory, A.C., and Gregory F.T. (1884). *Journals of Australian explorations*. Government Printer, Brisbane.

Gregory, S., Ward, M., and Campagna, V. (2002). *Classification of inland salt lakes in Western Australia*. Unpublished rationale for masters research proposal. Outback Ecology Services and Curtin University, Western Australia.

Heritage Council of Western Australia (2019). *Emu Barrier Fence*. inHerit – State Heritage Office. Accessed 10 Nov 2022.

Heritage Council of Western Australia (2022). *Rabbit Proof Fence No 1*. inHerit – State Heritage Office. Accessed 10 Nov 2022.

Johnson, C. (2006). *Australia's Mammal Extinctions: a 50,000 year history*. Chapter 12, Interactions: rabbits, sheep and dingoes. Cambridge University Press, Melbourne.

IPCC (2021). *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., Zhai, P., Pirani, A., Connors, S.L., Péan, C., Berger, S., Caud, N., Chen, Y., Goldfarb, L., Gomis, M.I., Huang, M., Leitzell, K., Lonnoy, E., Matthews, J.B.R., Maycock, T.K., Waterfield, T., Yelekçi, O., Yu, R., and Zhou, B. (eds)]. Cambridge University Press. In Press.

Keiller, S., and Rye, P. (2021). *Scoping survey and heritage assessment of proposed walking trails, lookouts, and 4WD tracks in the Karara Rangeland Park, for Badimia Land Aboriginal Corporation and the Department of Biodiversity, Conservation and Attractions*. Report prepared by Terra Rosa Consulting, Perth, Western Australia.

Kennedy M., Phillips B.L., Legge S., Murphy S.A., and Faulkner R.A. (2012). Do dingoes suppress the activity of feral cats in northern Australia? *Austral Ecology*. 37 (1): 134-139.

Leue, B. (2018). *Greater stick-nest rats make the journey west over land and sea*. Australian Wildlife Conservancy website. *Greater Stick-nest Rats make the journey west over land and sea – AWC – Australian Wildlife Conservancy*. Accessed October 2022.

McKenzie, N.L., May, J.E., and McKenna, S. (eds). (2002). *Bioregional summary of the 2002 biodiversity audit for Western Australia*. Department of Conservation and Land Management, Western Australia.

Meissner, R., and Caruso, Y. (2008). Flora and vegetation of banded iron formations of the Yilgarn Craton: Mount Gibson and surrounding area*. Conservation Science Western Australia*. 7 (1): 105–120.

Meissner, R.A., and Coppen, R. (2014). Flora and vegetation of the greenstone ranges of the Yilgarn Craton: Warriedar Fold Belt. *Conservation Science Western Australia*. 9 (2): 153–167.

Mitchell, S. (2006). *Gascoyne Murchison outback pathways*. Prepared by Market Creations for the Mid West Development Commission, Western Australia.

Mitchell, S. (2021). *Badimia people return to country to help heal their land, protect cave paintings and share Dreaming tales*. Australian Broadcasting Corporation, Midwest, Western Australia. Badimia people return to country to help heal their land, protect cave paintings and share Dreaming tales - ABC News. Accessed 6 March 2024.

Murray, I., Bianchi, P., Bloomfield, M., and Bridge, C. (2011). *Western Australian gold towns and settlements* volume II. Hesperian Press, Carlisle, Western Australia.

Nixon, M., and Lefroy, R.F.P. (1988). *Road to the Murchison: An illustrated story of the district and its people.* Shire of Murchison, Western Australia.

Outback Pathways (2023). *Gascoyne • Murchison Outback Pathways*. Outback Pathways – Self-Drive Trails Traversing Western Australia. Accessed May 2023.

Palassis Architects (2014). *Karara block heritage advice: Revised preliminary advice.* Unpublished report for the Department of Parks and Wildlife, Western Australia.

Parsons, B.C., and Gosper, C.R., (2011). Contemporary fire regimes in a fragmented and an unfragmented landscape: implications for vegetation structure and persistence of the fire-sensitive malleefowl. *International Journal of Wildland Fire.* 20: 184–194.

Patrick, S., Brand, J., and Meinema, M. (1997). Murchison haven. *LANDSCOPE*. 13 (2): 42–48. Department of Conservation and Land Management, Western Australia.

Patrick, S. (2002). Flora and vegetation of Burnerbinmah Station: a study of the plant communities in the Mulga shrublands of the Murchison Region, Western Australia. *Conservation Science Western Australia*. 4 (3): 72–93.

Pearson, D. (2012). *Western Spiny-tailed Skink (Egernia stokesii) National Recovery Plan*. Wildlife Management Program No.53. Department of Environment and Conservation, Western Australia.

Pinder, A. (2023). Personal Communication. Department of Biodiversity, Conservation and Attractions, Western Australia.

Raines, J.A., Yung, F.H., and Burbidge, A.H. (1995). *Wetlands of outstanding ornithological importance for the register of the national estate in south-west Western Australia*. Draft report to the Australian Heritage Commission. Royal Australian Ornithologists Union.

Rix, M.G., Huey, J.A., Cooper S.J.B., Austin, A.D., and Harvey, M.S. (2018). Conservation systematics of the shield-backed trapdoor spiders of the nigrum-group (*Mygalomorphae, Idiopidae, Idiosoma*): integrative taxonomy reveals a diverse and threatened fauna from south-western Australia. *ZooKeys.* 756: 1–121.

Roche, R. (ed) (1992). *Wongajabba – Stories of the Badimia*. Dalwallinu District High School, Dalwallinu, Western Australia.

Shire of Yalgoo (2024). *The Murchison Regional Vermin Council (MRVC)*. Shire of Yalgoo website. The Murchison Regional Vermin Council (MRVC) » Shire of Yalgoo. Accessed 6 March 2024.

Syme, K., Edinger, D., Muir, B., and Heriot, S. (2008). *A Brush with nature – The Art of the flower hunters*. LANDSCOPE Expedition Briefing. Department of Environment and Conservation and The University of Western Australia, Perth, Western Australia.

Talbot, L. (1983). Wooden gold: early days of the sandalwood industry. *LANDSCOPE*. 4 (4): 21–31. Department of Conservation and Land Management, Western Australia.

Thackway, R., and Cresswell, I.D. (eds) (1995). *An interim biogeographic regionalisation for Australia: A framework for setting priorities in the national system of reserves, Version 4.10*. Australian Nature Conservation Agency, Canberra.

Vellekoop, S. (2002). *The fringing halophytic vegetation of Lake Austin: a study of mining impacts and vegetation dynamics*. Unpublished honours thesis. School of Natural Sciences, Faculty of Communication, Health and Sciences, Edith Cowan University, Western Australia.

Western Australian Museum (2015). *The Yilgarn*. Western Australian Museum website. The Yilgarn | Western Australian Museum. Accessed 6 March 2024.

Western Australian Museum (2017). *Salt lakes and ancient river systems*. Western Australian Museum website. Salt Lakes and Ancient River Systems | Western Australian Museum. Accessed 21 March 2024.

Wilson, S., and Swan, G. (2010). *A complete guide to reptiles of Australia, third edition*. New Holland Publishers, Australia.

Withers, P. (2000). Overview of granite outcrops in Western Australia. *Journal of the Royal Society of Western Australia*. 83: 103–108.

Warburton, N.M. (2014). Relicts, reproduction and reintroductions—a century of marsupial research in Western Australia. *WA Science - Journal of the Royal Society of Western Australia*. 97: 65–85.

Yates, C.J., Halls, R.J., and Bell, R.W. (1994). Landscape-scale disturbance regeneration in semi-arid woodlands of south-western Australia. *Pacific Conservation Biology*. 1: 214–224.

Glossary of Badimia terms in text

Badimia word(s)	English word
bagudyi	European red fox (*Vulpes vulpes*)
bandi barna	honey ant
bardi	witchetty grubs
barna	Country
barnabinmah	red Country
bigurda	euro; hill kangaroo (*Macropus robustus*)
biluny	white
bilyabarl	twenty-eight parrot (*Barnardius zonarius*)
bilygi	clean
Bimarra	Dreamtime creation serpent
biyarrgu	galah (*Eolophus roseicapilla*)
budyi	cat (*Felis catus*)
bulugu	cattle (*Bos taurus*)
bungarra	goanna
bunyarri	drought
dyiibu	sheep (*Ovis aries*)
gabi dhaa	water hole; rock hole
gadharra	flood/flooding
gagarlagu	Major Mitchell's cockatoo (*Lophochroa leadbeateri*)
gagurla	cogola bush (*Leichhardtia australis*)
gambura	bush tomato (*Solanum orbiculatum*)
gaya/kiya	desert kurrajong (*Brachychiton gregorii*)
gurdurdu	heart
gurriya	collecting
guwiyarl, quoelle, barn.ga, bungarra	goanna
marda	hills
marlu	red kangaroo (*Macropus rufus*)
marrgan	frogs
marun; murany	quandong (*Santalum acuminatum*)
mulgu	bush onion (*Cyperus bulbosus*)
meelyu	western spiny-tailed skink (*Egernia stokesii badia*)
ngubaanu	dingo (*Canis familiaris*)
wabarl	malleefowl (*Leipoa ocellata*)
wadyan	fire
wagu	camping/camp
walarda	Western Australian sandalwood (*Santalum spicatum*)
walgaly/gara	seeds
warrida	wedge-tailed eagle (*Aquila audax*)
yalibirri	emu (*Dromaius novaehollandia*)
yalibirri ngawu	emu eggs

Appendices

Appendix A – Tenure and traditional names of the Badimia parks and reserves

Name	Origin/meaning of name	Class	Purpose	Vesting	Area (ha)
Lakeside National Park[8] (Reserve 53839)	Named after the former Lakeside pastoral station, from which this land area was a part of.	Class A	National Park	CPC and BBBAC	8489.54
Lakeside Conservation Park[9] (Reserve 53840)	Named after the former Lakeside pastoral station, from which this land area was a part of.	Class A	Conservation Park	CPC and BBBAC	7076.62
Barnabinmah Conservation Park (Reserve 53838)	A Badimia place name meaning 'red Country' or 'red ground', also meaning of the former Burnerbinmah pastoral station name (preferred spelling adjustment).	Unclassified	Conservation Park	CPC and BBBAC	59,966.56
Thundelarra Conservation Park (Reserve 53971)	Named after the former Thundelarra pastoral station, from which this land area was a part of.	Unclassified	Conservation Park	CPC and BBBAC	100,107.10
Gagarlagu Nature Reserve[10] (Reserve 53827)	A Badimia place name meaning 'Major Mitchell's cockatoo (*Lophochroa leadbeateri*)'.	Unclassified	Conservation of Flora and Fauna	CPC and BBBAC	15,702.24
Biluny Wells Nature Reserve (Reserve 53842)	A Badimia name, meaning 'white'.	Unclassified	Conservation of Flora and Fauna	CPC and BBBAC	22,852.03
Gurdurdu Conservation Park (Reserve 54313)	A Badimia name, meaning 'heart'. This reserve is the heart of Badimia barna.	Class C	Conservation of Flora and Fauna	CPC and BBBAC	78,530
Total area					292,724.09

[8] National parks have outstanding natural values that are managed for public use and enjoyment. They also have national significance for scenic, cultural or biological values, and can accommodate recreation that maintains these values. They are managed for sustainable tourism and recreation, to conserve flora and fauna and to preserve features of archaeological, historical or scientific interest.

[9] Conservation parks have mostly regional or local, rather than national significance. They are managed for sustainable tourism and recreation, to conserve flora and fauna and to preserve features of archaeological, historical or scientific interest.

[10] Nature reserves have high conservation values as they represent natural ecosystems and provide habitat for particular species of flora and fauna. These reserves are managed to protect and restore natural environments, and to promote the study and appreciation of nature. Recreational activities that are compatible with this purpose such as bushwalking, nature appreciation and birdwatching are permitted.

Appendix B – Flora and fauna of Badimia cultural significance

Flora of cultural significance to Badimia people

Badimia name	Common name (scientific name)	Significance/Purpose
	scent grass (*Cymbopogon ambiguous*) (also known as native lemongrass)	Boiled in dishes to add flavour and used to scent homes.
	flannel bush (*Solanum lasiophyllum*)	Small walgaly/gara (seeds) eaten from inside the purple flower. Tastes like celery.
bilydyaa	blueberry lily (*Dianella revoluta*)	The base of the leaf blade eaten (tastes like the flesh of coconut) and also used to weave baskets.
gagurla	cogola bush (*Leichhardtia australis*) (also known as bush pear/banana)	Fruit and flowers eaten.
gambura	wild tomato (*Solanum orbiculatum*) (also known as bush tomato)	Fruit eaten.
gaya; kiya	desert kurrajong (*Brachychiton gregorii*)	Walgaly/gara are ground up or chewed. The texture of the bark is used for navigation. The leaves are also shaped like an emu footprint.
guruma		Medicine bush.
marun; murany	quandong (*Santalum acuminatum*)	Fruit eaten.
mulgu	bush onion (*Cyperus bulbosus*)	Bulb eaten.
walarda	Western Australian sandalwood (*Santalum spicatum*)	Walgaly/gara, nuts eaten as a salad and wood burnt as an aromatic and used in smoking ceremonies.
wandyinu	miniritchie (*Acacia grasbyi*)	Wood is used to make percussion instrument - clapping sticks.

Fauna of cultural significance to Badimia people

Badimia name	Common name (scientific name)	Significance/Purpose
bandi barna	honey ant	Traditional food, lives under the ground in the roots of the mulga trees.
bardi; dyulabardi	Grubs from the witchetty bush (*Acacia kempeana*)	Traditional food.
bardurda	bush turkey/Australian bustard (*Ardeotis australis*)	Traditional food.
bigurda	euro; hill kangaroo (*Macropus robustus*)	Traditional food.
boodie	rat kangaroo, burrowing bettong (*Bettongia lesueur*)	Traditional food (now locally extinct in the Badimia parks and reserves).
bulla bullah	lizard	Traditional food.
gagarlagu	pink cockatoo/Major Mitchell's cockatoo (*Lophochroa leadbeateri*) white cockatoo/sulphur crested cockatoo (*Cacatua galerita*)	
gunduwa	echidna (*Tachyglossus aculeatus*)	Traditional food.
guwiyarl; quoelle; barn.ga; bungarra; bungara	various goanna species	Traditional food.
meelyu	western spiny-tailed skink (*Egernia stokesii badia)*	Has spiritual significance (totem – not eaten).
marlu	red kangaroo (*Macropus rufus*)	Traditional food.
marrgan	frogs	Traditional food.
warrida	wedge-tailed eagle (*Aquila audax*)	A sacred or spiritual species for some Badimia people.
wabarl	malleefowl (*Leipoa ocellata*)	Eggs used to be eaten (but not anymore). The wabarl itself was not eaten.
yalibirri	emu (*Dromaius novaehollandia*)	The fat of the yalibirri was used for traditional healing and its meat and eggs for food.
yalibirri ngawu	emu eggs (*Dromaius novaehollandia*)	Traditional food.

Appendix C – Land systems of the Badimia parks and reserves

Land system	Description	Lakeside NP	Lakeside CP	Barnabinmah CP	Thundelarra CP	Gagarlagu NR	Biluny Wells NR	Gurdurdu CP
Bandy	Gritty-surfaced plains and low outcrops of granite with scattered acacia shrublands.				X			X
Campsite	Alluvial plains supporting eucalypt woodlands with halophytic understories and acacia shrublands.							X
Carnegie	Salt lakes with fringing saline alluvial plains, kopi dunes and sandy banks, supporting halophytic shrublands and acacia tall shrublands		X	X	X			X
Challenge	Gently undulating gritty and sandy surfaced plains, occasional granite marda (hills), tors and low breakaways, supporting acacia shrublands and occasional halophytic shrublands.	X	X	X	X			
Cunyu	Calcrete platforms, intervening drainage floors and channels and minor alluvial plains, supporting acacia shrublands, occasional casuarina woodlands and minor halophytic shrublands.	X		X	X			
Doney	Undulating yellow sandplain supporting dense mixed acacia, melaleuca and casuarina shrublands with patchy mallees.						X	X
Ero	Tributary floodplains with shallow, erodible duplex soils on red-brown hardpan, more or less saline and supporting acacia shrublands with halophytic and non-halophytic undershrubs.			X	X			
Euchre	Low granite breakaways with alluvial plains and sandy tracts supporting eucalypt woodlands and acacia shrublands.				X		X	
Gabanintha	Greenstone ridges, marda (hills) and footslopes supporting sparse acacia and other mainly non-halophytic shrublands		X		X			X
Graves	Basalt and greenstone rises and low marda (hills) supporting eucalypt woodlands with prominent saltbush and bluebush understories.				X			

Land system	Description	Lakeside NP	Lakeside CP	Barnabinmah CP	Thundelarra CP	Gagarlagu NR	Biluny Wells NR	Gurdurdu CP
Hamilton	Hardpan plains, stony plains and incised drainage lines supporting mulga tall shrublands.			X				
Joseph	Undulating yellow sandplain supporting dense mixed acacia, melaleuca and casuarina shrublands with patchy mallees.						X	
Jundee	Hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved mulga shrublands.	X			X			
Kalli	Elevated gently undulating red sandplains edged by stripped surfaces on laterite and granite, supporting acacia tall shrublands with wanderrie grass understories.	X		X	X			
Lake bed	Bare lake beds inundated for short periods after rain.		X		X			X
Marmion	Gently undulating sandplains with mixed tall shrublands and hummock grasslands.					X		
Melaleuca	Sandy-surfaced plains and calcareous plains supporting spinifex or mulga shrublands with wanderrie grasses.					X		
Mileura	Saline and non-saline calcreted river plains with floodplains and calcrete platforms supporting variable tall shrublands, mixed halophytic shrublands and shrubby grasslands.			X	X			
Millex	Plains on granite, with irregularly distributed low sandy banks and saline alluvial plains lightly		X					
Moriaty	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.				X			
Narryer	Low marda (hills) and lateritised breakaways above very gently undulating stony slopes and plains on gneiss and granite with sparse acacia shrublands.				X			
Nerramyne	Undulating plains of sandy-surfaced laterite and weathered granite with low remnant plateaus, breakaways and rises supporting acacia shrublands.				X			

Land system	Description	Lakeside NP	Lakeside CP	Barnabinmah CP	Thundelarra CP	Gagarlagu NR	Biluny Wells NR	Gurdurdu CP
Nubev	Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.				X			
Olympic	Irregular plains with occasional low breakaways and tor fields on granite supporting acacia shrublands.				X			
Pindar	Loamy plains surrounded by sandplain supporting York gum woodlands and acacia shrublands.						X	
Rainbow	Hardpan plains supporting mulga tall shrublands.				X			
Roderick	Broad, saline riverine plains, mainly supporting chenopod shrublands; also numerous grassy drainage foci, claypans and non-saline marginal hardpan plains with acacia shrublands.				X			
Sherwood	Breakaways, kaolinised footslopes and extensive gently sloping plains on granite supporting mulga shrublands and minor halophytic shrublands.	X		X	X			X
Singleton	Rugged greenstone ranges with dense casuarina and acacia shrublands.							X
Tallering	Prominent ridges and marda (hills) of banded ironstone, dolerite and sedimentary rocks supporting bowgada and other acacia shrublands.				X			
Tindalarra	Near level hardpan wash plains, narrow drainage lines and moderately saline drainage floors; supporting tall mixed acacia shrublands with wanderrie grasses, also minor saltbush/bluebush low shrublands.			X	X			
Violet	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.				X			

Land system	Description	Lakeside NP	Lakeside CP	Barnabinmah CP	Thundelarra CP	Gagarlagu NR	Biluny Wells NR	Gurdurdu CP
Waguin	Sandplains and stripped granite or laterite surfaces with low fringing breakaways and lower plains; supports bowgada and mulga shrublands with wanderrie grasses and minor halophytic shrublands.			X	X	X		
Woodline	Almost flat sandy-surfaced hardpan wash plains supporting tall shrublands and woodlands of mulga	X	X	X	X			
Yalluwin	Hardpan plains and drainage tracts carrying concentrated flow, supporting mulga, karara and other acacia shrublands.				X			
Yanganoo	Almost flat hardpan wash plains, with or without small wanderrie banks and weak groving; supporting mulga shrublands and wanderrie grasses on banks.	X		X	X			
Yarrameedie	Undulating stony interfluves, drainage floors and pediment foothill plains below major ranges, supporting sparse mulga shrublands.	X						
Yowie	Sandy plains supporting tall shrublands of mulga and bowgada with patchy wanderrie grasses.				X	X		

Appendix D – Vegetation associations of the Badimia parks and reserves

Vegetation association code & description		Reserved in conservation estate %	Location
No Protection in conservation reserves (0%)			
240	Succulent steppe with open scrub; scattered *Acacia sclerosperma* & bowgada over saltbush & bluebush	0.00	Lakeside Conservation Park
326	Low woodland over scrub; mulga over bowgada & miniritchie scrub	0.00	Barnabinmah and Thundelarra conservation parks
269	Low woodland over scrub; mulga over bowgada scrub	0.00	Thundelarra Conservation Park
338	Hummock grasslands, mixed sandplain; bowgada, sugarbrother, mallee, *Triodia basedowii*	0.00	Gagarlagu Nature Reserve
357	Medium woodland over scrub; York gum over bowgada & jam (*Acacia acuminata*)	0.00	Gurdurdu Conservation Park
358	Shrublands; bowgada & *Acacia quadrimarginea* on stony ridges	0.00	Gurdurdu Conservation Park
395	Hummock grasslands, mixed sandplain; bowgada, mallee, heath and spinifex	0.00	Lakeside National Park
404	Shrublands; bowgada & *Acacia murrayana* scrub	0.00	Lakeside National Park
414	Succulent steppe with open scrub; scattered bowgada & jam over saltbush & bluebush	0.00	Thundelarra Conservation Park
415	Succulent steppe with open scrub; scattered mulga & other wattles over saltbush & bluebush	0.00	Barnabinmah and Thundelarra conservation parks
533	Low woodland; mulga & cypress pine	0.00	Thundelarra Conservation Park
1127	Mosaic: Saltbush & bluebush/samphire	0.00	Lakeside Conservation Park
Little to no protection in existing conservation reserves (< 1%)			
202	Shrublands; mulga & *Acacia quadrimarginea* scrub	0.39	Thundelarra Conservation Park
268	Succulent steppe with open scrub; scattered *Acacia sclerosperma* over saltbush & bluebush	0.05	Thundelarra Conservation Park
352	Medium woodland; York gum	0.43	Biluny Wells Nature Reserve and Gurdurdu Conservation Park
420	Shrublands; bowgada & jam scrub	0.06	Barnabinmah, Thundelarra and Gurdurdu conservation parks

Vegetation association code & description		Reserved in conservation estate %	Location
Little protection in existing conservation reserves (< 5%)			
18	Low woodland; mulga (*Acacia aneura*)	2.13	Lakeside National Park; Lakeside, Barnabinmah and Thundelarra conservation parks; Gagarlagu Nature Reserve
40	Shrublands; acacia scrub, various species	1.51	Barnabinmah and Thundelarra conservation parks
142	Medium woodland; York gum & salmon gum	1.02	Gurdurdu Conservation Park
631	Succulent steppe with woodland and thicket; York gum over Melaleuca thyoides & samphire	2.12	Biluny Wells Nature Reserve
676	Succulent steppe; samphire	3.57	Barnabinmah and Thundelarra conservation parks
Inadequate protection in existing conservation reserves (< 15%)			
125	Bare areas; salt lakes	5.31	Lakeside, Thundelarra and Gurdurdu conservation parks
141	Medium woodland; York gum, salmon gum & gimlet	11.64	Biluny Wells Nature Reserve
221	Succulent steppe; saltbush	5.14	Gurdurdu Conservation Park
416	Low woodland; mulga mixed with cypress pine & York gum	6.15	Gurdurdu Conservation Park
437	Shrublands; Mixed acacia thicket on sandplain	12.50	Biluny Wells Nature Reserve
Adequate protection in existing conservation reserves (> 15%)			
120	Succulent steppe with open low woodland; mulga & sheoak	94.06	Gurdurdu Conservation Park
1063	Medium-Low woodland; York gum & cypress pine (*Callitris columellaris*)	73.84	Gurdurdu Conservation Park

* Statistics are taken from DBCA (2019b)

Appendix E – Flora, fauna and communities of conservation significance

Flora of conservation significance in the Badimia parks and reserves

Common name (Scientific name)	Conservation status – State (Commonwealth EPBC Act)	Location
Threatened flora		
Native foxglove (*Dasymalla axillaris*)	Critically endangered (Critically endangered)	Gurdurdu Conservation Park
Stylidium scintillans	Vulnerable	Thundelarra Conservation Park
Priority flora		
Banksia rosserae	Priority 1	Gagarlagu Nature Reserve
Darwinia sp. *Kirkalocka* (M. Crowhurst 296)	Priority 1	Gagarlagu Nature Reserve
Eremophila sp. *Thundelarra* (B. Buirchell BB 324)	Priority 1	Barnabinmah and Thundelarra conservation parks
Grevillea kirkalocka	Priority 1	Gagarlagu Nature Reserve
Petrophile vana	Priority 1	Barnabinmah Conservation Park
Ptilotus andersonii	Priority 1	Barnabinmah Conservation Park
Hyalosperma stoveae	Priority 2	Barnabinmah Conservation Park
Lepidium merrallii	Priority 2	Barnabinmah Conservation Park
Acacia subsessilis	Priority 3	Thundelarra Conservation Park
Cryptandra subtilis	Priority 3	Gurdurdu Conservation Park
Dicrastylis linearifolia	Priority 3	Barnabinmah Conservation Park
Euryomyrtus recurve	Priority 3	Gurdurdu Conservation Park
Gnephosis cassiniana	Priority 3	Thundelarra Conservation Park
Goodenia perryi	Priority 3	Gurdurdu Conservation Park
Grevillea granulosa	Priority 3	Thundelarra Conservation Park
Micromyrtus acuta	Priority 3	Thundelarra Conservation Park
Petrophile pauciflora	Priority 3	Lakeside National Park
Rhodanthe collina	Priority 3	Thundelarra Conservation Park
Triglochin protuberans	Priority 3	Barnabinmah Conservation Park
Cluster Head Frankenia *(Frankenia glomerata)*	Priority 4	Barnabinmah Conservation Park
Goodenia neogoodenia	Priority 4	Barnabinmah Conservation Park

Priority flora communities of the Badimia parks and reserves

Community name	Conservation status – State (Commonwealth EPBC Act)	Location
Lake Austin vegetation complexes (banded ironstone formation)	Priority 1	Lakeside Conservation Park
Warriedar Hill/Pinyalling vegetation complexes (banded ironstone formation)	Priority 1	Thundelarra Conservation Park
Eucalypt woodlands of the Western Australian Wheatbelt	Priority 3 (Critically Endangered)	Biluny Wells Nature Reserve

Fauna of conservation significance in the Badimia parks and reserves

Language name	Common name (Scientific name)	Conservation status – State (Commonwealth EPBC Act)	Park/reserve
	Australian painted snipe (*Rostratula australis*)	Threatened – Endangered (Endangered)	Thundelarra Conservation Park (Thundelarra Lignum Swamp)
	Lake Goorly shield-backed trapdoor spider (*Idiosoma kopejkaorum*)	Threatened – Endangered	Biluny Wells Nature Reserve
Meelyu	Western spiny-tailed skink (*Egernia stokesii badia*)	Threatened – Vulnerable (Endangered)	Thundelarra Conservation Park
Wabarl	Malleefowl (*Leipoa ocellata*)	Threatened - Vulnerable (Vulnerable)	Barnabinmah, Thundelarra and Gurdurdu conservation parks; and Biluny Wells Nature Reserve
	Blue-billed duck (*Oxyura australis)*	Priority – P4	Thundelarra Conservation Park (Thundelarra Lignum Swamp)
	Gull-billed tern (*Gelochelidon nilotica)*	Migratory (Migratory)	Gurdurdu Conservation Park
	Peregrine falcon (*Falco peregrinus*)	Specially protected	Gurdurdu Conservation Park

Migratory and mobile birds likely to occur in the Badimia parks and reserves

Common name (Scientific name)	Conservation status – State (Commonwealth EPBC Act)	Listed in relevant legislation, bilateral agreements or conventions
Curlew sandpiper (*Calidris ferruginea*)	Critically endangered (Critically endangered; Migratory)	EPBC Act – Marine, Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Hooded plover (*Thinornis cucullatus)*	P4	Biodiversity Conservation Act; EPBC Act – Marine
Common sandpiper (*Actitis hypoleucos*)	Migratory (Migratory)	EPBC Act – Marine; Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Sharp-tailed sandpiper (*Calidris acuminata*)	Migratory (Migratory)	EPBC Act – Marine, Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
White-winged black tern (*Chilidonias leucopterus)*	Migratory (Migratory)	EPBC Act – Marine, Migratory (CAMBA, JAMBA, ROKAMBA)
Wood sandpiper (*Tringa glareola*)	Migratory (Migratory)	EPBC Act – Marine, Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Common greenshank (*Tringa nebularia)*	Migratory (Migratory)	EPBC Act – Marine, Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)

Conservation codes

Under the *Biodiversity Conservation Act 2016*:
T (CR) Threatened (Critically Endangered) Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future".
T (EN) Threatened (Endangered) Threatened species considered to be "facing a very high risk of extinction in the wild in the near future".
T (VU) Threatened (Vulnerable) Threatened species considered to be "facing a high risk of extinction in the wild in the medium term future".
EX Extinct species Species where "there is no reasonable doubt that the last member of the species has died".
EW Extinct in the wild species Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form".
MI Migratory Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth. Migratory species include birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) or The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program.
CD Conservation Dependent Species of special conservation need that are dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
OS Specially protected Species otherwise in need of special protection to ensure their conservation.

P Priority species are not a listing category under the BC Act. The Priority Flora and Fauna lists are maintained by the department and are published on the department's website. Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient, are listed under Priorities 1, 2 or 3 for further survey and evaluation of conservation status. Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

More information is available at Nominations for listing | Department of Biodiversity, Conservation and Attractions (dbca.wa.gov.au) – refer to *Conservation codes for Western Australian flora and fauna 2023* (DBCA, 2023b).

Flora and fauna of conservation significance are also listed under the *Environment Protection and Biodiversity Conservation Act 1999* categories of Critically Endangered, Endangered, Vulnerable, Extinct, Extinct in the Wild, Conservation Dependent, Migratory and Marine.

Priority fauna communities of the Badimia parks and reserves

Community name	Conservation status – State (Commonwealth EPBC Act)	Location
Maranalgo west calcrete assemblage type on Moore Palaeodrainage on Maranalgo Station	Priority 1	Gurdurdu Conservation Park

Conservation codes

WA

Under the *Biodiversity Conservation Act 2016*:

CO Collapsed ecological communities An ecological community where — (a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or (b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover — (i) its species composition or structure; or (ii) its species composition and structure.

CR Critically endangered ecological communities are at an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future.

EN Endangered ecological communities are at a very high risk of becoming eligible for listing as a collapsed ecological community in the near future.

VU Vulnerable ecological communities are at a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future.

Priority ecological communities are not a listing category under the BC Act. The Priority Ecological Communities list is maintained by the department and is published on the department's website. Possible threatened ecological communities that do not meet survey criteria or are not adequately defined to enable listing are added to the department's Priority Ecological Communities for Western Australia list under priority 1, 2 or 3. Ecological communities that are adequately known and not threatened but rare, near threatened, or have recently been removed from the threatened list are placed in priority 4. Conservation dependent ecological communities are placed in priority 5.

More information is available at Threatened ecological communities | Department of Biodiversity, Conservation and Attractions (dbca.wa.gov.au) – refer to *Definitions and categories for Western Australian ecological communities* (DBCA, 2024).

Ecological communities of conservation significance are also listed under the *Environment Protection and Biodiversity Conservation Act 1999* categories of Critically Endangered, Endangered and Vulnerable.