Rangelands NRM
Enabling Prosperity

Rangelands NRM Co-ordinating Group (Inc.)

Regional Plan (Plan)

Review Approved -September 2022

Acknowledgement

We acknowledge Aboriginal People as the Traditional Owners of the lands and waters where we work and pay our respect to their Elders past and present and future leaders.

Rangelands NRM
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SECTION A

1 Executive Summary

The Rangelands NRM Regional Plan (The Plan) ensures natural resource management activities in the Rangelands region of Western Australia are focused, effective and complies with community needs, industry standards and developments.

The Plan is embedded into the governance and operational framework of Rangelands NRM Strategies and day-to-day operations are all directed toward achieving the set priorities.

Section A provides the makeup of Rangelands NRM its governance and organisational process and a background of the natural and cultural environment and land use of the region.

Following this, a discussion along the objectives and approach of the plan, across subregions, priority areas and assets.

It provides the asset lists, subregional information, threats and mitigative actions, and describes the priority areas and how the plan is to be implemented and tracking against the priority areas.

Section B provides a timeline of the development of the Regional Plan, the method undertaken for the review with lessons learned from this process.

Section C provides an overview of the integration of the Regional Land Partnerships (RLP) program and the Regional Plan.

2 Rangelands NRM

In 1997, the Australian Commonwealth, state and territory governments identified 56 (currently 54) Natural Resource Management (NRM) regions covering all of Australia.

Each of the regional NRM management groups, including Rangelands NRM (RNRM) was contracted to coordinate the delivery of projects dealing with NRM priority issues within their regions through investments from the Natural Heritage Trust (NHT) program, and its successors including Caring for our Country (CfoC) and the current National Landcare Program (NLP).

Project goals and objectives are aligned with the local community, regional stakeholders and state and federal agencies, and many of the assets on the Asset Register (Section C - Appendix 1) are also known or identified agency priorities. Similarly, actions to mitigate threats to assets and investment priorities align with local, regional, or national plans, investments, and activities.

Rangelands NRM enables the integrated land management of threats to assets and sustainable utilisation of the natural resources of the region by working with pastoralists, traditional owners and their ranger teams, horticulturalists, industry, resource sector, government, and community when co-designing and delivering outcomes.

In developing the Regional Plan, Rangelands NRM acknowledges the cultural significance of the assets and works closely with relevant stakeholders and the community to identify these and develop appropriate management activities.

Rangelands' approach to the development and delivery of the Regional Plan is to:

1. Maintain independence as an organisation to facilitate meaningful collaboration across the diverse NRM managers and stakeholders in the region.
2. Apply learnings, experiences, and an awareness of historical impacts.
3. Integrate technical expertise of NRM practices with a focus on delivering holistic and landscape scale change.
4. Proactively build long-term working relationships and communities of practices across the region, encompassing:
    a. integration of scientific evidence and knowledge banks
    b. developing common goals and NRM resourcing alignments
    c. land and sea manager engagement and knowledge transfer
    d. promoting the work of local and regional champions
5. Operating within an environment of transparency, accountability, and governance. Employing flexible, nimble, and agile delivery mechanisms.

3 Rangelands Region

The region that Rangelands NRM manages investments within covers about 28% of Australia, 85% of Western Australia (WA) and is the largest NRM region in Australia.

Figure 1. The Rangelands NRM Region

The Rangelands is unmatched both in its geographic scale, and the vulnerability and challenges faced by its land managers, communities, and industries, but also is a region of extraordinary potential for both production and long-term stewardship of the unique assets.

The Rangelands region is home to areas of unsurpassed natural beauty, encompassing some of the most spectacular natural landscapes with immense diversity and cultural values, and is recognised globally for its uniqueness.

The region is comprised of:

- 220 million hectares across 6 subregions

- 15,000km of coastline
- 98 million hectares of pastoral leasehold
- 70 million hectares of determined Native Title areas
- 18 Dedicated Indigenous Protect Areas
- 50+ Traditional Owner Groups
- 27 Ranger Groups
- 430+ Pastoral Station Leases
- 100+ Resource Interests
- 400+ Natural Resource Management Assets
- 3 World Heritage Areas
- 5 Ramsar wetlands
- 3 climatic zones

3.1 Natural and Cultural Environment

Rangelands NRM recognises the strong interconnections between natural and cultural assets and the need for their integrated management, especially in the context of the fragility of many rangeland ecosystems and the harsh economic environment.

Like so many natural areas around the world, many of these places need active management to conserve and protect the very values that make them important to us, hence the necessity to develop a Regional Plan.

3.1.1 Climate

Rangeland is a term accepted around the world to describe a region of low rainfall and a highly variable climate of semi-arid and arid regions. Across the Rangelands of Western Australia, the climate varies.

In the North the climate is sub-tropical to tropical with a distinct monsoonal wet and dry season, inland it is a hot dry desert and in the south the climate is semi-arid to temperate with winter rainfall.

The climate information presented in this Plan draws on the three BOM sub-clusters that cover the Rangelands NRM area:

1. Monsoonal Northwest
2. Rangelands North
3. Rangelands South

3.1.2 World Heritage Areas

The following assets are recognised as World Heritage Areas with outstanding universal value:

1. Shark Bay
2. Ningaloo Coast
3. Purnululu National Park (Bungle Bungle Range)

Murujuga (Burrup Peninsula) is also a candidate. The Australian Heritage Council (AHC) found the Dampier Archipelago (including the Burrup Peninsula) contains one of the richest concentrations of rock engravings and stone arrangements in Australia making it of outstanding national heritage significance. In 2007, Murujuga was included on the Australian National Heritage List and in 2020 a submission was lodged with UNESCO and is currently under consideration as a World Heritage Site. This would make it the first Western Australian site to be recognised as having outstanding cultural significance.

3.1.3 Wetlands and Ramsar

Within the Rangelands there are numerous wetlands including both ephemeral and permanent water bodies and many of these are identified as regionally significant, nationally significant, and also internationally significant under the Ramsar Agreement.

Wetlands listed as internationally significant under the Ramsar Agreement include:

1. Lake Kununurra
2. Lake Argyle
3. Ord River Flood Plain
4. Roebuck Bay
5. Eighty Mile Beach

3.1.4 Rivers and Catchments

The Western Australian Rangelands supports many rivers, creeks, and streams. These vary from ephemeral to permanent water bodies and drain into the Timor Sea, the Indian Ocean and to the southwest region.

The major rivers and their catchments of the Rangelands include the:

1. Fitzroy River
2. Ord River
3. De Grey River
4. Fortescue River
5. Ashburton River
6. Gascoyne River
7. Murchison River

3.1.5 Coastline and Islands

The Rangelands coastline accounts for approximately 75% of Western Australia's coastline.

It is characterised by islands, lagoons, mangroves, seagrass, mudflats and long stretches of sandy beaches and rocky shorelines.

The Rangelands coastline has many spectacular features.

In the Murchison and Gascoyne regions a major area of coastline is situated within the Shark Bay World Heritage Area, Australia's largest enclosed marine embayment.

The coastline of the Gascoyne region is also home to Shark Bay World Heritage Area and the Ningaloo Coast World Heritage Area, Australia's only fringing coral reef.

The Rangelands coastline has many Islands and some of these supports some of the last remaining small mammals, for example the Banded Hare Wallaby, which is restricted to Bernier and Dorre Islands.

The Dampier Archipelago off the Pilbara region is considered to be the most biologically diverse, with pristine reefs and islands virtually untouched.

More than 2,500 islands lie off the Kimberley coast and the Buccaneer Archipelago consists of over 800 islands.

3.1.6 Flora and Fauna

The Rangelands contains a wealth of biodiversity and supports a number of endemic and threatened flora and fauna species. These are listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC) The National Threatened Species Strategy 2021-31 and its "100 Priority Species" list, which for WA Rangelands includes the following species:

- Threatened Fauna:
  - Mammals:
    - Trichosurus vulpecula arnhemensis (Northern Brushtail Possum)
    - Dasyurus hallucatus (Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu])
    - Dasyurus geoffroii (Chuditch, Western Quoll)
    - Macrotis lagotis (Greater Bilby)
    - Black-flanked Rock Wallaby
    - Golden Bandicoot
  - Birds:
    - Erythrotriorchis radiatus (Red Goshawk)
    - Pezoporus occidentalis (Night Parrot)
    - Leipoa ocellata (Malleefowl)
    - Polytelis alexandrae (Princess Parrot, Alexandra's Parrot)
    - Numenius madagascariensis (Eastern Curlew, Far Eastern Curlew)
  - Reptiles:
    - Liopholis kintorei (Great Desert Skink, Tjakura, Warrarna, Mulyamiji)
    - Aipysurus apraefrontalis (Short-nosed Seasnake)
    - Chelonia mydas (Green Turtle)
    - Lepidochelys olivacea (Olive Ridley Turtle, Pacific Ridley Turtle)
    - Ctenophorus yinnietharra (Yinnietharra Rock-dragon)

- Fish:
  - Pristis pristis (Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish)

3.1.7 Vegetation

Vegetation types range from tussock and hummock grasslands and shrublands, to eucalypt, mulga and acacia woodlands, coastal shrub-heaths but also include patches of monsoonal forests in the north and mangroves on the coast.

Within the Rangelands there is significant variation between the vegetation types that are inextricably linked to diverse land systems that include the vast desert rangelands, sub-tropical savanna grasslands, rugged rocky ranges, inland and coastal floodplains, and coastal estuaries.

The Monsoon Vine thickets behind the coastal sand dunes of Dampier Peninsula are classified as a Threatened Ecological Community.

Because ecosystems and the links between their community members are so complex, it is important to identify, maintain and manage whole ecosystems, their processes, and communities (including the many thousands of species of invertebrates, non-flowering plants like fungi and seaweeds, and micro-organisms), rather than just on a species-by-species basis.

3.2 Land Use

The changes in land use in Western Australia (WA) in the years since European settlement in 1829 have been dramatic. Subdivision, development, and use of land for settlement and agriculture has provided significant economic and social benefits to the State's expanding community.

A growing economy and population are increasing pressure on land for a wide variety of purposes including economic development; infrastructure and utilities; essential services such as water supply; expansion of settlements; areas for conservation, cultural and recreational purposes; and increased demand for food.

The Rangelands accommodates significant environmental assets and natural landscape values, and this needs to be factored into land use planning as this space is becoming increasingly contested.

3.2.1 Land and Sea Managers

3.2.1.1 Aboriginal People

The WA Rangelands environment holds great cultural significance for Aboriginal people. There are many language groups, whose people find affinity across our various sub-regions both with neighbouring Nations and those further afield through the ubiquitous sharing of Dreaming/Tjukurrpa

stories/songlines, from the Kimberley to the Pilbara, across the Western Deserts to the Nullarbor and back to the Gascoyne and Murchison coastlines. While Aboriginal livelihoods have significantly evolved in recent decades, cultural links to land and responsibilities for its stewardship remain.

Aboriginal peoples' stewardship for country is important not just for local places, but for the coordination of environmental issues that have state and national reach. They inherit holistic, place-based knowledge frameworks that are distinctly different from Western knowledge traditions, which focus on universal values and methodologies. These holistic frameworks, or worldviews, focus on the importance of connections and relationships. Integrated Indigenous knowledge is a powerful contribution to Western knowledge currently embedded in natural resource management.

Traditional landowners and Aboriginal land managers are established and long-term dependents and stewards of the land and its resources and have been proactive in the development of environmental services (including threatened species and carbon management in response to biodiversity loss and climate change), healthy country planning on Native Title and other lands, Indigenous Protected Area management.

The development of Aboriginal Rangers have been integral to providing these wide range of services and fulfilling cultural obligations through guidance by Elders, supporting closer connections to family, culture and country.

3.2.1.2 Pastoralists

Pastoralism is a significant land use across greater than 45% of the Rangelands and it includes activities such as cattle and sheep production. Currently there are 430+ pastoral stations, with an average size of 250,000 hectares. Pastoralism, is a major industry that has also seen many changes yet continues today in spite of the many and varied challenges. Industry leaders are adjusting stock numbers to season conditions/feed supply and support catchment rehydration and regenerative management practices. These manage grazing pressure, encourage pasture growth, build drought reserves, and align to land stewardship aspirations of pastoralists and producer groups.

3.2.1.3 Horticulturalists

The horticulture area is unique, having many small land management parcels. The irrigated horticulture precinct located on the Gascoyne River levee and floodplain delta near the town of Carnarvon is made up of approximately 170 plantation / freehold blocks operated as a whole or in part by approximately 300 growers with cropping approximately 1,200 hectares total each year of a wide variety of produce. The growers in Carnarvon are a mix of sharefarmers, sublessees, lessees, or landowners, and due to multiculturalism, a significant proportion are Language other than English (LOTE).

In Kununurra in the East Kimberley, the Ord River Irrigation Area (ORIA) is WA's largest irrigated agricultural project covering over 27,400 hectares and has access to considerable water resources from Lake Argyle.

3.2.1.4 Fishing and Aquaculture

The Rangelands has 2 Fishing and Aquaculture Bioregions. The Gascoyne Coast Bioregion has been identified as one of 18 world 'hotspots' in terms of tropical reef endemism and the second most diverse marine environment in the world in terms of tropical reef species. It is home to 3 of WAs more valuable fisheries – the Shark Bay Prawn, Exmouth Gulf Prawn and Shark Bay Scallop fisheries. The Shark Bay Blue Swimmer Crab Managed Fishery, Gascoyne Demersal Scalefish Fishery and Shark Bay Beach Seine and Mesh Net Fishery and the Mackerel Managed Fishery also operate in the region. Two (2) trail Oyster farms are currently running in the region.

The North Coast Bioregion is home to the North Coast Prawn Managed fishery, Pilbara trap, line, and trawl fishery, Northern Demersal Scalefish (trap and line) fishery, Kimberley Gillnet and Barramundi Managed fishery, Mackeral Managed fishery, and the Kimberley Devleoping Mud Crab fishery. Other significant commercial fisheries in this bioregion are based on the collection of pearl oysters for the use in aquaculture production of pearls.

3.2.2 Economy and Major Centres

The major towns of the Rangelands are Kununurra, Derby, Broome, Port Hedland, Karratha, Exmouth, Carnarvon, Kalgoorlie.

Other key towns include, Denham, Coral Bay, Halls Creek, Fitzroy Crossing, Kalumburu, Tom Price, Newman, Marble Bar, Mt Magnet, Meekatharra, Wiluna, Boulder, Norseman, Leinster, Leonora, Meekatharra, Mount Magnet, Laverton, Cue, Wiluna, Eucla, Yalgoo and Paynes Find.

The livestock industry is an important industry for primary productive land use occupying just under half of the regions land area. It's dominated by cattle production throughout the region with the largest herds in the northern rangelands. Sheep and goat production occurs in relatively low numbers in the southern rangelands.

The Rangelands has 3 Horticulture regions, Carnarvon (Vegetables, Mangos, Bananas, Grapes) ($94 million), Kununurra (Ord River) (Sweetcorn, Vegetables, Cucurbits, Mangos, Bananas) ($30 million) and Broome. Kununurra and Ord River Irrigation Area also supports irrigated agriculture and forestry (cotton, fodder, grains and seeds, and sandalwood).

The Rangelands support a significant amount of the Australia's resources industry. In 2019-20, WA's mineral and petroleum production were valued at more than $174 billion.

Tourism is also a growing enterprise with the value of the WA tourism industry reaching $9.5 billion (gross value added) in 2019-20. In 2018-19, Ningaloo contributed an estimated $110 million and tourism accounted for more than $1.6 billion to the Broome and North West economy in 2019, with half of this generated by Broome tourism.

The WA seafood industry generates a billion dollars for the State's economy annually and employs about 10,000 people in direct and indirect jobs connected to commercial fishing and aquaculture activity.

Whilst the Rangelands is rich in natural resources, it is also home to some of the most remote and socio-economically vulnerable communities in Australia. The full costs of infrastructure, services, restoration of land and ecological legacy issues, and reframing of value needs to be factored into natural resource management planning, the environmental, social and governance responsibilities of businesses operating in the region and the pursuit of real sustainability.

3.3 Regional NRM Challenges

Since European settlement, the development of the rich natural resources has impacted land condition and local economies have been in cycles of boom and bust, as attested to by the changing fortunes of many of the region's settlements.

Generations of the region's land managers have demonstrated extraordinary ingenuity and fortitude in developing and operating under challenging conditions, with financial resources thin on the ground, and experiencing periods of severe drought.

This legacy of development and lack of management alignment to ecology and landscape function has resulted in large scale threats to resource condition and widespread loss of biodiversity. Significant threats and challenges to natural resources continues to confront and be dealt with by land managers today.

These threats and challenges are at a scale in the region that reaches beyond title boundaries and any individual land managers resources and places additional pressures on land managers and community groups and the productivity, ecological values, and sustainability of land resources.

These factors and their potential consequences may at times limit Rangelands NRM's and our project partners' ability to implement projects developed through this plan or achieve outcomes that were reasonably anticipated when projects were initiated. However, a long-term investment in the capabilities and capacities of the land management community to address these threats and challenges (beyond the limitations of project activities that are often small, isolated, and short-term) is key strategy addressed by this Plan.

The threats and challenges to natural resource management in the region are:

1. Biodiversity
    - species and habitat loss
2. Biosecurity
    - Plants and Animals – Feral, Weeds and Native Invasives
    - Disease
3. Climate Change
4. Land and Sea Use
    - Grazing
    - Mining – Post Mining
    - Tourism
    - Fishing
5. Water Security
6. Ground Cover

7. Water and Wind Erosion
    - Sediment loads
    - Soil loss
8. Fire
9. Disconnection

To maximise limited investment and other resources, our level of influence needs to be at the landscape scale involving land managers and the wider community working together. Our aims are to build upon the multiple community focused programs/projects that have worked towards addressing some of the legacy issues and developing change management activities. Hence our priority areas need to remain the focus for Rangelands NRM investing in on ground works and the community's' capability and capacity to implement and continually develop their land and sea management practices.

Species diversity and ecosystem resilience ensures that landscape processes are maintained; subsequently land management informed by ecological science and traditional ecological knowledge systems is a priority for Rangelands NRM.

More details of the threats and challenges are provided in the Threats and Assets Matrix and reflected in the priority areas.

4 Regional Plan 2017-22

4.1 Objectives of the Plan

The Regional Plan acts as an investment decision-making tool and a framework to guide the development of natural resource management activities for regional, sub-regional and local land, coast, and sea managers. The three main objectives of the Plan are:

1. To provide clear direction to Rangelands NRM to enable valuable investment in managing the subregion's most highly valued natural assets for the benefit of future generations
2. To identify specific, well-considered investment opportunities that have a high likelihood of success
3. To create a plan that is easy to update as new information becomes available

The Plan and its supporting documents have a core focus and purpose for the organisation:

- Outlines the regional and bioregional areas, details the assets and threats to the natural resources for each, and prioritises and recommends options for managing the assets and the threats.
- Provide prioritisation and options for co-design and delivery with the community.
- The Plan is available online.

4.2 Layers of the Plan

Within the Rangelands region, we have a number of views and separate it into:

1. Climate Subclusters – 3 subclusters that span from the tropical north to temperate and semi-arid south
2. Subregions – the Kimberley, Pilbara, Desert, Gascoyne, Murchison, and Goldfields-Nullarbor.
3. Priority Areas – incorporating significant assets, manageable threats, and the willingness of community to be engaged, demonstrating strong leadership, and having a sustainable vision for the area.
4. Community – 22 layers of land managers and stakeholder groupings (8.2.4)
5. Assets

Climate projections are based on the Bureau of Metrology (BOM) 'subclusters' (Figure 3), Monsoonal Northwest subcluster includes the Kimberley; Northern Rangelands subcluster contains the Pilbara, and Desert; with the Southern Rangelands subcluster taking in the Murchison, Gascoyne, and Nullarbor – Goldfields. Only BoM projections with 'high' or 'very high' levels of confidence are included.

The regions has 5 NRM subregions (Figure 2) that are then further separated into Interim Biogeographic Regionalisation for Australia (IBRA) (Figure 3).

Figure 2. Rangeland Sub-regions

Figure 3. Sub-cluster climatic zones.

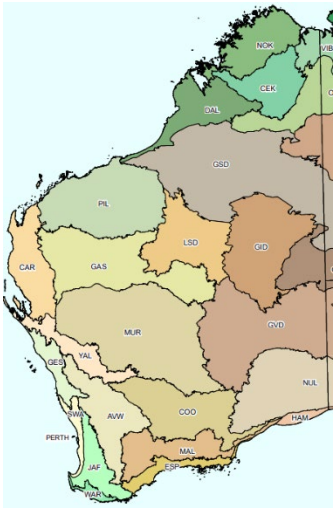


Figure 4. IBRA Bioregions, V 7.

4.3 Approach of the Plan

The Plan is asset-based, meaning that it focuses on specific places in the landscape – places that physically exist and can be pinpointed on a map, such as a wetland, an island, a vegetation community, or an animal (or its habitat).

The Asset Registers developed for all Rangelands Subregions are located within Section 5.

To strategically guide investments, Rangelands NRM has identified Priority Areas at the subregional level (Kimberley, Pilbara, Gascoyne, Murchison, Goldfields-Nullarbor, and the Desert) to ensure a proactive approach in achieving outcomes which are both realistic and focused. The Priority Areas provide a focus for future investment opportunities, against a backdrop of a dynamic environment with climatic extremes and other drivers.

The identified Priority Areas are not in response to any specific funding program, they reflect what is needed in the region to conserve special environmental areas, nurture enthusiasm and involvement of community and address threats affecting environmental assets.

Rangelands NRM does not expect to invest in every asset in the Priority Areas, the Priority Areas provide scope to be selective when choosing preferred projects within the subregions.

It is recognised that not all the investment funds available for projects will be invested into specific assets; some investments will be made to into human assets to build the skillsets of the land, coast and sea managers, and communities of practice, to deliver catchment-wide and cross regional projects.

4.4 Measuring the Success of the Plan

Rangelands NRM is developing a framework where this data can be assembled and aggregated against key indicators for the Plan's 7 Target areas

1. Productive Land Systems;
2. Significant Vegetation Ecological Communities;
3. Resilient Engaged Communities;
4. Coastal Zones and Islands;
5. Threatened Significant Species,
6. Flora and Fauna; and
7. Rivers, Lakes, and Wetlands.

This will provide a measure and means to evaluate progress against the Plan at the Rangelands regional level and also at sub regional levels (Kimberley; Pilbara; Desert; Gascoyne; Murchison; and Goldfields-Nullarbor).

The developing framework is an addition to Rangelands NRM's existing Program and Project Management System (Section 8.3) that captures Monitoring, Evaluation and Reporting information.

The system records measures of success, key lessons, and opportunities for improvement at a project and program output/outcome scale and for reporting to clients including the Commonwealth's RLP program.

4.5 Updating the Plan

Priority Areas have been defined by having umbrella and significant environmental assets, manageable threats, and the willingness of community to collaborate and be engaged, demonstrating strong leadership, and having a sustainable vision for the area.

Constant co-design and community engagement ensures the plan remains current.

The Plan is reviewed annually and updated as more information comes to hand through proactive regional engagement, nomination of new assets and change in threat status or future projections.

5 Subregions

5.1 Kimberley Subregion

Figure 5. Kimberly Subregion

The Kimberley subregion of the Western Australian Rangelands is 424,517 square kilometres in size and is the State's most northern subregion.

The coastline faces the Indian Ocean to the west, and the Timor Sea to the north. It is bordered by the Pilbara subregion to the south, and the Northern Territory to the east.

History and Economy

Aboriginal people have inhabited the subregion for at least the past 40,000 years. The Kimberley environment holds great cultural significance for Aboriginal people. The Kimberley was first explored by non-indigenous people in the late 1800s and during this time pastoralists from across Australia declared land and started to move cattle into the region.

The first stations in the region were settled along the major river systems of the Ord and Fitzroy Rivers.

Gold was found in Halls Creek in 1885.

The subregion has a diverse regional economy; mining, tourism, agriculture, aquaculture, fishing, and retail are major contributors to the regions' economic output.

Today the major towns of the Kimberley are Broome and Kununurra. Broome was initially known for pearling however tourism is currently its major industry, while Kununurra's economy is driven by a mixture of agriculture, mining, and tourism.

Mining is by far the largest revenue earner and exploration activities include searching for diamonds, gold, iron ore, nickel, off-shore gas and crude oil. Tourism provides the second greatest contribution to the local economy.

The major agricultural activities of the Kimberley include horticulture (market gardening and fruit production), pastoralism and agriculture. Agricultural activities, horticulture and sugar cane provide substantial economic input into the region, especially in the Ord River Irrigation Area (ORIA). Pastoralism is iconic and a way of life in the Kimberley and continues to make a significant contribution to the local economy.

Natural Environment

Climate

The Kimberley has a strongly arid to semi-arid monsoonal climate that is characteristically hot and wet in the summer (wet season) and warm and dry in the winter (dry season). The months of May to August are relatively cool with average temperatures between 16°C and 32°C. In the remaining months maximum temperatures exceed 35°C and in October-November often exceed 38°C. Annual average rainfall ranges from 1,500 mm in the north-west coastal areas to less than 350 mm on the southern

perimeter and is generally confined to the six-month 'wet' period November to April, with January and February being the wettest months. It has a pronounced north-south rainfall gradient, so that southern parts of the zone are semi-arid, with a shorter growing season, less reliable rainfall, and higher annual temperature range than the northern parts.

Rivers

The Kimberley includes over one hundred rivers and many more creeks and streams which flow north or west, forming the Timor Sea drainage division. They exhibit highly seasonal flow conditions as a result of being located at the southern edge of the global monsoon system, where intense and widespread rainfall results in flood flows during summer. The largest river in terms of flow in the Kimberley, and in WA, is the Fitzroy – which has floodplains several kilometres wide. The Ord is the second largest river in WA and one of the most well-known. Water from the Ord River is used in the economically important Ord River Irrigation Area.

Wetlands

There are 23 wetlands (including rivers) of national importance and four Ramsar listed wetlands within the Kimberley and nine on the Register of National Estate. The four declared Ramsar sites (listed as International wetlands of significance under a global treaty) in the Kimberley are Lake Kununurra and Lake Argyle, the Ord River Floodplain, Roebuck Bay, and Eighty Mile Beach. Paruku (Lake Gregory) also satisfies criteria for listing as a Ramsar site.

Coastline

The Kimberley coast is approximately 2,500 kilometres in length and contains more than 2,500 islands. It's unique from an Australian perspective due to its large tidal range, with a movement of up to 12 metres driving coastal processes. This coast is one of the most contorted of anywhere on the Australian coastline and its geological, biological, and anthropogenic history is unique.

Flora and Fauna

Biodiversity in this subregion is unique and highly varied. It supports a diverse and spectacular flora of more than 2,000 plant species and the fauna is unique and rich in species diversity, including many threatened and endangered species.

Vegetation

Vegetation is generally characterised as tropical savanna, although there is considerable variation throughout, determined by rainfall, topography, and soils. The most extensive vegetation is eucalypt woodland and open woodland, but there are also areas of hummock grassland, tussock grassland and acacia open woodland. The ground layer is almost always dominated by grasses, with grazing mostly based on native, perennial tussock grasses and in some instances introduced buffel and birdwood grasses.

IBRA Subregions

The Kimberley contains five IBRA sub-regions: Central Kimberley, Dampierland, Northern Kimberley, Ord Victoria Plains and Victoria Bonaparte.

To read more about IBRA subregions, and to access the Australian Government's detailed descriptions of each, visit the Department of Climate Change, Energy, the Environment and Water website.

5.1.1 Threats to Target Areas

Threats to target areas in the Kimberley Region are presented below overlain with RLP program activities and identification of new threat/targets under review.

Kimberley Region								
Threats \ Targets	Productive Land Systems	Significant Vegatation Ecological Communities	Sites of Significance	Resilience Engaged Communities	Coastal zones and Islands	Threatened & Significant species (Flora/ Fauna)	Rivers, Lakes, Wetlands	Summary Threat Rating
Climatic change	MEDIUM RLP	LOW	LOW	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
Inappropriate Fire	HIGH RLP	HIGH RLP	MEDIUM	LOW RLP		HIGH RLP	MEDIUM RLP	HIGH
Water extraction/diversion/ hydration	LOW RLP	LOW	LOW	MEDIUM RLP		LOW	MEDIUM RLP	MEDIUM
Inappropriate tourism/ visitation	LOW RLP	LOW	MEDIUM	LOW	MEDIUM RLP	LOW RLP	LOW RLP	LOW
Inappropriate grazing management	MEDIUM RLP	MEDIUM	LOW	LOW	LOW	LOW	MEDIUM	MEDIUM
Weeds	MEDIUM RLP	MEDIUM	LOW	LOW	LOW	LOW	LOW	MEDIUM
Feral Animals (Herbivores)	MEDIUM	MEDIUM		LOW	LOW	LOW RLP	HIGH	MEDIUM
Feral Animals (Predators)	LOW RLP	LOW	LOW	LOW RLP		HIGH RLP		MEDIUM
Disconnection	MEDIUM	MEDIUM	LOW	MEDIUM	LOW	LOW	LOW	MEDIUM
Saltwater and saline intrusions	LOW	LOW	LOW	LOW		LOW	LOW	LOW
Inappropriate fishing				LOW	LOW	MEDIUM	LOW	LOW
Land Clearing	LOW	LOW	LOW		LOW RLP	LOW	LOW RLP	LOW
Mining, Industry and Pollution	LOW	LOW	LOW		LOW	LOW	MEDIUM	LOW
Summary Target Rating	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	HIGH	MEDIUM	HIGH
	Threats under review			RLP	RLP 2017-23 program/ project			

5.1.2 Kimberley Asset Register

KIMBERLEY ASSETS					
UMBRELLA					
Number	Name	Project	Number	Name	Project
B014	Buccaneer Archipelago (Sunday Island Group) Sunday Straight		B012	Canning Basin (Timor Basin)	
K056	Critical Weight Range mammal community - Carson River to Yampi Military Land		B019	Critical Weight Range mammal community - North Kimberley above 1000mm rainfall	
B023	Dampier Peninsula - West Coast		K015	Eighty (80) Mile Beach (inc: Migratory shorebirds, Bilby, ramsar areas and turtle nesting areas)	RLP
B036	Fitzroy River (Mardoowarra) -Entire system		K036	Highly productive pastoral land in the Kimberley	RLP
K032	Lake Argyle		D008	Lake Gregory (Paraku) inc migratory shorebirds	
K022	Lake Kununurra		K060	North Kimberley and Camden Sound Marine Parks	
B053	North Kimberley IBRA region	RLP	K083	North Kimberley offshore islands (31 islands)	
K035	Ord River - Entire catchment		B002	Perennial Savannah Grasslands	RLP
K017	Purnululu NP / Bungle Bungles		B071	Rainforest in the Kimberley	
B018	Riparian Vegetation Community		B040	Roebuck Bay - Entire	
B003	Savannah woodland	RLP			
SIGNIFICANT					
F002	Alexander Island		B034	Byal Byal Freshwater sawfish	
B073	Cable Beach	RLP	B022	Camballan Wetlands	
K025	Cape Domett turtle nesting beach		B027	Carnot Peaks and Kings Peak	
K053	Central Gibb River Road gorges (eg Manning, Adcock Moll)		F004	Christmas Creek	
B054	Coastal reserves including Kennedy Hill		K034	Cockburn Ranges	
K055	Critical Weight Range mammal community - Charnley River, Artesian Range (ex Beverley Spring Station)		K054	Critical Weight Range Mammal community - Mornington & Tablelands Stations	
F017	Cycads (Ridge loving Cycads on Fairfield Station)		B032	Dampier Peninsula - Gouldian Finch	
B038	Dampier Peninsula - Greater Bilby Population	RLP	B024	Dampier Peninsula - Monsoon Vine Thicket on Coastal Sands TEC	RLP
B037	Dampier Peninsula - Seagrass meadows		K024	Dampier Peninsula - Water Resource	
F001	Devonian Reef		D041	Dragon Tree Soak Nature Reserve	
B031	Edgar Ranges		B044	Fitzroy River- Lower reaches	
K018	Fitzroy River- Water Resource (industry groundwater in lower reaches)		F007	Fossil Soil Type	
B004	Frazier Downs Coastal Strip		K020	Geikie Gorge	

K027	Gouldian finch populations of Wyndham and Ord Stage 2.		B021	Gourdan Bay	
B067	Humpback whale calving grounds		K082	Lake Gladstone	
B039	Lake Louisa		B069	Lake Patterson	
F009	Lakes on Bulka Station		B029	Lolly Well Springs and Bobbys Creek	
D038	Mandora Marsh		K037	Mirruiwung Gajerrong DEC reserve	
F008	Mitchell and Flinders Grasslands pastoral grazing land		B001	Munkayarra Wetland	
D045	Munro Spring water and animal places		B072	Nimalaica wetland near Willie Creek	
K039	Ord River - Ramsar site including associated land system (inc: Lake Kununurra – Ramsar site and high-value conservation areas)		K023	Ord River- the lower part of the system	
K059	Ord River - Water Resource (quantity)		K057	Ord River Irrigation Area (ORIA)	
B056	P1 Public Drinking water soruce Area		D004	Paruka Indigenous Protected Area (wetland complex)	
B068	Pender Bay including Pender Gardens outstation		B035	Atlas Moth Plant -*Pittosporum moluccanum*	
K031	Rainforest, North Kimberley, particularly on Bougainville Peninsula		B049	Roebuck Bay- Faunal Values	
B051	Roebuck Bay- Fish Stocks		B048	Roebuck Bay- Intertidal mudflats	
B052	Roebuck Bay- Migratory shorebirds	RLP	B045	Roebuck Bay- Seagrass meadows	RLP
B041	Roebuck Plains Lakes/wetlands chain	RLP	D047	Salt Creek	
B017	Sandstone Ridges (Heath vegetation community)		B064	Scaly-tailed Possum and Rock Ringtail	
B063	Sea Turtles- Across the region	RLP	B046	Small mammals (Golden back tree rat and Golden Bandicoot [Dampier Peninsula] and Dunnarts)	RLP
F006	Spectacle Hare Wallaby	RLP	B030	TECs and PECs in Broome Peninsula and Dampier Peninsula	
B061	Tropical rangelands		K019	Tunnel Creek	
B020	Udialla Springs (Pastoral Lease) (Oongalkakda)		B065	Vine thickets of the north and central Kimberley	RLP
D046	Wetlands of the Great Sandy Desert		K021	Wild rivers in the Kimberley	
B043	Willie Creek wetlands (Nimalarragun)		B028	Yalleroo Lakes	
B025	Yarp Lake System		TBA	Night Parrot	RLP
TBA	Bilby - macrotis lagotis	RLP	TBA	Purple Crowned fairy wren	
TBA	Black flanked rock wallaby	RLP	TBA	Northern Quoll	RLP
NOTABLE					
K073	Annie Creek		K075	Artesian Range	
B008	Beagle Bay		B007	Camballin Barrage Pool	
K079	Chamberlain River Valley		F019	Clay Soil Types	

B042	Coastal camping spots/ free camping		B070	Cypress Pine, Mt Elizabeth Station	
B026	Dampier Peninsula - Inshore dolphins		K077	Fitzroy River- on Mornington Station	
F003	Fitzroy River (Mardoowarra) - Fitzroy crossing town area and old crossing		B016	Lake Eda and other lake and wetlands systems on Roebuck Station.	
B015	Lower Liveringa (Water reserve)		K074	Marion Downs spring-fed wetlands	
B050	May River (crossing)		Desktop 3	Minyirr Park Coastal Reserve	
K076	Mornington destocked area		B066	Myroodah Crossing	
F050	Nippa Dam (mountains around)		K030	Nulla Nulla	
D049	Pepperpot Springs		K080	Phillips Range (Northern Brown Bandicoot)	
B047	Roebuck Bay & Willie Creek- Mangroves		K078	Sir John Gorge (Northern Quolls and Short-eared Rock-wallabies)	
F033	Solloman Creek Rock Hide		D048	Walyarta Salt Creek (Mandora Mash)	
K052	Wood River/ Rust Range Proposed Conservation Estate				
			Assets included under 2022 Review		

5.1.3 Key management issues and features of the Kimberley Subregion

Key features and issues of the Kimberley Subregion are:

- Fire management is increasingly important. Late dry-season fires tend to homogenise the vegetation structure, with mid-storey vegetation particularly at risk. They also contribute significantly to greenhouse gas emissions, with the savannah burning carbon method increasingly providing additional cost sharing and incentives. These fires also contribute significantly to greenhouse gas emissions.
- Increasing need for cross-tenure collaborations between pastoral, cultural and conservation land managers.
- A small proportion of the subregion is within the conservation estate (recently increased).
- In the recent past a long run of good to very good rainfall years produced the best sequence of rainfall on record, even better than the mid-1970s and the period leading up to the 1920s.
- Increased intensity of extreme rainfall events is projected.
- More hot days and warm spells are projected to increase with average temperatures continuing to increase in all seasons.
- Mean sea level will continue to rise and height of extreme sea-level events will also increase.
- Infrastructure development has made more pastoral land accessible to livestock and raised the potential for increased livestock numbers.
- The threat of woody thickening will continue to be monitored (especially in the north of the subregion)
- Basic management is still largely ‘cattle harvesting’ with minimal fences and mostly natural waters (especially in the north of the subregion).

- Income from tourism provides a substantial proportion of pastoralists' livelihood (especially in the north of the subregion).
- Weed infestation remains an on-going risk, with the Northern Kimberley the most weed-free area
- Biosecurity issues abound, including recent arrival of Myrtle Rust fungal pathogen *Austropuccinia psidii*
- Cane toads threaten the enter subregion having penetrated from Northern Territory over the last decade to the central Kimberley.
- More than 5% of the subregion is within the conservation estate.
- Included in the subregion are the expanded stage 2 and 3 of the Ord River irrigation area. This will further increase irrigated agriculture, and some pastoral leasehold land will be resumed for this purpose.

5.2 Pilbara Subregion

The Pilbara subregion of the Western Australian Rangelands covers an area larger than 500,000 square kilometres and has about 4,665 kilometres of coastline.

It is bordered by the Gascoyne subregion in the south, the Kimberley subregion in the North, the Indian Ocean to the west and the Desert Rangelands to the east.

Figure 6. Pilbara Subregion

History and Economy

Aboriginal people have lived in the Pilbara for more than 40,000 years and the many different indigenous groups of the region call it Bilybarra, which means 'dry country'. In 1818, Captain Philip Parker King arrived in the Dampier Archipelago, he was later followed by Francis Thomas Gregory who arrived in 1861 at Nickol Bay on the 'Dolphin'. Francis Thomas Gregory named Hearson's Cove, the Maitland and Fortescue rivers, the Hamersley Ranges, and Mt Samson and Mt Bruce.

Today the major towns of the Pilbara are Karratha, Roebourne, Onslow, Port Hedland, South Hedland, Newman, Pannawonica, and Tom Price.

The main economic activities of the region include mining, petroleum, pastoralism, and tourism.

Some of the most significant mineral resources being mined in this region are iron ore, salt, molybdenum, manganese, gold, copper, tantalite, silver, lead and zinc. A significant portion of the Pilbara is under mining tenement although only a small portion is directly subjected to exploration and mining activities. Currently more than 95% of Australia's iron ore exports come from the Pilbara. The Pilbara has the largest solar salt fields in Australia and the second largest in the world. As well this subregion has a large proportion of Australia's hydrocarbon reserves making it the major gas-processing hub of the nation. The Pilbara also produces oil and gas products such as fertiliser and industrial products such as those from the world's largest ammonia plant, opened on the Burrup Peninsula in April 2006.

The majority of the subregion (58 per cent) is under pastoral leasehold tenure, with leases being between 200,000 and 300,000 hectares, although smaller on the more productive coastal areas. Before the economy boom in the 1960s, pastoralism was the main industry in the Pilbara, this was until settlers realised that the environmental conditions of the region were generally unfavourable for crops.

The Pilbara is valued by the tourists for the variety of recreational experiences, wilderness experiences and scenic views it provides. Key draw cards are the region's natural assets e.g. Karijini and Millstream-Chichester National Parks.

Natural Environment

Climate

The Pilbara has a semi-arid to arid climate that is characterised by high temperatures, low and variable rainfall, and high evaporation. Between the months of October and April temperatures exceed or reach 32°C almost every day and the average maximum temperature is often over 40°C. In the winter months the average temperature falls to 25°C. Inland the temperatures are generally higher due to the absence of a cooling sea breeze.

The average annual rainfall of the Pilbara subregion ranges from about 200 to 350 mm per year, however, the rainfall can vary widely from year to year. Most of the rain falls in the summer months between December and March but can continue through until June. This is followed by a pronounced dry period between August and November. The average yearly evaporation is about 2,500 mm; this exceeds the average yearly rainfall and is consistent throughout the year.

The coast from Port Hedland to Exmouth Gulf is the most cyclone prone area in Australia, with three to four tropical cyclones expected every year.

Rivers

The major river systems of the Pilbara are the Fortescue System, and the De Grey and lesser rivers off the Northern divide of the Chichester Range. Along many of the region's rivers e.g. the Fortescue and Oakover rivers, rock holes, gorges, grassy floodplains and wooded riparian areas occur. Intermittent systems like the Fortescue and Oakover rivers drain the Hamersley Ranges, the largest mountain range in Western Australia.

Wetlands

Six Pilbara wetlands have been identified as being of national significance, including Fortescue Marsh, Millstream Pools, Karijini Gorges, Leslie Saltfields system, De Grey River, and the Mt Bruce coolibah-lignum flats. A further 12 have been identified as being of regional significance. There is one Ramsar listed wetland site, located on the very southern edge of Eighty Mile Beach.

Coastline

The Pilbara coastline is characterised by deltas like the De Grey River delta, barrier islands and lagoons with extensive mangroves, wide tidal mudflats like the Roebourne Plains and long stretches of sandy beaches or rocky shorelines.

The Dampier Archipelago has pristine reefs with islands that are virtually untouched. Some of the marine areas within the region, like the Dampier Archipelago, are considered to be the most biologically diverse in the state.

Flora and Fauna

The Department of Environment and Heritage identified the Hamersley-Pilbara area as one of the 15 biodiversity hotspots of Australia. This region provides habitat for a number of threatened, endemic and fire sensitive species and communities e.g. the ghost bat, mulgara and spectacled hare-wallaby.

The Pilbara contains known aquifers that support endemic stygofauna.

Vegetation

Arid grasses and shrubs are found widely throughout the Pilbara subregion. Hummock grasslands are the most extensive vegetation type; as well there are significant areas of tussock grassland, acacia woodland and open woodland. Smaller areas of chenopod shrubland and eucalypt woodland occur primarily on floodplains and along drainage lines. The coastal strip consists of grasslands and low open woodlands and th e coastal flats have mangroves scrub.

IBRA Subregions

The Pilbara contains one IBRA sub-region, named Pilbara.

To read more about IBRA subregions, and to access the Australian Government's detailed descriptions of each, visit the Department of Climate Change, Energy, the Environment and Water website.

5.2.1 Threats to Target Areas

Threats to target areas in the Pilbara Region are presented below overlain with RLP program activities and identification of new threat/targets under review.

Pilbara Region								
Targets / Threats	Productive Land Systems	Significant Vegatation Ecological Communities	Sites of Significance	Resilience Engaged Communities	Coastal zones and Islands	Threatened & Significant species (Flora/ Fauna)	Rivers, Lakes, Wetlands	Summary Threat Rating
Climatic change	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
Inappropriate Fire	MEDIUM	HIGH	MEDIUM	MEDIUM		HIGH	MEDIUM	HIGH
Water extraction/diversion/ hydration	LOW RLP	LOW	LOW	LOW RLP		LOW	LOW	LOW
Inappropriate tourism/ visitation			LOW		MEDIUM		LOW	LOW
Inappropriate grazing management	MEDIUM RLP	MEDIUM	LOW	MEDIUM		LOW	MEDIUM	MEDIUM
Weeds	MEDIUM RLP	MEDIUM	LOW		LOW	MEDIUM RLP	MEDIUM	MEDIUM
Feral Animals (Herbivores)	MEDIUM RLP	MEDIUM	LOW			MEDIUM	HIGH	MEDIUM
Feral Animals (Predators)						HIGH RLP		MEDIUM
Disconnection	LOW	LOW	LOW	MEDIUM	LOW	LOW	LOW	LOW
Saltwater and saline intrusions	LOW			LOW	LOW		MEDIUM	LOW
Inappropriate fishing				LOW	LOW	LOW	LOW	LOW
Land Clearing	LOW	LOW	LOW		LOW		LOW	LOW
Mining, Industry and Pollution	LOW	LOW	HIGH	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
Summary Target Rating	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH
	Threats under review			RLP	RLP 2017-23 program/ project			

5.2.2 Pilbara Asset Register

PILBARA ASSETS					
UMBRELLA					
Number	Name	Project	Number	Name	Project
Desktop 6	Burrup Peninsula		KA069	Dampier Archipelago	
Desktop 4	De Grey River		KA021	Fortescue Marsh - Entire	
KA035	Fortescue River		Desktop 5	Hamersley Range	
Desktop 7	Millstream Chichester National Park		KA004	Pilbara offshore islands (excluding Barrow Island)	
KA046	Pilbara Sand Cays - Onslow to Dampier excl Dampier Archipelago				
SIGNIFICANT					
KA062	Arid zone mangroves		Desktop 23	Barrow Island group Nature Reserve	
KA027	Blind Cave Eel		KA014	Bungaroo Valley aquifer	
T029	Cane River		KA020	Caves Creek	
KA022	Coondewanna Flats Priority Ecological Community		KA031	Coral (inshore coastal strip Onslow to 80-mile beach)	
KA017	Deep Gorge		KA010	Ephemeral wetlands of Nickol bay remnant dune and Burrup Peninsula	
KA026	Ethel Gorge		KA040	Fish resource (inshore coastal)	
KA032	Flatback Turtles - at Port Hedland	RLP	T025	Fortescue freshwater claypans downstream of the Marsh	
Desktop 8	Fortescue Marsh- Floodplain		KA065	Grazing Rangelands	RLP
KA034	Intertidal and supratidal habitat (Dampier salina)		T021	Karijini Gorges	
Desktop 9	Karijini National Park		KA070	Karrawine Gorge (Oakover River)	
KA049	Limestone Islands		Desktop 18	Lowendal Islands Nature Reserve	
KA036	Marine mangroves		KA025	Millstream wetland	
KA005	Montebello Islands		T020	Mount Meharry	
KA045	Mountain top flora (uplands of the Hamersley Ranges)		KA030	Mulga lands proposed Conservation Park	
KA023	Munjina Claypan		T007	Native perennial grasses/grasslands	
T030	Peedamulla wetlands and swamp		KA018	Pilbara leaf-nose bat at API cave	
KA003	Rock art - Burrup Peninsula		KA008	Rock art - various locations, excluding Burrup Peninsula	
KA006	Roebourne Plains	RLP	KA024	Sand dunes of Fortescue Valley	
KA064	Sea grasses -inshore coastal strip		KA019	Skull Spring (upper Oakover, De Grey River)	
T001	Springs on Cheela Plains		KA060	Themeda grasslands (Hamersley Station)	
T011	Upper Yule River catchment		T026	Weeli Wolli pools - example of pastoral lease reform	
T002	Weeli Wolli Spring		KA013	West Mid Intercourse Island	
KA002	White Sandy Dunes (on soils dataset)		KA050	Wonna Land System	
TBA	Northern Quoll		TBA	Greater Bilby	RLP
TBA	Night Parrot	RLP			
NOTABLE					

KA048	*Leeuwen's Wattle* - Acacia leeuwinana		KA039	Air Quality- Port Hedland and Dampier	
Desktop 11	Barramundi		T006	Beasley River	
T028	Bush Tucker and medicine plants		T005	Catchment areas e.g. Turner syncline (Rocklea Dome)	
KA016	Cleaverville turtle nesting sites		T022	Fortescue Marsh - Floodplain in Marillana station	RLP
KA051	Fortescue River - Floodplain on Mt Florance Station		T004	George River- estuary/river mouth	
T003	Isolated landforms e.g. Mount Robinson The Governor		KA028	Hamersley - *Lepidium catapyncon*	
KA011	Maitland River		KA015	Meentheena	
T008	Minor inland rivers		KA029	Mulgara	RLP
T031	Native Perennial grasses on Cheela Station	RLP	KA042	Natural structures that slow water within drainage channels	
KA012	Pastoral Land on Mardie and Yarraloola stations		KA041	Pastoral rangeland on Mt Florence Station (watershed of the Hamersley)	
KA047	Rare Flora (Declared Rare Flora, Priority Flora, EPBC listed flora)		T024	Riparian corridors between Karijini and Newman	
Desktop 10	Rocklea Dome		T027	Running waters - pool and spring	
T023	Springs and semi-permanent waterholes between Karijini and Newman		KA043	Steep slopes at top/edge of catchment	
KA063	Tichella / Condon beaches and estuaries		KA052	Western Turner River	
	Assets included under 2022 Review				

5.2.3 Key management issues and features of the Pilbara Subregion

Key features and issues of the Pilbara Subregion are:

- About 15% of the pastoral leases are under Indigenous ownership and another 15% are under mining company ownership.
- Infrastructure development has made more pastoral land accessible to livestock and raised the potential for increased livestock numbers.
- Stocking rates have increased considerably since the early 1990s.
- Wild dog numbers and their impacts have increased markedly in recent years.
- Camel populations continue to encroach from desert areas in the east of the bioregion, with joint desert-pastoral interface partnerships fluctuating.
- Mesquite and Parkinsonia weeds in the western part of the bioregion, and upper catchments of the rivers. Despite significant resources going into management, the problem remains out of control.
- About 8.3% of the bioregion is within the conservation estate.
- Average temperatures will continue to increase in all seasons and more hot days and warm spells are projected.
- There is also high confidence of increase in the intensity of extreme rainfalls events, with low pressure cyclonic cells penetrating further and more frequently into the Pilbara (and Deserts)
- Mean sea level will continue to rise and height of extreme sea-level events will also increase.

5.3 Gascoyne Subregion

Figure 7. Gascoyne Subregion

The Gascoyne subregion of the Western Australian Rangelands covers an area of approximately 264,497 square kilometres.

It is bordered by the Murchison subregion in the south, the Pilbara subregion in the North, the Indian Ocean to the west and the Desert subregion to the east.

History and Economy

The Gascoyne subregion was home to Aboriginal people for thousands of years before it was discovered by Europeans. There are many key cultural and sacred sites throughout the subregion that provide significant insight into the rich heritage of Aboriginal history. This includes Shark Bay (a national heritage listed area); Mt Augustus and Wilgie Mia, the world's oldest ochre mine, just to name a few.

In 1818 Lieutenant Phillip Arthur King completed a survey of the Exmouth Gulf. In 1839 the British explorer Lieutenant George Grey and his party, came across Bernier Island (approximately 48.3 km west of Carnarvon) and the Gascoyne River for the first time, however there was little settlement until the 1890s Murchison gold rushes. Early pastoral settlements were focused along and around the major water courses. During this period the Aboriginals were forced away from their traditional ceremonial and hunting sites. This resulted in tribal disintegration and caused fragmented family groups to adapt their lifestyle and congregate on pastoral properties. The Aboriginal people were highly valued and respected workers and were considered to be the backbone of the cattle industry.

In the 1930s orchards were established, the Gascoyne River bridge was built and there was a prosperous sheep industry.

Today the major towns of the Gascoyne are Carnarvon, Exmouth, Denham, Gascoyne Junction, Burringurrah Community and Coral Bay.

The main economic activities of the region include pastoralism, horticulture, retail, tourism, mining, and fishing.

Pastoralism is the dominant land use in the Gascoyne. Lease sizes are typically between 100,000 and 250,000 hectares.

The regions horticultural crops include bananas, tomatoes, grapefruit, mangos, table grapes and a range of vegetables products grown along the Gascoyne River.

The fishing industry of the Gascoyne is based in Carnarvon and Exmouth and includes prawn, scallop, crab, and wet line fishing operations.

Mining operations include salt and gypsum mining; these are mined at Lake MacLeod, north of Carnarvon.

Due to the warm climate and long coastline, which includes Ningaloo Coast and Shark Bay World Heritage Areas, tourism is an important industry in the Gascoyne subregion.

Natural Environment

Climate

The climate of the Gascoyne is semi-arid to arid, with hot summers and mild winters. Temperatures are highest between January and February, during this time inland average temperatures generally exceed 37°C. Due to sea breezes, coastal temperatures are kept well below those inland. Average winter temperatures range below 18°C in the far south to 23°C in the North. In July the overnight minimum averages about 10°C in coastal area's and 6°C in the far east.

The average annual rainfall of the Gascoyne is between 190 mm to 250 mm and is relatively uniform throughout most of the region; however, it is highly variable particularly in the central and eastern parts. Most of the rainfall occurs in two 'seasons' – January to March and May to July. Summer rainfall is less reliable than the May to July rainfall, but it can be very significant especially when it is produced by tropical lows and cyclones.

Rivers

The watercourses of the Gascoyne are ephemeral, meaning the rivers dry up for at least part of the year. The western half of this region is dominated by the catchment areas of the Ashburton and Gascoyne Rivers. The Gascoyne River Basin has a total area of approximately 77,600 km2 and discharges into the ocean at Carnarvon. Tributaries of the Gascoyne River include Lyons River, Turner Creek, Thomas River, Dalgety Brook. The Lyndon and Minilya Rivers are two relatively small rivers originating in the inland rangelands and discharging into Lake Macleod, a wetland of national significance.

Wetlands

Although much of the subregion's surface water is ephemeral, there are a number of permanent pools and soaks that survive the summer as wetlands.

Wetlands of national significance in the Gascoyne region are Cape Range Subterranean Waterways (including the associated karst system), Exmouth Gulf east, Lake Macleod and the McNeil Claypan System. The northern end of Lake Macleod has been proposed for listing as a wetland of international significance under the Ramsar agreement.

Wetlands of regional significance within river systems of the subregion include Cattle Pool and Edithana Pool (Lyons River), Rocky Pool, Fishy Pool, Erong Spring, Mibbley Pool, Yinnitharra Cattle Pool and Mooka Springs (Kennedy Ranges) (all part of the Gascoyne River system) and Callytharra Spring (Wooramel River).

Coastline

The Gascoyne coastline can be broken up into three broad areas; the Shark Bay Area in the south, the Ningaloo Coast and Exmouth Gulf in the north and the Quobba Coast in between. Shark Bay is

Australia's largest enclosed marine embayment and Ningaloo Reef is Australia's only fringing coral reef.

Flora and Fauna

The biodiversity of the Gascoyne is rich and varied across extensive terrestrial ecosystems. The region also has an exceptional marine and coastal zone which includes the Ningaloo fringing reef and parts of the Shark Bay World Heritage Area.

Vegetation

Vegetation of the Gascoyne is predominantly chenopod and Acacia shrublands and woodlands, however many other vegetation types can be found within this region. Much of the Gascoyne region can be described as the 'mulga zone'. The natural vegetation of this region consists of Spinifex (Triodia), Wattle (Acacia) and Poverty Bush (Eremophila) shrub varieties.

Along the subregion's rivers and adjacent floodplains a number of eucalypt varieties grow along with Paperbarks (Cadjeputs). On the alluvial flats shrubs of Bluebush (Maireana) and Saltbush (Atriplex) species are present. In coastal areas Mangroves grow. The hardpan plains support open mulga woodlands and scrub, the ranges are dominated by Eremophila shrublands and the salt lakes are characterised by succulent steppes.

IBRA Subregions

The Gascoyne contains two IBRA sub-regions: Carnarvon and Gascoyne.

To read more about IBRA subregions, and to access the Australian Government's detailed descriptions of each, visit the Department of Climate Change, Energy, the Environment and Water website.

5.3.1 Threats to Target Areas

Threats to target areas in the Gascoyne Region are presented below overlain with RLP program activities and identification of potential new threat/targets under review.

Gascoyne Region								
Targets / Threats	Productive Land Systems	Significant Vegatation Ecological Communities	Sites of Significance	Resilience Engaged Communities	Coastal zones and Islands	Threatened & Significant species (Flora/ Fauna)	Rivers, Lakes, Wetlands	Summary Threat Rating
Climatic change	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM
Inappropriate Fire	LOW	LOW	MEDIUM	LOW	LOW	LOW	LOW	LOW
Water extraction/diversion/ hydration	MEDIUM RLP		LOW	LOW RLP		LOW	LOW	LOW
Inappropriate tourism/ visitation	LOW		MEDIUM	LOW	MEDIUM		LOW	LOW
Inappropriate grazing management	HIGH RLP		LOW	LOW RLP	LOW	LOW	MEDIUM	MEDIUM
Weeds	MEDIUM		LOW			LOW	LOW	LOW
Feral Animals (Herbivores)	HIGH RLP	LOW		LOW RLP	LOW	LOW	MEDIUM	MEDIUM
Feral Animals (Predators)						MEDIUM		LOW
Disconnection	LOW RLP		LOW	MEDIUM RLP	LOW	LOW	LOW	LOW
Saltwater and saline intrusions	MEDIUM	LOW		LOW	LOW		LOW	LOW
Inappropriate fishing				LOW	MEDIUM	MEDIUM	LOW	MEDIUM
Land Clearing			LOW		LOW	LOW		LOW
Mining, Industry and Pollution	LOW		LOW		LOW	LOW	MEDIUM	LOW
Summary Target Rating	HIGH		LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
Threats under review				RLP	RLP 2017-23 program/ project			

5.3.2 Gascoyne Asset Register

GASCOYNE ASSETS					
UMBRELLA					
Number	Name	Project	Number	Name	Project
G002	Gascoyne River	RLP	Desktop 13	Islands off the North-West Cape	
C008	Ningaloo Reef	RLP	Desktop 14	Shark Bay- Peninsulas and islands	
Desktop 40	Shark Bay- Marine Park (East Shark Bay)	RLP	Desktop 41	Wooramel River channel and floodplains	
SIGNIFICANT					
C011	Barlee Range reserve (Jidarda)		C038	Bernier and Dorrie Islands	
Desktop 24	Bottomland systems- Gascoyne		Desktop 16	Carnarvon Coastal Plain landsystems	RLP
C024	Carnarvon horticulture precinct		C005	Chaffcutters and associated springs	
C014	Chenopod shrublands at Lake MacLeod		G016	Cobra Valley	
C037	Dugong		C022	Eastern escarpment of Kennedy Range National Park	
Desktop 22	Exmouth Gulf- Entire		Desktop 19	Exmouth Gulf- Islands Nature Reserves	
G018	Gascoyne Floodplains	RLP	C023	Gascoyne River Aquifers (Carnarvon)	
C031	Gascoyne River mouth		Desktop 17	Karst System of Cape Range	
Desktop 20	Lake Macleod - Entire		C001	Lake Macleod - Northern ponds	
G013	Lorna Glen and Earaheedy Reserves		G014	Lower Ashburton floodplains and coastal area	
G023	Lower Lyons River		C004	Mooka Spring	
G019	Mount Augustus- Entire		Desktop 21	Northwest Cape Karst fauna	
G012	Palatji "Weld Spring"		C036	Sea Turtles	RLP
G008	Seeps and springs at the base of Mt Augustus		G001	Upper Lyons River	
C002	Wirrawaana (Dirk Hartog Island)		TBA	Night Parrot	RLP
TBA	Mallefowl *Leipoa ocellata*	RLP	TBA	Hamelin Pool Stromatolites	RLP
TBA	Wooramel seagrass bank	RLP			
NOTABLE					
G003	Ashburton River		Desktop 26	Birdrong Aquifer	
C032	Browera Flats		Desktop 29	Calcreted valley-fill and dolomitic areas (carbonate rocks)	
Desktop 38	Callytharra Springs area		G009	Cattle Pool	
G004	Dingo Gap		G005	Edithana Pool	
C012	Fishy Pool		C035	Fresh water seeps in frontal dune troughs	
C006	Gladstone		G007	Kurrabuka Creek	
C007	Mangroves on the Wooramal Coast		C010	Mc Neill's Claypan	
G006	Mt James area		G020	Old Cobra, original homestead	

C013	One Mile Jetty Inner Mangroves System		G017	Peedawarra Flats land system	
G021	Pingandy Creek catchment		G011	Quandong	
C009	Rocky Pool		G010	Rufous Hare-Wallaby and Western Barred Bandicoot	RLP
G015	Savory Creek- Headwaters		Desktop 28	Shark Bay- Birrida pans on peninsulas (salt lakes)	
C003	The Blowholes		G022	"The Lake" on Mt Augustus Station	

5.3.3 Key management issues and features in the Gascoyne Subregion

Key features and issues of the Gascoyne Subregion are:

- More hot days and warm spells are projected, and average temperature will continue to increase in all seasons, with future harsher fire-weather conditions.
- Winter rainfall is projected to decrease but an increase in intensity of extreme rainfall events is projected.
- Mean sea level will continue to rise and height of extreme sea-level events will also increase
- Low proportion (<10%) of pastoral leases are under Indigenous ownership.
- Low proportion (<10%) of pastoral leases are under mining company ownership.
- Historical trend in enterprise type away from merino sheep to cattle and meat sheep

5.4 Murchison Subregion

The Murchison subregion of the Western Australian Rangelands covers an area of approximately 331,775 square kilometres.

It is bordered by the South West Region and Goldfields subregion in the south, the Gascoyne subregion in the North, the Indian Ocean to the west and the Desert Rangelands to the east.

Figure 8. Murchison Subregion

History and Economy

For thousands of years the Murchison has been home to many different Indigenous groups. These groups are collectively known as the Yamatji People. Much of the traditional customs and knowledge of the Yamatji People has been lost as a result of dispossession of their homelands. The culture of the Yamatji People has been slowly eroded by the dominance of the western culture, however, the spirit and identity of these people still remains very strong.

In the early 1800s European exploration and settlement of the subregion began. On his voyage to the Shark Bay region and subsequent journey to Perth, Lieutenant George Gray named and explored many

of the coastal geographical features. By the 1850s pastoralism, agriculture and mining industries had begun to establish. In the late 1880s gold prospectors sought fortune in the Murchison gold rushes.

Today the major towns of the Murchison are Leinster, Leonora, Meekatharra, Mount Magnet, Laverton, Cue and Wiluna.

The main economic activities of the region include mining, agriculture, fishing, and tourism.

Resources that are being mined in the region include gold, coal, iron, mineral sands, copper, lead, zinc, magnesite, nickel, talc, uranium, vanadium, and titanium.

Agricultural industries include cereal and legume crops e.g. wheat, lupins and canola, livestock e.g. cattle, sheep, pigs and goats, horticulture and aquaculture.

The Murchison subregion is a popular tourist destination. Visitors to this region make an important contribution to the regions local economy.

This subregion also has a strong manufacturing sector. Most of the manufacturing businesses are focussed on servicing the agriculture, mining, and fishing industries.

Natural Environment

Climate

The climate of the Murchison is semi-arid to arid, with hot summers and mild winters. Temperatures are highest between January and February, during this time inland average temperatures generally exceed 37°C. Due to sea breezes, coastal temperatures are kept well below those inland. Average winter temperatures are below 18°C. The average annual rainfall of the Murchison is between 190 mm to 250 mm Rainfall in the Murchison is unreliable. Most of the rainfall occurs in winter and most years there is a dry period of four to six months.

Rivers

The watercourses of the Murchison are ephemeral, meaning the rivers dry up for at least part of the year. The major catchment of the region is the Murchison River catchment. The Murchison River Basin has a total area of approximately 91,000 km2 and discharges into the Indian Ocean at Kalbarri. It includes tributaries of the Sandford, Roderick, Yalgar, and Hope rivers.

Wetlands

Although much of the subregion's surface water is ephemeral, there are a number of permanent pools and soaks that survive the summer as wetlands. Wetlands of national significance in the Murchison subregion are Hamelin Pool, Murchison River (lower reaches), Anneen Lake (Lake Nannine), Breberle Lake, Lake Ballard, Lake Barlee, Lake Marmion, and Wooleen Lake.

Coastline

The major area of coastline in the Murchison subregion is the Shark Bay World Heritage Area. The Shark Bay World Heritage Area is Australia's largest enclosed marine embayment. It covers an area more than 2.2 million hectares and has a coastline greater than 1,500 km long.

Flora and Fauna

The biodiversity of the Murchison is rich and varied across extensive terrestrial ecosystems. The Shark Bay World Heritage Area is an exceptional marine and coastal zone.

Vegetation

Vegetation is predominantly chenopod and Acacia shrublands and woodlands, however many other vegetation types can be found within this region. The Murchison subregion is essentially Western Australia's mulga region. Vegetation within this subregion is closely associated with the climate, geology, and soils. Mulga low woodlands are supported by areas of outcropping rock with skeletal soils. On calcareous soils there are hummock grasslands and saltbush shrublands while on saline alluvium areas there are samphire (Halosarcia sp.) low shrubland. To the east of the subregion, mallee-mulga parkland over hummock grassland is supported by red sand plains. The lake margins in the Murchison are dominated by lignum (Muehlenbaeckia cunninghamii) and low open woodland of river red gum (Eucalyptus camuldulensis).

IBRA Subregions

The Murchison contains two IBRA sub-regions: Murchison and Yalgoo.

To read more about IBRA subregions, and to access the Australian Government's detailed descriptions of each, visit the Department of Climate Change, Energy, the Environment and Water website.

5.4.1 Threats to Target Areas

Threats to target areas in the Murchison Region are presented below overlain with RLP program activities and identification of potential new threat/targets under review.

Murchison Region								
Targets / Threats	Productive Land Systems	Significant Vegatation Ecological Communities	Sites of Significance	Resilience Engaged Communities	Coastal zones and Islands	Threatened & Significant species (Flora/ Fauna)	Rivers, Lakes, Wetlands	Summary Threat Rating
Climatic Change	HIGH	MEDIUM	LOW	MEDIUM	LOW	LOW	LOW	MEDIUM
Inappropriate Fire	LOW	LOW	LOW	LOW		LOW	LOW	LOW
Water extraction/diversion/ hydration	LOW RLP		LOW	LOW RLP		LOW	LOW	LOW
Inappropriate tourism/ visitation	LOW		MEDIUM	LOW			LOW	LOW
Inappropriate grazing management	HIGH RLP	LOW	LOW			MEDIUM	MEDIUM	MEDIUM
Weeds	MEDIUM	LOW	LOW	LOW		LOW	LOW	LOW
Feral Animals (Herbivores)	HIGH	MEDIUM				LOW	MEDIUM	MEDIUM
Feral Animals (Predators)	LOW	LOW	LOW	LOW		MEDIUM	LOW	LOW
Disconnection	LOW RLP	LOW	LOW	MEDIUM RLP		LOW	LOW	LOW
Saltwater and saline intrusions	LOW	LOW	LOW	LOW		LOW	LOW	LOW
Inappropriate fishing								
Land Clearing			LOW	LOW		LOW	LOW	LOW
Mining, Industry and Pollution	LOW	LOW	LOW	LOW		LOW	LOW	LOW
Summary Target Rating	HIGH	MEDIUM	LOW	LOW		MEDIUM	MEDIUM	MEDIUM
	Threats under review			RLP	RLP 2017-23 program/ project			

5.4.2 Murchison Asset Register

UMBRELLA					
Number	Name	Project	Number	Name	Project
M001	Murchison River		M012	Sandalwood	
SIGNIFICANT					
M129	Banded Ironstone Formation- Jack Hills		M019	Banded Ironstone Formation - Mt Forrest and Ida Valley Reserve	
M128	Banded Ironstone Formations- across the Midwest		M009	Beiring Pool (linked to Junga Drainage system)	
M120	Bottomland systems- Murchison		M017	Depot springs Calcrete Aquifer PEC	
M080	Greenough River		M005	Hope River and Muggabullin Swamp	
M008	Junga drainage system		M006	Lake Austin	
M015	Lake Ballard		M007	Lake Nallan and Nallan Creek	
M018	Lake Raeside		M126	Low slopes of breakways in Lake Noondie catchment	
M041	Monger's Lake system		M081	Murchison River- Beringarra to Meebury	
M085	Murchison River- Sills and filters		M160	Ninghan Station	RLP
M082	Roderick River- Gordon's creek, north sytem		M083	Roderick River- South Branch	
M121	Walga Rock		M004	Wooleen Lake- Entire	RLP
M127	Yuinmery Station		TBA	Malleefowl	RLP
NOTABLE					
M014	Banded Ironstone Formation- Mt Richardson		Desktop 33	Breberle Lake	
M123	Bulga Downs Station bottomlands- Lana's Paddock		M125	Bulga Downs Station bottomlands- Ram Paddock	
M124	Bulga Downs Station bottomlands- Ten Foot Well		Desktop 35	Dalgaranga Crater Reserve	
M011	Emu Land system		M013	Goongarrie Bluebush Plains	
Desktop 31	Lake Annean		Desktop 32	Lake Barlee	
M122	Mount Barloweerie		Desktop 39	Mount Narryer	
M084	Mt Luke Creek		Desktop 36	Mungawolagudgi Claypan	
M042	Sandford River System		Desktop 37	Thundelarra Lignum Swamp	
Desktop 34	Wagga Wagga Salt Lake		M016	Wanjarri Nature Reserve	
M003	Wilgia Mia Mine		M010	Zuydtdorp cliffed coast	
	Assets included under 2022 Review				

5.4.3 Key management issues and features of the Murchison Bioregion

Key features and issues of the Murchison Subregion are:

- More hot days and warm spells are projected, and average temperature will continue to increase in all seasons, with future harsher fire-weather conditions.
- Winter rainfall is projected to decrease but an increase in intensity of extreme rainfall events is projected.
- Mean sea level will continue to rise and height of extreme sea-level events will also increase
- About 6% of the pastoral leases are under Indigenous ownership and another 22% are under mining company ownership.
- There has been a strong trend in enterprise type away from merino sheep to cattle, meat sheep and rangeland goats. This change was due to low wool prices, high meat prices, difficulty in finding labour for wool enterprises and wild-dog predation on sheep. Infrastructure on many stations, especially fencing, is not being maintained. This is partly the result of the move away from merino sheep.
- An increasing percentage of pastoralists expect to earn significant off-station income, principally from supporting the mining industry. Many leases are unviable as pastoral enterprises on their own.
- Unmanaged goats contribute a large proportion of the total grazing pressure and their contribution to station income can be high. A large number of trap yards have been built in the past 10 years, as a way of lowering the cost of mustering and for better controlling total grazing pressure.
- Wild dog numbers and their impacts have increased markedly in recent years, leading to some recent state government-backed interventions.

5.5 Goldfields-Nullarbor Subregion

The Goldfields-Nullarbor subregion of the Western Australian Rangelands covers an area larger than 930,000 square kilometres. It is bordered by the Southwest Region and Southern Ocean in the south, the Murchison subregion and Desert subregion in the North, the Southwest Region to the west and South Australia to the east.

Figure 9. Goldfields-Nullarbor Subregion

History and Economy

Prior to European settlement, the Goldfields-Nullarbor subregion was used for thousands of years by the Aboriginal people. In the late nineteenth century European development and economic exploration of the subregion began. In the 1880s and 1890s gold was discovered in the subregion.

The Goldfields-Nullarbor subregion's primary economic activities include mining, agriculture, fishing, forestry, manufacturing, construction, and tourism; however, economic activity of the subregion is overwhelmingly dominated by mining, particularly gold and nickel mining. Although mining dominates the subregion in monetary terms, the most extensive land-use is pastoralism. Native Title has been declared over lands occupied by the Ngaanyatjarra and Tjuntjuntjarra communities and their residents.

Aboriginal artists from the Goldfields are world-renowned for their dot paintings and glass blowing, both of which have found important markets in Europe.

Natural Environment

Climate

The climate in the Goldfields-Nullarbor subregion is arid to semi-arid, with hot summers and mild winters. Summers in this subregion are extremely variable; daily temperatures exceeding 40°C can be followed by cloudy days with temperatures in the low 20's. The mean average summer temperature ranges from 16°C to 34°C.The mean average winter temperature ranges from 4°C to 17°C.

Within the subregion there is a rainfall gradient; in the southwest area there is a winter rainfall regime of about 300 mm annual rainfall while in the northern Nullarbor area there is a non-seasonal regime of about 150 mm annual rainfall. Tropical cyclones influence the region in the form of rain-bearing depression and can often result in large rainfall events. The average yearly evaporation exceeds the average yearly rainfall and is about 2400 to 2800 mm.

Rivers

The Goldfields-Nullarbor subregion is almost completely devoid of major riverine landform features and there are no permanent watercourses. Most of the river systems within this subregion are short and all of them are ephemeral and infrequently, flowing briefly following large episodic rainfall events like tropical cyclones. Three 'wild rivers' have been identified within this region; these are Savory Creek, Herbert Wash and Ponton Creek.

Wetlands

The Goldfields-Nullarbor subregion has no permanent watercourses; however, there are numerous salt lakes of varying sizes throughout the area.

Coastline

The coastline and marine environment of the Goldfields-Nullarbor subregion is poorly researched. It is known that the subregion is an important habitat for marine mammals and that offshore areas feature algal beds and seagrass meadows.

The subregion hosts a number of species which are of commercial and/or recreational value, these species include Southern Rock Lobster (Jasus edwardsii), several abalone species, scallops, snapper, trevally, cod and leatherjackets.

Flora and Fauna

The Coolgardie IBRA subregion is especially important as a biogeographic interzone between the moist south-west and the arid interior of the state. This IBRA subregion contains floristic elements of both zones and as a result exhibits high levels of ecological community diversity as well as a high level of species diversity.

Vegetation

In the Goldfields-Nullabor subregion there are 5 broad types of vegetation community. The treeless Nullarbor Plain and its surroundings are dominated by low halophyte and saprophyte communities sometimes. The arid regions of the central north and north-east consist of areas of hummock grasslands with various tree and shrub associations as well as areas of low open mulga woodlands. The central west and north-west are predominantly mulga woodlands with smaller areas of shrubland and hummock grasslands. The south west part of the subregion has a complex mix of vegetation types, this includes tall woodlands as well as areas of shrub-heath and tall shrubland. These woodlands are globally unique and are the largest remaining area of intact Mediterranean climate woodland on Earth. The coastline and eastern margins are colonised with a range of shrubland and low woodlands dominated by acacia and eucalyptus.

IBRA Subregions

The Goldfields-Nullarbor contains three IBRA sub-regions: Nullarbor, Hampton, and Coolgardie.

To read more about IBRA subregions, and to access the Australian Government's detailed descriptions of each, visit the Department of Climate Change, Energy, the Environment and Water website.

5.5.1 Threats to Target Areas

Threats to target areas in the Goldfields Nullarbor Region are presented below overlain with RLP program activities and identification of potential new threat/targets under review.

Goldfields Region								
Threats \ Targets	Productive Land Systems	Significant Vegatation Ecological Communities	Sites of Significance	Resilience Engaged Communities	Coastal zones and Islands	Threatened & Significant species (Flora/ Fauna)	Rivers, Lakes, Wetlands	Summary Threat Rating
Climatic Change	MEDIUM	LOW	LOW	MEDIUM		LOW	LOW	MEDIUM
Inappropriate Fire	LOW	LOW	MEDIUM	LOW		MEDIUM	LOW	MEDIUM
Water extraction/diversion/ hydration	LOW	LOW	LOW	LOW		LOW	MEDIUM	MEDIUM
Inappropriate tourism/ visitation		MEDIUM	MEDIUM	LOW		LOW	LOW	LOW
Inappropriate grazing management	HIGH RLP	LOW	LOW	LOW		MEDIUM	MEDIUM	MEDIUM
Weeds	MEDIUM RLP	MEDIUM	LOW			LOW	LOW	MEDIUM
Feral Animals (Herbivores)	MEDIUM	LOW				LOW	MEDIUM	MEDIUM
Feral Animals (Predators)	LOW	LOW				MEDIUM		LOW
Disconnection	MEDIUM	LOW	LOW	MEDIUM RLP		LOW	LOW	MEDIUM
Saltwater and saline intrusions	MEDIUM	LOW	LOW	LOW		LOW	LOW	LOW
Inappropriate fishing								
Land Clearing	LOW	MEDIUM	LOW	LOW		MEDIUM	LOW	LOW
Mining, Industry and Pollution	LOW	LOW	LOW	LOW		LOW	MEDIUM	LOW
Phytopthera dieback		MEDIUM		LOW				LOW
Summary Target Rating	MEDIUM	MEDIUM	MEDIUM	LOW		MEDIUM	MEDIUM	MEDIUM
	Threats under review			RLP	RLP 2017-23 program/ project			

5.5.2 Goldfields Nullarbor Asset Register

GOLDFIELDS ASSETS					
UMBRELLA					
Number	Name	Project	Number	Name	Project
Desktop 42	Great Western Woodlands	RLP	E003	Lakeside soil- Vegatation system	
E005	Nullabor Karst		N018	Nullarbor pastoral land (Rawlinna Area)	RLP
N020	Old growth woodlands in the Great Western Woodlands		N001	Pastoral land/properties in the Goldfields (all)	RLP
N033	Pontoon Creek and lakes draining into Lake Boondaroo		E018	Sheetflow Land Systems - "Bottom Lands" above the salt lakes	
SIGNIFICANT					
N027	Banded Ironstone Formation and DRF at Die Hardy Range		N009	Banded Ironstone Formation, DRF and landscape at Helena and Aurora Range	
E015	Brockway Timber Reserve		N034	Cape Arid National Park	
E016	Dundas Nature Reserve		E009	Eyre Bird Observatory Reserve	
N006	Fraser Range (Hills)		N007	Johnson/ Hope Lake system	
N013	Lake Boondaroo wetland		Desktop 43	Nuytsland Nature Reserve	
N002	Old growth woodlands at Johnson Lakes		N010	Peak Charles National Park and granites	
N005	Plumridge Lakes Nature Reserve		N003	Rowles Lagoon, Clear and Muddy Lakes Reserve and Brown Lagoon	
E001	Western Ground Parrot		N028	Windarling Peak and associated DRF and critcally endangered flora	
TBA	Malleefowl	RLP			
NOTABLE					
E019	Bluebush Plains		E012	Hairy Nosed Wombat	
N012	Harris Lake Bunagonia Spring (on top of Lake Harris)		E004	Mt Ney	
E006	Mt Ridley		N014	Naretha Blue-bonnet	
E002	Russel Ranges		E014	Unique geological formation on Hampton Hill Station	
E008	"Woodline"- Old mining infrastructure		N011	Woodline Hills Priority Ecological Community	
	Assets included under 2022 Review				

5.5.3 Key management issues and features of the Goldfields Nullarbor Subregion

Key features and issues of the Goldfield Nullarbor Subregion are:

- Most of the bioregion is held as Aboriginal land or conservation reserve.
- More hot days and warm spells are projected, and average temperature will continue to increase in all seasons, with future harsher fire-weather conditions.
- Winter rainfall is projected to decrease but an increase in intensity of extreme rainfall events is projected.
- About 25% of the pastoral leases are under mining company ownership.
- There has been a strong trend in enterprise type away from merino sheep to cattle, meat sheep and rangeland goats. This was due to low wool prices, high meat prices, difficulty in finding labour for wool enterprises and wild-dog predation on sheep. Infrastructure on many stations, especially fencing, is not being maintained. This is partly the result of the move away from grazing merino sheep.
- Unmanaged goats contribute a large proportion of the total grazing pressure, and their contribution to station income can be high.
- About 13% of the region is within the conservation estate.
- Wild dog numbers and their impacts have increased markedly in recent years.
- High numbers of kangaroos (fluctuating) contribute a significant proportion of total grazing pressure.
- Lack of water, both potable and of stock quality, is the major limiter to any development.
- Much of the area has been modified by extensive fires.
- Increasing tourism pressure (whale watching, surfing, fishing) along the coastal fringe is evident.

5.6 Desert Subregion

The Desert subregion largely covers the inner east area of Western Australia. It is bordered by the Goldfields-Nullarbor subregion in the south, the Kimberley subregion in the North, the Pilbara, Gascoyne, and Murchison subregions to the west and South Australia and the Northern Territory to the east. The Desert subregion covers six IBRA bioregions: the Great Sandy Desert, the Gibson Desert, the Little Sandy Desert, the Great Victoria Desert, the Central Ranges and Tanami. This subregion is sparsely populated and consists of Aboriginal communities and mining centres.

Figure 10. Desert Subregion

History and Economy

The Desert – like anywhere in Australia - is home to Aboriginal people and has been for tens of thousands of years, and despite comparatively less interference from the Europeans (as compared to areas closer to the coast and in the major regional population centres), there have been profound impacts to their homelands, starting with the early European exploration expeditions (e.g. Canning Stock Route, Gunbarrel Highway, Great Central Highway, and others), through to forced removal from Country under the guise of weapons testing during the Cold War. The Homelands Movement of 1980s saw autonomously led returns to Country, which government was late to support.

European exploration expeditions within this region:

Colonel Peter Egerton-Warburton CMG, a British explorer, was the first European to cross the Great Sandy Desert, which he did between 1873 to 1874. In 1874, British-born Australia explorer Ernest Giles named the Gibson Desert after a member of his party, Alfred Gibson, who became lost in the desert and presumably died. In 1875, Giles became the first European to cross the Great Victorian Desert, which he named after the then reigning British monarch, Queen Victoria. Later, in 1891, David Lindsey, an Australian exporer born in Goolwa, South Australia, conducted an expedition that crossed the Great Victorian Desert from North to South.

The First Nations across the Western Deserts include the Nyangumarta People, the Tjurabalan People, the Martu People, the Ngurrara People, the Ngurra Kayanta Peoples, the Pintupi People, the Ngururrpa Peoples, the Lappi Lappi & Ngulupi Peoples, the Wiluna Martu Peoples, the Wiluna Tarlpa People, the Kultju People, the Ngaanyatjarra Peoples, the Manta Rirrtinya Peoples, the Nangaanya-ku People, the Spinifex/Pilki/Untiri Pulka Peoples, the Yilka Peoples, the Tjiwarl Peoples, the Gingirana Peoples, the Upurli Upurli Nguratja People, the Ngadju People Through Native Title claims and determinations the Western Deserts First Nations

There are very few settlements, which includes some of the most remote communities in Australia, namely Kiwirrkura and Tjuntjuntjara. The margins of this region support some mining and mineral exploration activities e.g. Telfer Gold Mine and Nifty Copper Mine) as well as pastoralism, tourism and Indigenous art. Land management activities across the above mentioned Native Title claims and determinations amount to a public service with respect to the imperatives of the state and national NRM sector, with Aboriginal ranger programs (now auspiced increasingly by the Indigenous Desert Alliance) delivering critical NRM management interventions, underpinned by the desert peoples deep cultural values.

Natural Environment

Climate

The climate of the Desert subregion is hot and arid. Rainfall in this region can be variable and unpredictable in parts or it can be summer or winter dominant. Tropical cyclones can sometimes cross the coast and penetrate well inland to the Desert subregion. Their winds rapidly lose strength as they pass over the land, however the rains can reach deep inland.

Hydrology

Hydrology of the Desert subregion is limited to short ephemeral creeks and rivers, which only flow after heavy rainfalls. In the northern limits of the Great Sandy Desert IBRA region there are the Rudall River, Cotton River, and Dragon Tree Soak. The Rudall River flows about 120 km into Lake Dora and is a significant wetland/ecological refuge for the region as it contains major permanent waterholes and soaks. Dragon Tree soak is a freshwater spring that supplies freshwater to the marsh and peatland.

The Desert region also has a number of salt lakes e.g. Lake Disappointment and Lake Mackay.

Flora and Fauna

Biodiversity of the Desert varies across extensive terrestrial ecosystems. Each of the IBRA subregions within the desert region supports threatened flora and fauna species.

Vegetation

Vegetation of the desert subregion is predominately desert grasslands e.g. hummock grasslands, scattered trees and shrubs e.g. *Eucalyptus*, *Acacia*, *Hakea* and *Grevillea*, and mulga woodland.

IBRA Bioregions

The Desert contains six IBRA regions: Great Sandy Desert, Little Sandy Desert, Gibson Desert, Great Victoria Desert, Central Ranges and Tanami.

To read more about IBRA subregions, and to access the Australian Government's detailed descriptions of each, visit the Department of Climate Change, Energy, the Environment and Water website.

5.6.1 Threats to Target Areas

Threats to target areas in the Desert Region are presented below overlain with RLP program activities and identification of potential new threat/targets under review.

Desert Region								
Targets / Threats	Productive Land Systems	Significant Vegatation Ecological Communities	Sites of Significance	Resilience Engaged Communities	Coastal zones and Islands	Threatened & Significant species (Flora/ Fauna)	Rivers, Lakes, Wetlands	Summary Threat Rating
Climatic change		LOW	LOW	MEDIUM		LOW	LOW	LOW
Inappropriate Fire	■	MEDIUM RLP	MEDIUM RLP	■		MEDIUM RLP	MEDIUM RLP	MEDIUM
Water extraction/diversion/ hydration							LOW	LOW
Inappropriate tourism/ visitation							LOW	LOW
Inappropriate grazing management								
Weeds		HIGH					MEDIUM	MEDIUM
Feral Animals (Herbivores)	■	LOW	LOW	LOW		LOW	MEDIUM	LOW
Feral Animals (Predators)	■		■	■		MEDIUM		
Disconnection	■	LOW	LOW	LOW RLP		LOW	LOW	LOW
Saltwater and saline intrusions								
Inappropriate fishing								
Land Clearing								
Mining, Industry and Pollution			LOW				MEDIUM	MEDIUM
Summary Target Rating		MEDIUM	LOW	MEDIUM		MEDIUM	MEDIUM	MEDIUM
■ Threats under review				RLP	RLP 2017-23 program/ project			

5.6.2 Desert Asset Register

DESERT ASSETS					
UMBRELLA					
Number	Name	Project	Number	Name	Project
D018	Canning Stock route (water sources)		Desktop 46	Lake Dora and Rudall River	
D011	Officer Basin		D021	Waterholes of the Western Desert (Martu determination)	
SIGNIFICANT					
D007	Bilby habitat	RLP	D014	Black- flanked Rock Wallaby	RLP
D029	Blue Hills breakaway		D027	Canning Basin peleodrainage channel	
D001	Carnarvon Range including Lake Kerlyn		D028	Desert Sheoak Woodlands	
D016	Great Desert Skink		D040	Great Victoria Desert Nature Reserve	
D035	*Grevilliea ilkurlka*		D030	Ilgarari Creek terminal lake system	
D002	Jilukurru (Durba Springs		Desktop 47	Kaalpi (Calvert Range)	
D017	Karlamilyi River catchment (Rudall River)		D009	Kiwirrkurra	
D057	Known Malleefowl site #1	RLP	D058	Known Malleefowl site #2	RLP
D006	Lake Disappointment		D042	Lake Mackay	
D012	Long unburnt Spinifex	RLP	D022	Marsupial Mole (Northern and Southern species	
D013	Mopoke Spinifex at Well 30		D003	Mungarlu (Constance Headland)	
D039	Neale Junction Nature Reserve		D043	Night Parrot	RLP
D010	Nyinmi/Jupiter Well		D020	Percival Lakes	
Desktop 44	Plumridge Lakes Nature Reserve		D019	Queen Victoria Spring and Yellow Sand Plain Nature Reserve	
D025	Remnant rock wallaby populations in desert e.g. Lennard Bastion		D005	Savory Creek- Entire	
D031	Serpentine Lakes		D052	Unnamed breakaway # 2	
D036	Unnamed Breakaway # 3		D032	Wanna Lakes	
TBA	Crest tailed Mulgara	RLP	TBA	Dunnart	RLP
NOTABLE					
D054	Freshwater asset (Lake)		Desktop 49	Gibson Desert Gnamma Holes	
D034	Greater Stick-nest Rat nest		D059	Known Malleefowl site # 3 (inactive)	
N008	Lake Brown		Desktop 50	Lake Gruszka	
D037	Lizzie Lightfoot and Ernest Favenc Range		DO26	Mungilli Claypan	
D044	Ngaanyatjarra IPA	RLP	D015	Northern Quoll	RLP
D062	Permanent water source		D024	Princess Parrot, Rainbow Bee-eater, Peregrine Falcon (Princess Parrot etc)	
D056	*Ptilotus blackii* and Priority and threatened fauna (birds)		D033	Western Desert Taipan	
	Assets included under 2022 Review				

5.6.3 Key management issues and features of the Desert Subregion

Includes Aboriginal land, unallocated crown land and conservation reserves. Conservation and Aboriginal land are the main land uses, with mining and exploration in restricted locations. The bioregion has a very low population.

Key features and issues of the Desert Subregion are:

- Camels, horses, and donkeys are an increasing feral problem. Damage caused by large groups of camels is not limited to vegetation and waterholes; reports of damage to infrastructure and housing are now common.
- There is increased interest in mining exploration.
- Conflicts between mining and conservation/ wilderness interests are evident.
- Lack of water, both potable and of stock quality, is the major limitation to development.
- Rabbit numbers are recovering from rabbit haemorrhagic disease (calicivirus).
- Invasion of buffel grass is evident.
- Parkinsonia is establishing around watering points on pastoral leases on the edge of the bioregion.
- Winter rainfall is projected to decrease but an increase in intensity of extreme rainfall events is projected.
- More hot days and warm spells are projected, and average temperature will continue to increase in all seasons, with future harsher fire-weather conditions.
- Fire activity increases with increased fuel loads after good rainfall years. There is a particular need for controlled use of fire following wetter years.

6 Priority Areas

To strategically guide ongoing and future investments, Rangelands NRM has continued to identify Priority Areas at the landscape-level.

Priority Areas are not in response to any specific funding program, rather they reflect what is needed in the Rangelands region to conserve special environmental areas, nurture enthusiasm and involvement and address threats affecting assets in the Asset Register.

A whole of landscape approach has been adopted to promote collaboration and partnerships which address threats to assets and potential protects. Natural resource management at the landscape scale requires land and sea managers to work collaboratively with neighbours and other stakeholders, to look beyond the political constraints of tenure and remain tenure blind.

Rangelands NRM uses the following criteria to determine the Priority Areas for our future investments:

landscape scale,
acknowledging community interest and capacity,
incorporates Asset Register and Threats to Target Areas,
national and international interests,
prior longitudinal investments,
productivity and
the potential for sustainable rangelands management.

Priority Areas have been defined by having significant assets, manageable threats, and the willingness of a community to collaborate and be engaged, demonstrating strong leadership and having a sustainable vision for the area.

6.1 Priority Areas Change over Time

The Priority Areas have and will continue to change over time with areas highlighted (brown) in Figure 11 designating the areas of focus during the period 2014-2016.

In 2014, the mapped areas provided Rangelands NRM the best opportunity to capitalise on investment opportunities given the existing level of engagement and capacity, the variety of assets and dispersed geographical locations.

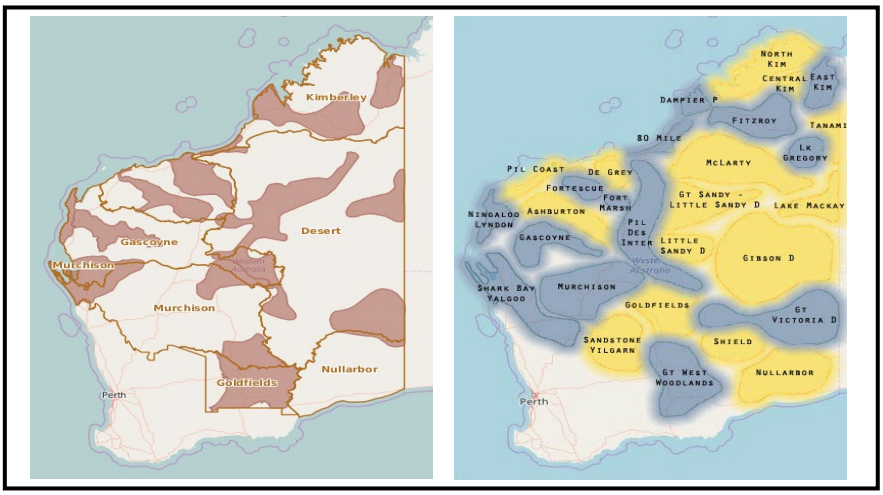


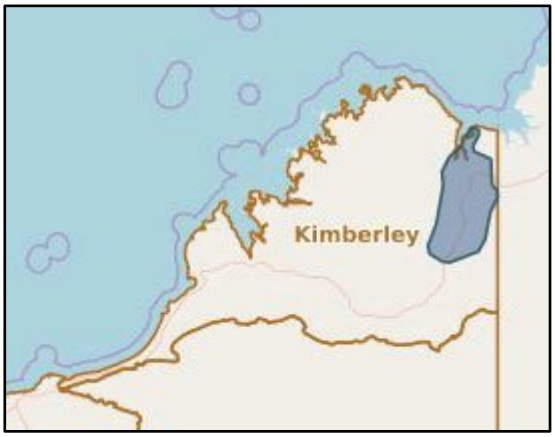
Figure 11. 2014 – 2016 Strategic Focus Areas *Figure 12. 2017 – 2022 Strategic Focus Areas*

The blue zones in *Figure 12* highlight Strategic Focus areas for 2017-2022 and beyond.

Rangelands NRM does not expect to invest in every asset in the Priority Areas, rather these areas provide scope to select and develop projects within the overall subregions.

6.2 Priority Areas

6.2.1 East Kimberley



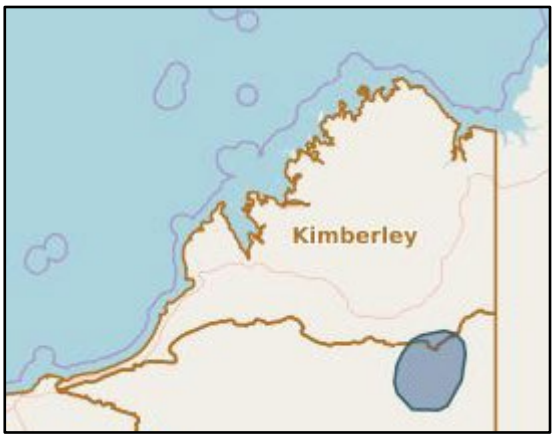
Overview

Building on historic efforts in the East Kimberley, this Priority Area focuses attention on building upon a landscape-scale fire program across pastoral properties currently managed in an Culturally Informed Fire style by the Kija Rangers.

Bounded by the World Heritage Purnululu (Bungle Bungles) to the south and the Ord/Lake Argyle Ramsars to the north, this Priority Area is building upon current partnership opportunities and sharing of resources and learnings with neighbouring native title and pastoral properties.

Working with properties clustered together, we are engaging pastoralists and ranger groups to protect critical habitat and encourage regenerative pastoral management.

6.2.2 Lake Gregory



Overview

Lake Gregory (Paraku) in the Walmajarri language, is a permanent freshwater lake that plays host to significant environmental and cultural assets as well as being a major stop over for migratory shore birds. The lake has seen significant historic damage from large numbers of unmanaged feral herbivores.

An opportunity exists to work with traditional owners and new pastoral interests to manage the lake sustainably with a view to expand land management opportunities such as fire, weeds and ferals up the entire catchment.

6.2.3 Eighty Mile Beach

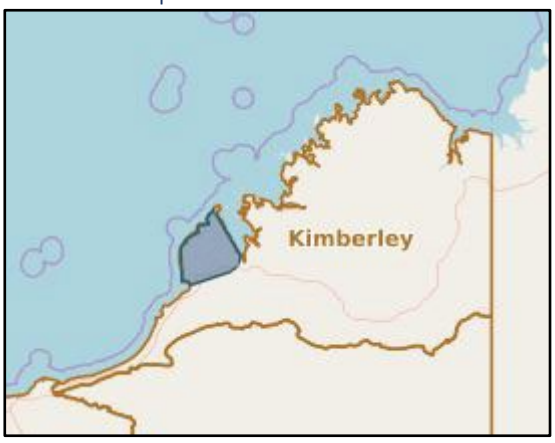
Overview

Following ancient Paleo drainage channels from the Great Sandy Desert through to the sea, this region plays host to a series of significant wetlands including Mandora Marsh culminating in the Ramsar listed Eighty (80) Mile Beach.

Through capacity building the emerging Ranger group (Nyangumarta), this Priority Area aims to provide a focus for fire, weed and feral management. There is also a strong focus on assisting with building collaborations and partnerships to diversify learning and opportunities.

The region also includes productive land systems. With the focus on development of the La Grange aquifer, this Priority Area aims to build relationships between traditional owners and pastoralists along the coastal belt with an idea to link with Roebuck Bay Ramsar and through the development of holistic property plans, fostering a landscape scale perspective on sustainable grazing practices.

6.2.4 Dampier Peninsula

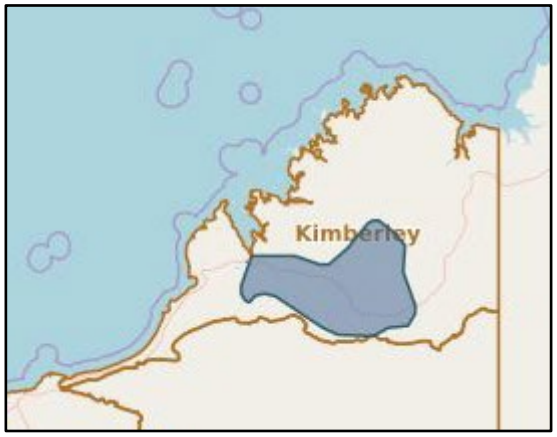


Overview

The Dampier Peninsula is host to a number of EPBC species and ecological communities that are under significant threat from late season wildfire. Despite individuals and groups best efforts over a number of years, the Peninsula is subject to uncontrolled fires that burn extensive areas of country.

Through a coordinated and collaborative Culturally Informed fire project, working across tenure and a sharing of skills and resources, fire will be reduced and managed across the entire Peninsula. This focus will grow to include management of weeds and ferals as well as linking in with sustainable grazing practices. The fire program will expand to include improved science and raising awareness and understanding of communities.

6.2.5 Fitzroy



Overview

The Fitzroy River has been a strategic priority for Rangelands NRM for many years given the complexity surrounding competing priorities between pastoral, conservation, Traditional Owner, Industry and State Government interests.

Recent interest in irrigated agriculture, the Aboriginal Declaration, National Park boundaries, bilbies and clearing permits has further complicated and escalated the situation, highlighting the need for all stakeholders to work collaboratively towards a shared vision.

The Nationally Heritage listed river forms the backbone for productive land systems, management of threatened species and aboriginal sites and communities. It forms the focus for building collaboration around cross tenure fire, sustainable grazing practices and protection of key threatened species habitat with both pastoralists and traditional owners.

There is a major opportunity to facilitate collaboration and assist in exploring opportunities to work together towards shared goals.

Improved employment opportunities for Aboriginal Corporations and their Ranger Groups on pastoral properties, has been identified as an opportunity to meet a workforce gap in the region.

6.2.6 Fortescue

Overview

The Pilbara is a fragmented landscape, which hinders holistic land management at the landscape scape.

Building on the previous Pilbara Corridors fire project, there is an opportunity to integrate land management in the area and build collaboration amongst the variety of land managers (Aboriginal pastoralists, Aboriginal Ranger groups and Conservation estate managers). This area (covering the triangle of Millstream-Karijini-Yandeyarra) is defined by the large Hammersley and Chichester ranges. The hills are particularly susceptible to lightning strikes and bush fires, and this is a major threat in the region, so it is also important to continue a coordinated approach to fire. It is important to Traditional Owners and because it houses important national parks and has existing populations of threatened species such as bilbies and quolls.

Through the previous work of the Pilbara Corridors project, important relationships have developed. Rangelands NRM will continue to build these relationships and bring in Traditional Owners and pastoralists to link with the conservation estate.

6.2.7 Fortescue Marsh

Overview

The Fortescue Marsh is the largest ephemeral wetland in the Pilbara region and is of national significance, being a High Conservation Value Aquatic Ecosystem (HCVAE). It is regarded as the 'lungs of the Pilbara' with extensive Mulga woodlands including flora and fauna of high conservation value. It is Traditional Country and the Marsh is variously shared by the Banjima People, the Nyiyaparli People and the Palyku People. It is impacted by fire feral predators and feral herbivores.

In 2015 the Marsh was excised from the pastoral estate with the goal of turning the area into a Conservation estate, a process that could take up to 10 years to implement due to the complexities of the development of an Indigenous Land Use Agreement (ILUA) with the various Traditional Owners.

This provides a unique opportunity for Rangelands NRM to continue the work which commenced under the Pilbara Corridors project by working with the diverse stakeholders to create a shared 'tenure blind' vision for both the Fortescue Marsh Strategy and surrounding pastoral estate. This work will include Traditional Owner pastoral enterprise (Yandeyarra) and Aboriginal ranger groups (Banjima Rangers in Tom Price, Yandeyarra Rangers, Ngurawaana Rangers and the Nyiyaparli people).

6.2.8 Ningaloo - Lyndon

Overview

The Ningaloo-Lyndon Priority Area encompasses a diverse stretch of land composed of pastoral estate, conservation estate and the Ningaloo Coast World Heritage Area, which has high tourism value for the State.

The Ningaloo coast ranges from Quobba in the south to the Northwest Cape incorporating Ningaloo Marine Park, Exmouth's Cape Range National Park, Learmonth Air Weapons Range and Muiron Islands Marine Management Area.

The World Heritage listed Ningaloo Coast is the world's largest fringing reef which supports a diversity of marine life including threatened sea turtles, humpback whales, killer whales, and dugongs.

There are two key sea turtle rookeries within the Ningaloo Coast World Heritage Area and Ningaloo Marine Park, namely the Gnaraloo Bay Rookery and Gnaraloo Cape Farquhar Rookery. These rookeries

represent the largest mainland nesting sites of Loggerhead turtles in Western Australia leaving them exposed to predation by foxes, feral cats, and wild dogs. Low rainfall and minimal runoff from surrounding catchments contribute to the exceptional condition and water quality within the Ningaloo Reef which in turn supports coral reef communities, shoreline intertidal reef communities, sponge gardens, macroalgal and seagrass communities, and mangroves.

Historically, the area has had disjointed management and competing priorities, limiting the ability of the community to respond to key threatening processes.

Our primary role is to facilitate alignment of the various land management initiatives underway across the region, to foster a more collaborative approach between State Government agencies, community groups and the pastoral sector and to support the delivery of an integrated and community-led regional land, coast, and sea management program.

6.2.9 Upper Gascoyne

Overview

The Upper Gascoyne Priority Area encompasses much of the Gascoyne River catchment and encompasses the Kennedy Ranges, Mount Augustus, and the Matuwa Kurrara Kurrara Indigenous Protected Area. The Upper Wooramel, Lyons and Gascoyne River catchments are recognised as important areas to the health and functionality of the Ningaloo Coast and Shark Bay World Heritage Areas.

Over the past decade, the Upper Gascoyne Catchment has also served as an important a hub for trialling innovative grazing practices and leading rangelands rehydration efforts. The willingness and high level of organisation evident amongst active pastoral producer groups in the Upper Gascoyne Catchment to engage in a wide range of NRM initiatives provides an opportunity for Rangelands NRM to support community-led landscape change at a landscape scale.

The Matuwa Kurrara Kurrara Indigenous Protected Area, comprised of the former Lorna Glen and Eraheedy pastoral leases, is known for its unique conservation values and cultural significance to the Wiluna Martu.

6.2.10 Shark Bay - Yalgoo

The Gascoyne Murchison strategy delivered a corridor of conservation estate steppingstones between the Karara block of former pastoral properties south of Yalgoo, to the Shark Bay World Heritage Area. This corridor lies between the wheatbelt and the rangelands and extends from Ninghan Station in the south, east to Charles Darwin Reserve, Mt Gibson Station and up the central Midwest through several Department of Parks and Wildlife conservation blocks (Karara, Muggon, Doolgunna-Mooloogool and Dalgaranga) to Hamelin station and the Shark Bay World Heritage Area in the north.

The Shark Bay World Heritage Area is an important asset in this corridor extending over 2,320,000 hectares and includes the Shark Bay Marine Park and Hamelin Pool Nature Reserve. The isolated, and relatively untouched peninsulas and island habitats of Shark Bay are home to five endangered mammals and harbours 35% per cent of Australia's bird species. Many species of birds and reptiles found here are also within the northern and southern extent of their range. Ten percent of the world's dugong population (10,000) resides in Shark Bay along with significant loggerhead and green turtle rookeries. The twelve species of seagrass found here make it one of the most diverse seagrass assemblages in the world.

Throughout the Shark Bay – Yalgoo Corridor there are real opportunities to build landscape-scale collaborative efforts between the pastoral industry, State Government agencies and conservation land managers.

By building upon initiatives led by the pastoral industry over the past 10 years and linking these with the activities of conservation land management organisations including Bush Heritage, Northern Agricultural Catchments Council and the Department of Biodiversity Conservation and Attractions, Rangelands NRM is supporting improved land management throughout the corridor, integrating sustainable pastoral production, biodiversity conservation and community leadership.

6.2.11 Central Murchison

Overview

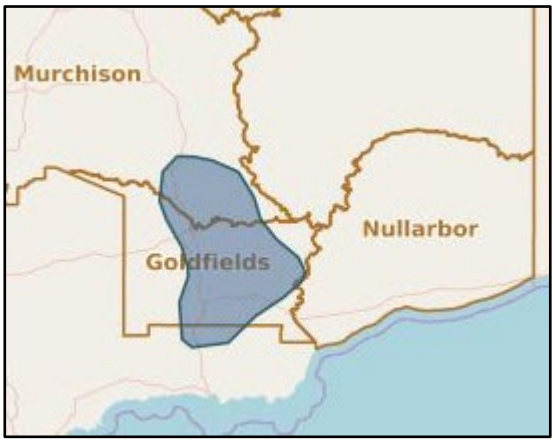
The Central Murchison Priority Area encompasses a vast area of land featuring a diverse range of land uses, the region is one of the main pastoral (sheep and cattle) areas in Western Australia and incorporates the local government areas of Yalgoo, Murchison, Mount Magnet, Cue, Sandstone, Meekatharra, and Wiluna.

The geography of the region is characterised by low hills and mesas separated by flat colluvium and alluvial plains. Vegetation is predominantly low mulga woodlands. Perennial grasses play a vital role in maintaining soil structure. Changing climatic conditions, combined with the impacts of total grazing pressure have put substantial pressure on the regenerative capacity of the landscape, challenging both the ecological and economic viability of the region.

Changing climatic conditions and historical degradation have placed substantial pressure on the regenerative capacity of the Central Murchison Rangelands, challenging both the ecological and economic viability of the region.

Due to the dominance of pastoralism in the region there are opportunities for Rangelands NRM to work with producers to support improved land management across the Central Murchison Rangelands and to drive and regenerate productive capacity across the landscape and improve the region's biodiversity values.

6.2.12 Great Western Woodlands



Overview

Encompassing 16 million hectares of woodlands and heathlands interspersed with salt lakes, the Great Western Woodlands represents the largest remaining intact Mediterranean habitat in the world. It is home to more than 20 per cent of all known Australian plant species and provides a haven for a community of animal species that are now threatened elsewhere in Australia.

As the national and international significance of the Great Western Woodlands has gained increasing recognition over the past five years, a greater focus has been placed on the some of the key threatening processes affecting both biodiversity and biosecurity across the landscape. These key threatening processes include altered fire regimes, loss of habitat and the spread of invasive species including weeds and feral animals.

The Ngadju people are the Traditional Owners of a large section of the Great Western Woodlands. Through the Ngadju Conservation Aboriginal Corporation (NCAC) they have sought increased capacity to undertake work that addresses their environmental concerns. Initiatives to date have included an initial fire management program, a project mapping water trees, two significant knowledge documentation programs with CSIRO and the development of a Conservation Action Plan.

Initially established in recognition of the ecological and cultural significance of the region (particularly to the Ngadju Traditional Owners), the Great Western Woodlands Priority Area has been maintained and expanded in order to build engagement and optimise partnership opportunities across the pastoral and indigenous land management interface.

6.2.13 Great Victoria Desert

Overview

The Spinifex People (Pila Nguru) have maintained continuous connection to this Country for as long time. This area focuses on managing places of significant biodiversity value which are inextricably linked with places of high cultural significance specifically permanent and ephemeral water bodies, rock holes, freshwater lakes, salt lake systems and wetlands of national significance. The Spinifex People have exclusive Native Title of Spinifex Lands and Pilki Native Title Lands determinations. They collaborate with the state on joint-management of nature reserves on their Country. And they work with partners (state, federal, philanthropic, and mining companies) to help return Spinifex Country land management into balance with people and nature. They maintain important cultural sites at numerous locations.

Current relationships with the Spinifex People involve supporting their peak cultural and land management organisation–Spinifex Land Management–and the GVD Adaptive Management Partnership to undertake ranger-based caring for Country activities. This involves actively managing country by reinstating traditional fire burning regimes, managing Weeds of National Significance (including a focus on the Buffel Free GVD initiative) and feral animals (cats, foxes, camels) to protect several threatened species and their respective habitats.

The GVD partnership between Spinifex, Yilka, Desert Support Services (DSS), Department of Biodiversity, Conservation and Attractions (DBCA), Greening Australia, Conservation Management, the GVD Biodiversity Trust and Rangelands NRM (serving as both contract/project manager and backbone support) arose from a desire to build a greater alliance to link isolated Traditional Owner groups in order to strengthen their capacities to look after large tracks of high value desert country.

Focus in this Priority Area aims to build on the capacity of existing ranger groups, assist in the management of Traditional Spinifex and Pilki Lands and promote the inter-generational transfer of traditional ecological knowledge and integrating western science with traditional practices.

6.2.14 Pastoral-Desert Interface

Overview

Traditionally we have worked in the desert and pastoral areas discretely.

In more recent years, we have seen the opportunity that exists to bring these two stakeholder groups together, both in terms of the issues and the people who are dealing with them.

Over the next five years we've identified a priority area where we can focus on bringing together desert Traditional Owners (TOs), pastoralists and others together to address threats, which exist along that interface that we call the Pastoral/Desert Interface, particularly fire in the north and ferals and weeds in the south.

These are productive land systems on the fringe of the desert. Impacted by fire, feral herbivores, and weeds. Through partnerships with KJ and DSS and other desert Aboriginal ranger groups, we seek to bridge connections to manage fire, ferals and weeds for and with pastoralists to:

Mitigate climate change driven increased fuel loads impacting on productive pastoral land systems.
Expanded partnerships between TOs and pastoralists across the landscape where issues of common concern exist (fire, ferals and weeds)
Undertake collaborative research conducted on fire for different purposes
Reduced impact from large feral herbivores
Improved employment opportunities for TOs on pastoral properties, meeting a workforce gap in the region

7 Assets

An asset needs to be protected, improved, or managed better through a proposed project. It could be large or small, degraded, or pristine, localised or dispersed.

The Asset Register is a systematic appraisal of sites, locations, flora and faunal assemblages, sites of cultural value, aggregated across the landscape by the people who live, work and are passionate about the Rangelands.

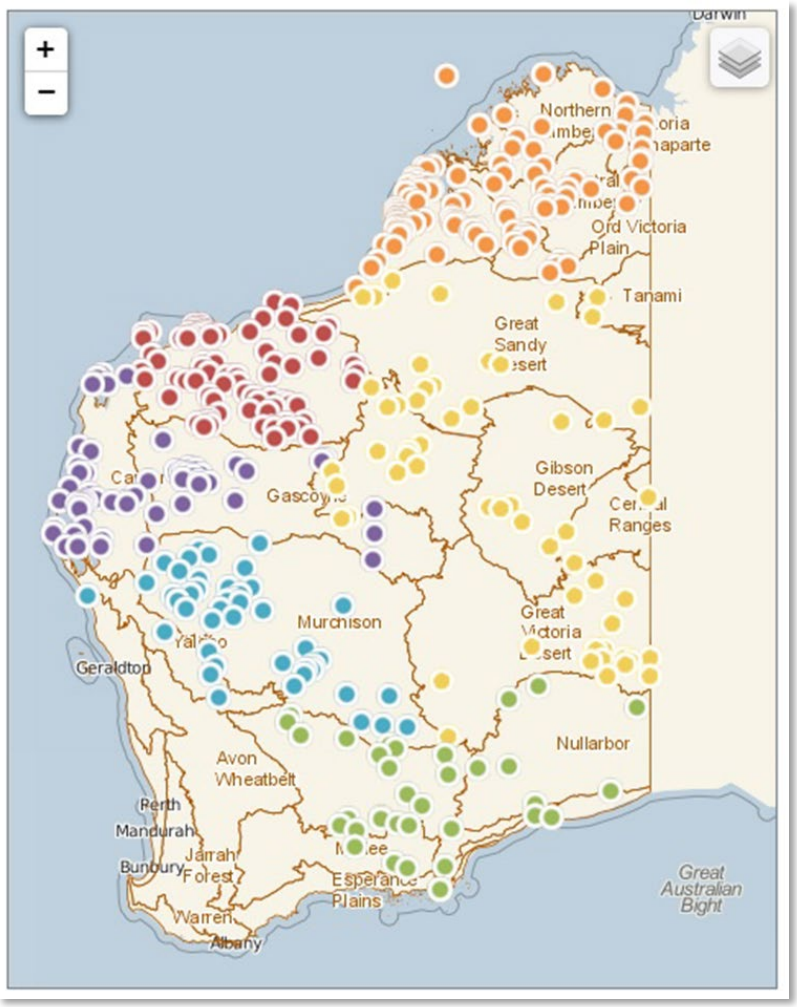


Figure 13. GRID Assets Database

There are over 400 assets on the Asset Register including offshore islands, highly productive land systems, threatened species, rivers, wetlands, underground aquifers.

Each coloured dot in Figure 13 represents a nominated asset within its subregion.

7.1 Asset Categories

In order to sort assets in a way that recognises their different scales and level of importance, a hierarchical classification is used. The three levels are:

7.1.1 Umbrella Assets

- Generally, at a very large scale (e.g., the Fitzroy River) or aggregations of entities (e.g., species of plants and animals with similar ecological requirements or threats).
- While assets at this level are of exceptional or at least very high significance, they are too large and complex to effectively manage in their entirety. They do however form an umbrella for component significant or notable assets.

7.1.2 Significant Assets

- Usually of high to very high significance where there is potential for major investment or protection measures to maintain or enhance their values.
- Assets at this scale have potential for consideration but only a limited subset is likely to be the focus of major investment at any one time.

7.1.3 Notable Assets

- Many assets identified are of local significance.
- Generally modest in scale, they are certainly noteworthy and will be the focus of smaller scale projects often initiated by local community environmental and Landcare groups.
- Most notable assets are in fact nested within assets at higher levels.

7.1.4 Process for Asset Selection

Rangelands uses the following seven steps to identify an asset for potential project development:

Step 1: Identifying significant assets – A list of significant natural assets that are candidates for investment is prepared. These are separated into umbrella, significant and notable assets.

Step 2: Filtering significant assets – Using a simplified set of criteria, the list of significant assets is filtered down considering significance, threat levels and regional priorities. The list is further filtered as these questions are addressed:

1. Can you spatially identify the asset,
2. Is it possible to develop SMART goals for the asset,
3. Is there evidence to indicate that management actions can make a real difference sufficient to achieve a smart goal,
4. If the desired management actions are mainly on private land, is it likely that those actions would be reasonably attractive to fully informed land managers when adopted over the required scale?,
5. If the project requires change by other institutions (e.g. local government, state government departments) is there a good chance that this will occur?

Step 3: Develop internally consistent project outlines for each asset on the reduced list. This process draws together readily available information, consisting of desktop review of publications and reports, and consultation with the community and with relevant experts. Information required at step 3 includes: asset significance, threats, project goal, works and actions, time lags, effectiveness of works, private adoption of actions, delivery mechanisms and costs.

Step 4: Selection of priority projects, select a short list of priority assets/projects based on the filtering information above that fit with available funding resources.

Step 5: Develop investment plans or funding proposals for external/internal/available funding.

Step 6: Implement projects that receive funding.

Step 7: Monitor, evaluate and adaptively manage projects. At this point projects are also reviewed to ensure original project design is still suitable and whether the project should remain a priority.

The Rangelands NRM Asset Register currently lists 50 Umbrella Assets; 236 Significant Assets; and 125 Notable Assets, totalling 411 across all classes.

8 Implementing the Regional Plan

8.1 Landscape-scale Coordinated Approach

The current Regional Plan reflects a landscape-scale, coordinated approach with a focus on Priority Areas that are identified by the quantity of umbrella and significant environmental assets as well as the level of interest and activity in the area. In this way the Plan links local passion and resources to manage and conserve special environmental areas, nurtures enthusiasm and involvement, and addresses threats affecting key strategic environmental assets.

The Plan and the supporting Rangelands NRM management system have community participation and continuous co-design embedded. As part of our community engagement, Rangelands NRM utilises this Plan and its Priority Areas as a framework to build on past learnings and successes and to open conversations with community for new investment discussions.

By recognising and promoting the local knowledge and wisdom of land and sea managers and complementing this knowledge with technical expertise and support at appropriate junctures, barriers and opportunities for land and sea management activities can be identified to address the Plans priorities or for further enquiry through shared learnings.

A significant amount of planning has occurred throughout our region in the form of Healthy Country Plans, species Recovery Plans and other local plans which are either private or publicly available. These planning documents are regularly drawn on to help prioritise and guide the management of our natural resources.

8.2 Community Co-design and Partnering

To deliver this Plan, Rangelands NRM uses a constant community co-design approach to the design and delivery of programs and projects.

Project concepts and proposals are developed with current and potential new local community delivery organisations and are linked to stakeholders and other relevant local, regional, or national plans.

Our main objectives when undertaking community co-design and partnering with local community organisations are to:

- invest in and support community groups in building their capacity to manage their own land/sea country
- deliver on-ground results, at local, property, sub-regional and landscape scales that align to the regional plan
- provide opportunities to enable working and learning together through coordinated NRM programs

The level of interaction ensures that the Rangelands NRM team monitors and recognises community aspirations, capacity, and on-ground delivery activities. It helps to synthesise community priorities within the region to assist 1) community co-design and partnering that achieves the main objectives and 2) provide a feedback loop to the Regional Plan reviews.

8.2.1 Aboriginal – Traditional Cultural and Ecological Knowledge (TCEK)

Aboriginal people are a large land manager and a key stakeholder group, Rangelands NRM has developed a good-practice, and engagement method to support these groups.

Rangelands NRM works with over 50 Aboriginal groups, see table below, and their input, guidance and passion for the country makes possible the delivery of programs and projects across the vast rangelands landscape and has assisted their ranger teams to grow. We provide a range of support to a number of Traditional Owners groups through key regional organisations who have genuine intent, based on being respectful of traditions and culture, roles and responsibilities.

Aboriginal people provide a wide range of environmental services in the Rangelands including fire management, wildfire abatement, carbon sequestration and trading, weed control, feral animal control, biodiversity conservation, fisheries management, restoration of wetlands, water resource management and sustainable commercial enterprises such as eco-tourism.

The positive outcomes of Indigenous involvement in natural resource management are not only environmental. A variety of benefits come from these activities and investments, including improved health and wellbeing, cultural and social outcomes, and economic opportunities. For Indigenous people, it is increasingly documented that caring for country is intricately linked to maintaining cultural life, identity, autonomy, and health.

When developing projects or assisting others to develop projects, indigenous planning input is foundational to project development and delivery. To do this, Rangelands NRM works towards a coordinated, community consultation approach embedding Traditional Ecological Knowledge (TEK).

Specifically, we support Aboriginal groups to develop, review and deliver healthy country plans, and other plans such as Indigenous Protected Area (IPA) plans and Indigenous Land Use Agreement (ILUAs). These plans contain land management priorities and activities that meet a particular groups' caring for country aspirations or challenges. They capture important cultural and ecological values and assist Elders to manage access to country and convey traditional cultural protocols.

Long and respectful relationships with rangers and other stakeholders (including Registered Native Title body corporates) have enabled thorough consultation to ensure critical alignment between project outcomes and culturally informed land management so that future outcomes are not jeopardised, and priorities are addressed.

Table 1: *Aboriginal Partners*

Sub-Regions	Group/Description	Projects
Desert		
1	Kanyirninpa Jukurrpa (KJ) - Martu people	RLP Bilby
2	Desert Support Services (DSS) - Wiluna Martu people of the Birriliburu, Matuwa Kurrara IPAs	RLP Bilby
3	Desert Support Services (DSS) - Tjiwarl people, and the Pintupi people of the Kiwirrkurra IPA, and Ngjururrpa IPA	RLP Bilby
4	Ngurra Kayanta Aboriginal Corporation	RLP Night Parrot
5	Ngurrara Pty Ltd	RLP Night Parrot
6	Nyangumarta people	RLP Night Parrot

7	Karajarri Traditional Lands Association	RLP Night Parrot
8	Pila Nguru Aboriginal Corporation and the Spinifex community	Great Victorian Desert
9	Yilka at Cosmo Newbury	Great Victoria Desert
10	10 Deserts Project	Culturally Informed Fire
11	Indigenous Desert Alliance (IDA)	RLP Night Parrot
12	Gingirana people	RLP Night Parrot
13	Tjiwarl people	RLP Bilby
Kimberley		
1	Kimberley Land Council (KLC) - is an administration body for some traditional owners (Kimberley)	RLP Bilby, RAMSAR
2	Bunuba Dawangarri Aboriginal Corporation and Rangers	ERF
3	Kija Rangers	KLC, RLP Bilby
4	Nyangumarta Warrarn Aboriginal Corporation and Rangers	Connection
5	Karajarri Rangers of Karajarri IPA	Connection
6	Nyikina Mangala Rangers	Connection
7	Gooniyandi Aboriginal Corporation and Rangers	Connection
8	Oombulgurri people	Connection
9	Balanggarra Aboriginal Corporation, IPA and Rangers	Safe Havens
10	Bardi Jawi Niimidiman Aboriginal Corporation, IPA and Rangers	Dampier fire, Safe Havens
11	Nyul Nyul PBC Aboriginal Corporation, Rangers	Dampier fire
12	Yawuru Rangers	RLP Bilby, RAMSAR
13	Dambimangari Rangers	Safe Havens
14	Paraku Rangers	Connections
15	Yamatji Marlpa Aboriginal Corporation	Connections
16	Wunamba	Safe Havens
Pilbara		
1	Yamatji Marlpa Aboriginal Corporation (YMAC) - admin org for some groups (Pilbara, Murchison and Gascoyne).	Shark Bay WHA
2	Yaburara & Coastal Mardudhunera Aboriginal Corporation, Rangers	Connection
3	Banjima Native Title Aboriginal Corporation (BNTAC), Rangers	PEOF, Fortescue JM
4	Puutu Kunti Kurrama People and Pinikura People (PKKP)	Pilbara offsets
5	Nyiyiparli People	Fortescue
6	Ngurrawaana Rangers	Various
7	Murujuga Aboriginal Corporation (MAC), Rangers	RLP World Heritage
8	Yinhawangka People	Connection
9	Yindjibarndi / Ngarluma People	Connection
10	Yandeyarra Rangers	Connection
11	Budadee Rangers (Woodstock Abydos Protected Area)	Connection
12	Palyku People (Budadee Rangers – Woodstock Abydos Protected Area)	Connection
Gascoyne		
1	Yamatji Marlpa Aboriginal Corporation – (YMAC)	Shark Bay WHA
2	Naanda People	RLP Shark Bay WHA
3	Malgana Aboriginal Corporation, Rangers	RLP Shark Bay WHA
4	Yingaarda people Carnarvon townsite and surrounding Gascoyne region	RLP Shark Bay and Ningaloo Coast WHAs
5	Baiyungu – Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) -	RLP Ningaloo Coast WHA
6	Thalanyji – Buurabalyji Thalanyji Aboriginal Corporation	RLP Ningaloo Coast WHA
7	Indigenous Land Corporation	Connection
8	Central Desert Native Title Services	Connection
9	Aboriginal Biodiversity Conservation (ABC) Foundation	Connection
Murchison		
1	Yullella/Bundadea Aboriginal Corporation	RLP Malleefowl
2	Badimia Bandi Barna Aboriginal Corporation via Gundawa Regional Conservation Association	RLP Malleefowl
3	Aboriginal Biodiversity Conservation (ABC) Foundation	Connection
4	Yadgallah Aboriginal Corporation	Connection
Goldfields-Nullarbor		
1	Ngadju Conservation Aboriginal Corporation, Ngadju people in the Great Western Woodlands, Ngadju Rangers	RLP Malleefowl / MERN Pilot
2	Paupiyala Tjarutja Aboriginal Corporation - Spinifex	Connection
3	Wiluna Rangers	Connection
4	Ngurrara	Connection
5	Robe River Kuruma	Connection

This consultation and coordinated activity brings together TEK, western science and contemporary NRM practices, incorporating tools and technologies where applicable – a feature of healthy country planning. It builds both non-indigenous and indigenous partners capacity for cross-cultural engagement and strengthens land and sea management practices.

Many groups in the rangelands have already gone through rigorous Aboriginal and broader community-driven process that articulate their priorities through developing plans, including healthy country plans. These continue to make a substantial contribution to key asset and threat management in the rangelands and are a target for Rangelands NRM project co-design and investment.

With both community and Aboriginal engagement ensuring collaboration and gaining free, prior, and informed consent (FPIC) is an integral part of our engagement ethos and duty, in our support role. This follows through to our project co-design process with Aboriginal groups, including developing agreeable outputs/outcomes that are monitored, evaluated, and reported on.

During co-design, we listen and act upon the deep local and cultural knowledge of Traditional Owner rangers, which is vital in progressing the project initiation, outputs, and outcomes. Asking questions such as "What is culturally important to you?" and "Does the project/what project would align and assist in achieving your own outcomes?"

Overall, this delivers an integrated and robust approach to NRM with locally tailored and culturally appropriate application.

8.2.2 Pastoral

A large percentage of the WA rangelands is of Pastoral Lease tenure managed by pastoral producers and involve a network of producer groups, Land Conservation District Committees and Regional Biosecurity Associations. Rangelands NRM is supporting these groups and individual pastoralists to integrate agricultural production and profitability priorities with long-term environmental sustainability needs.

Rangelands NRM has invested in on-ground presence and resources to build up the trust, confidence and respect of the pastoral community through regular visits and meetings, and considerable support, advice and assistance towards the delivery of on-ground work and projects. Improving understanding of the systemic pressures (beyond the ecological) and historical impacts facing both producer groups and individual pastoralists is key. This better understanding supports the co-design of projects/programs and alignment of the economic, social, cultural, and environmental considerations and priorities.

Program/project activities are focussed on expanding the adoption of leading pastoral production and land management practices to enhance the condition of soil, vegetation, and biodiversity. These opportunities are accelerated through the co-design process that resources and empowers planning and action by pastoral communities, and link to rangelands ecological and production specialists, researchers, industry regulators and economists.

8.2.3 Horticultural

Horticulture growers in the 3 main regions grow a wide variety of produce, across mostly small land parcels, and due to multiculturalism, a significant proportion are Language other than English (LOTE). There is a keen appetite amongst growers and key stakeholders to re-organise and build capacity

collectively, to achieve improved good agriculture practice, area wide pest and disease management and improved productivity / prosperity.

There has been energy and activity in building connection, trust, and priority setting, although this needs to be harnessed through the extension and adoption service network to work together as a collaborative.

Key opportunities are centred on fostering industry solutions through on farm grower-led trials and demonstrations and coordinating stakeholder collaboration between growers, research station and agencies, consultants, market groups and accreditation providers. This is essential to develop a culture of grower led innovation and facilitate regional productivity, viability, and resilience.

8.2.4 Wider Community

The scale of the challenges we confront in the Rangelands region mean that no one organisation or sector is able to address these challenges by itself. The only way we are going to solve these is to work together.

Rangelands NRM establishes and maintains relationships with other regional stakeholders, including, environmental conservation groups, environmental services and carbon companies, mining, oil and gas companies, fishing and aquaculture groups, agricultural extension and adoption services, agricultural industry bodies, schools, universities, Local Shires, State and Federal Government agencies, and other NRM regional bodies.

The layers of partners and stakeholders described in the Community and Indigenous Communication, Engagement and Participation Plan include:

1. Pastoralists
2. Indigenous communities (including exclusive and non-exclusive Native Title holders, determined and claimant)
3. Aboriginal Corporations and Ranger Groups
4. WA and National NRM Network
5. Local Government
6. State Government Departments
7. Commonwealth Government Departments
8. Environmental non-government organisations
9. Commercial Environmental consultancies
10. Industry / Resources Companies
11. Land Conservation District Committees (LCDC's)
12. Regional Biosecurity Groups
13. WA Landcare Network
14. Volunteer NRM groups
15. Education
16. Producer and Grower Groups
17. Philanthropic Investors
18. Universities
19. Cooperative Research Centre's (CRCs)
20. Research Organisations

21. Technology development companies
22. Knowledge brokers and expert consultants

8.3 Governance and Management Systems

Rangelands NRM manages its Environmental, Social, Governance and Finance (ESG+F) outcomes and its activities and information about its projects, partners and stakeholders using the following plans and systems:

1. **The Community and Indigenous Communication, Engagement and Participation Plan -** defines partners and stakeholder layers and processes we implement across the region, including describing updates to the Regional Pan yearly and when needed.
2. **The Program and Project Management System** - describes where Rangelands NRM stores and manages list/databases of current and previous partners and stakeholders.
3. **The Regional Plan** - defines partners and stakeholders that are actively engaged in Priority Area community-led initiatives.
4. **The WHS Management System** – defines the policies and procedures to ensure all delivery partners are

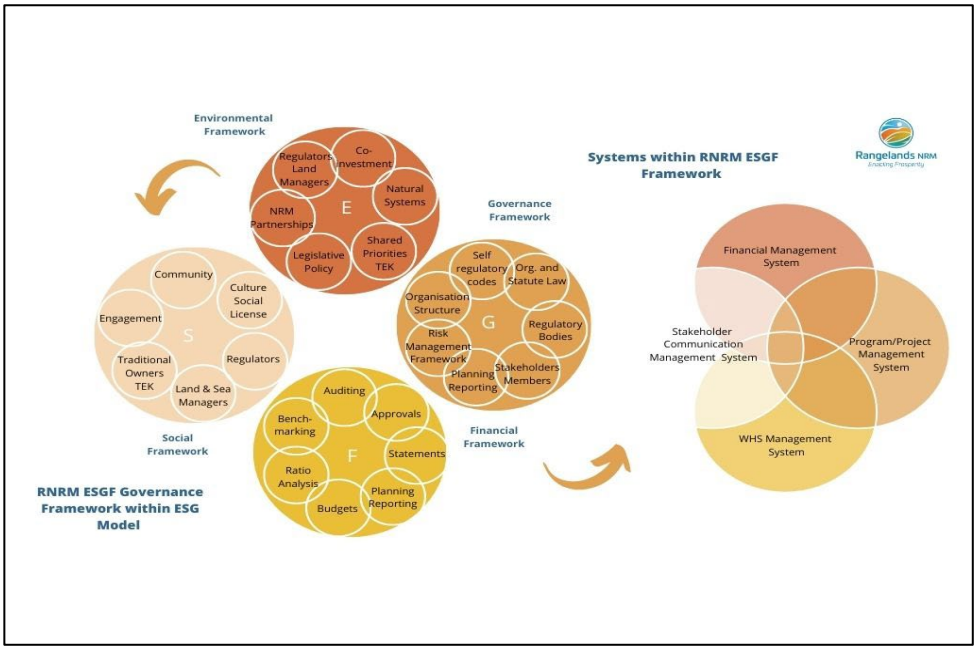


Figure 14. Governance Framework and Management Systems

The connection between the Rangelands NRM's Governance frameworks and its Systems is shown in Figure 14.

8.3.1 Operational Delivery

Rangelands NRM maintains a Program and Project Management System that guides our operational delivery of programs and projects in partnership with community delivery organisations.

It references this Plan, and links to Rangelands NRM's organisational governance documents containing policies, guidelines, processes, standards, information, and data management systems, including

- Stakeholder Communication Management System
- Financial Management System
- Workplace Health and Safety Management System

It provides the framework for the operationalisation of co-design project planning, kick off, project delivery and guides stakeholder engagement and collaboration, resource allocation, planning processes, contract development, delivery organisation selection, monitoring, evaluation, reporting and communications.

The program design and delivery model are guided by the Priority Areas and Objectives identified in this Plan, and includes consideration of:

- Scale and priority dispersion of resources over the 220-million-hectare region
- Limited people resources and developing capabilities and capacities
- The status and condition of natural resource assets
- The status and scale of natural resource threats
- Identification of umbrella and significant assets and those that are sensitive that may require higher priority resource allocation
- Importance of co-design with community partners and their ownership of resulting projects and activities to achieve successful outcomes

SECTION B

9 Review of the Regional Plan

One of the most significant benefits in reviewing the Plan is the opportunity for staff, community, and stakeholders to re-engage with the Regional Plan. Some people are not regularly immersed in the Plan and conducting the review has brought it back into focus for everyone, stimulating a clear and renewed sense of purpose.

Rangelands NRM Regional Plan has been undergoing a full transition from the historical 'web plan' to an electronic document format. This is due to the level of difficulty and resources required when updating content which is interlinked with complex and dependent associations.

9.1 Historical Development of the Regional Plan

The historical development milestones of the regional plan are outlined in Figure 15.

The inaugural Rangelands NRM Regional Plan was developed and published in 2005. In this first-generation plan, Rangelands region's landscape was broken into Sub-Regions. Priority Areas were developed with community consultation, resulting in a landscape scale planning approach being adopted.

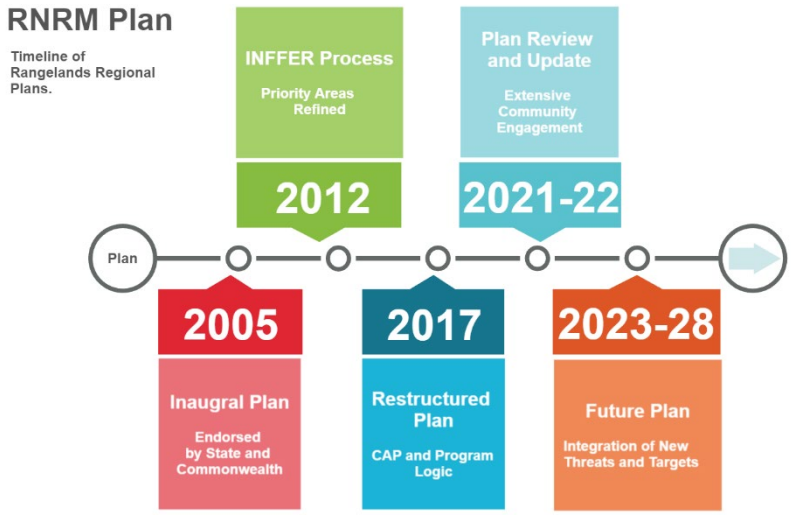


Figure 15 Timeline of Rangelands Regional Plans

In 2012 the Priority Areas were further refined through a series of twelve workshops held across the region. The asset-threat layer of the Plan was developed using the INFFER process incorporating analysis of social, economic, and environmental factors.

The Priority Areas capture the complexity of assets, threats and community interests and inform the location of priority projects. The projects are co-designed with community and stakeholder partners to guide the community to deliver multiple outcomes at landscape-scale.

In 2017, the Plan was extensively restructured using the Conservation Action Planning (CAP) framework alongside the MERI program logic. This provided Rangelands a five-year horizon with a more sophisticated method of analysing the data sets, including incorporating the level of social engagement as an outcome. This was an important inclusion given the sparsely populated region. The plan articulated the fundamental importance of identifying, engaging, and developing the community to achieve long term on ground landscape scale outcomes.

9.2 Review Method for Regional Plan 2017-22

9.2.1 Fit for Purpose

The review considered the 'big picture' of the Plan and the validity of the asset-based and target-threat approach in the context of where the Rangelands organisation stands, and will the Plan continue to deliver on the Vision, Mission, and Objectives of Rangelands NRM. Over the last few years, funding mechanisms, politics and emerging issues offer different challenges to when the Plan was first developed.

The revised Plan acknowledges that the Rangelands NRM is a large region with diverse landscapes, conservation assets, threatening processes, and stakeholders with varying interests. Within a framework of achieving lasting regional NRM outcomes, the Plan seeks to articulate and address stakeholder views and aspirations wherever possible.

Extensive community/stakeholder consultation occurred between 2020 - 2022 to inform this review (further information on the process of engagement can is in the internal Commercial in Confidence (CiC) controlled document; RNRM Community and Indigenous Communications, Engagement and Participation Plan, components of the plan may be provided to our stakeholders upon request.

The synthesis of project outcomes and new knowledge gathered has informed the review and delivery of the current Plan. These learnings are summarised at Section 9.3 and inform the current plan and will be incorporated into the 2023-28 plan and its supporting documents.

In addition to the Plan review, the RNRM Indigenous and Community Communication, Engagement and Participation Plan was updated, and a new Program, Project and Systems Management Plan is also under development.

9.2.2 Stakeholder Engagement

To inform the Plan revision, stakeholder and community engagement has occurred over the 2020/2021 and 2022 period. This took place through online surveys, specific stakeholder engagement projects, workshops, and group meetings and also one-on-one with producers, conservation, local government, community groups, ranger groups, the resource sector, DPIRD, DBCA, DPLH and Traditional Owner Groups across the Rangelands.

The following key activities were undertaken to update the plan in 2022:

- Funded by external investment, a regional Coastal-pastoral Interface Community Engagement project was launched to canvas a range of issues and seek feedback on current and future directions for the Regional Plan
- Deep investment and engagement in the horticulture industry
- A Rangelands NRM survey using on-line, workshops and face-to-face methods enabled engagement with over 2,000 partners and stakeholders in the region
- Transition of the Regional Plan from a web base to document-based will facilitate efficiencies in updating, provide better structure and logic, and increase readability
- Reviewed Social Media Strategy to further develop a network of followers, increase brand awareness, and engage with community, stakeholders, and industry leaders
- Reviewed and updated each Sub-region's threats, priority areas, assets, and key management issues
- Significant external RNRM investment into Rangelands project and data information management systems to increase the flow, interaction, utilisation, and visualisation of knowledge

The top issues identified in this process where (in order of number of responses):

- Feral pests (herbivores and predators)
- Biodiversity loss and Fire management
- Climate Change and Government on equal par

As a result of the engagement and feedback the 2017 - 2022 Plan has been revised and forms the basis for a new 2023 – 2028 Plan and Rangelands NRM's internal Indigenous and Community Communication, Engagement and Participation Plan has been updated. As part of the review process new and emerging threats were included and the asset register annotated for further revision and refinement in the 2023-28 Plan.

9.2.3 Details of the Plan

Components of the Plan such as objectives, measures, initiatives and evaluating how things have evolved since the initial creation of the Plan were considered. The Plan was developed without any funding profile in mind, and the asset register is a systematic appraisal of sites, locations, flora and faunal assemblages, sites of cultural value, aggregated across the landscape by the people who live, work and are passionate about the Rangelands.

The three objectives of the Plan were evaluated using four options

- Leave it alone - If the objective was still valid and appropriately reflected our Mission, Vision and Values, there was no need to alter it.
- The second option was to either tweak the objective in a minor way or to alter it majorly, depending on how much has shifted in the organisation and how much was accounted for that shift in the original Plan.

- The final option was to delete the objective entirely if it was no longer relevant or necessary to track.
- Ensure that each of the metrics included in the Plan are realistic, but also relevant.

9.2.4 Assets and Targets

By far the largest resourcing of this review is evaluation of the assets and targets with their respective risk analysis. Assumptions for reaching current five-year outcomes have not changed drastically. However, since the initial construction of the Plan there is increased science around climate change, emerging assets and new threats have emerged. Due to the sheer size of the Region, meaningful community consultations on assets and priorities in the Rangelands is an expensive business, and sourcing scientific and expert advice to supplement the aspirations is resource hungry, and time consuming.

A review of the assets and threats is also an ongoing process. A case in point is the Kimberley Subregion (see Section 5.1) with the Threats to Target matrix and Kimberley Asset Register. These are the frontend representations of the detailed Descriptions (Appendix 1) that sit behind the snapshots. The Descriptions record the science, community, and stakeholders' interactions to synthesise the information as represented in the snapshots. The same approach and level of detail holds true for the other 5 subregions.

The review has also shown the Plan when overlain with Australian Government priorities under the RLP, show assets such as the Eastern Curlew or Night Parrot as high Government priorities. Assets such as these will be reviewed over time and could be included in the Rangelands asset register, which now has over 400 assets. The influx of cane toads is an example of a new threat which will also be reviewed in time and is marked as a 'potential' in the updated Kimberley Target-Threat matrix. Additional threats such as a changing climate and erosion are also flagged for inclusion in the 2023-28 Plan.

9.2.5 Project Alignment

Rangelands engages widely throughout the region on new initiatives or strategic projects, and these long-term projects are carefully tracked. These key projects inevitably change in some way from year to year, with new science, technology, or assimilation of new knowledge. EMU and ESRM plans (100+ property plans), and sub catchment scale rehydration projects are just two examples of the large scale longitudinal strategic projects that Rangelands undertakes.

A key consideration is ensuring that new project initiatives are directly aligned to one of our strategic objectives. The strategic project alignment has resulted in the most successful outcomes as each of the project elements fully align with the Plan.

Many of the environmental assets identified by the community and stakeholders strongly align with the Australian Government's priorities for; World Heritage sites, Ramsar wetlands, threatened species, threatened ecological communities, regenerative pastoralism, climate change, soil health and carbon sequestration.

The current RNRM Community and Indigenous Communications, Engagement and Participation Plan contains the relative stakeholder management information and communication strategies to enable maximum engagement with our stakeholders and outlines activities to ensure our goals are achievable.

9.3 Lessons Learned

Lessons learned from decades of work in the Rangelands and from community feedback in this review can be summarised below:

1. Shared ownership – partnerships work best when ownership is shared and supported by shared decision making, data and approaches.
2. Collaboration and teamwork – a seat at the decision-making table is paramount.
3. Science and technology – monitoring, surveying and evaluation is essential to build understanding of asset condition and trends.
4. Transparency – Sharing reports and reporting progress towards targets, tracking action and publicising results is critical to a community-based organisation.
5. Connecting people – linking people - relationships and facilitation are the real secret to success.
6. Adaptation – continually reassessing goals, incorporating new science and being flexible to make mid-program adjustments as necessary.
7. Accountability – we each trust other to be accountable, to do their bit, and be accountable through monitoring and reporting.
8. Sound governance - Shaping sound governance is continuous and ongoing and positively influences the level of available investment.
9. Regional MER – monitoring, evaluation and reporting that integrates project and program level data into region reporting is a focus for 2023-28 Regional Plan.

9.4 Building MER

Rangelands NRM has program and project level MER process and guidelines in place. These include data flows through multiple databases and guidelines that are utilised and followed by Program Managers and Project teams.

Each Program has its own Program Management Spreadsheet which allows monitoring of deliverables achieved, data capture, evidential documents, collaboration, timelines, and financial components.

The capture of data and information within the project cycle is one of the most important factors for Rangelands NRM governance frameworks and constant improvement and review occurs to ensure we are capturing and storing information in relevant databases throughout the life cycle of all projects.

Following the review, Rangelands NRM is developing a framework where this data can be assembled and aggregated against key indicators for the Regional Plan's 7 Target areas:

1. Productive Land Systems;
2. Significant Vegetation Ecological Communities;
3. Sites of Significance

4. Resilient Engaged Communities;
5. Coastal Zones and Islands;
6. Threatened Significant Species - Flora and Fauna; and
7. Rivers, Lakes, and Wetlands.

This development will provide a measure and means to evaluate progress against the Plan at the Rangelands regional level and also at sub regional levels (Kimberley; Pilbara; Desert; Gascoyne; Murchison; and Goldfields-Nullarbor).

Rangelands NRM
Enabling Prosperity

SECTION C

10 Integrating the Regional Landcare Program (RLP)

Rangelands NRM delivers projects and programs across the Rangelands Region for many land and sea management clients including WA State Government agencies and Australian Commonwealth Government departments.

Building on and extending individual investment impacts, minimising duplication, value for money, and return on investments outcomes are central to Rangelands in delivering biodiversity and landscape scale change.

The RLP investment is currently foundational to Rangelands ability to deliver on its purpose and to engage community to deliver positive matters of national and international. The RLP program allows Rangelands to work directly or indirectly on 55 of the 411 RNRM listed assets.

RNRM Assets by Sub Region								
Asset Type		Kimberley	Pilbara	Gascoyne	Murchison	Goldfields	Desert	Total
Umbrella		21	9	6	2	8	4	50
Significant		76	49	33	24	18	36	236
Notable		27	28	26	20	10	14	125
Totals		124	86	65	46	36	54	411

RLP Activities as a % of Sub Regional Assets								
Asset Type		Kimberley	Pilbara	Gascoyne	Murchison	Goldfields	Desert	Total %
Umbrella		23.8	0.0	50.0	0.0	37.5	0.0	22.0
Significant		18.4	10.2	21.2	12.5	5.6	22.2	16.1
Notable		0.0	10.7	3.8	0.0	0.0	14.3	4.8
Total %		15.3	9.3	16.9	6.5	11.1	18.5	12.9

RLP Activities on Assets								
Asset Type		Kimberley	Pilbara	Gascoyne	Murchison	Goldfields	Desert	Total
Umbrella		5	0	3	0	3	0	11
Significant		14	5	7	3	1	8	38
Notable		0	3	1	0	0	2	6
Totals		19	8	11	3	4	10	55

Table 2: *Regional Assets and RLP delivery*

10.1 5-year Investment Opportunities and Priorities 2017-2022

The Regional Plan reflects the natural resource management activities needed in the Rangelands Region through Asset protection and Threat reduction of impact on the identified assets.

Rangelands NRM works on the following 5-year RLP Outcomes and Investment Priorities that are relevant to the Rangelands Region Management Unit including:

- *Threatened Species:* Three listed birds (Eastern Curlew, Mallee fowl and Night Parrot), and 11 listed mammal species (Black-flanked Rock Wallaby, including the West Kimberley race, Woylie, Pakooma, Antina, Chuditch, Golden Bandicoot, Greater Bilby, Mala, Numbat and Warru).

- *Threatened Ecological Communities:* Monsoon Vine thickets behind the coastal sand dunes of Dampier Peninsula.

- *Ramsar Wetlands:* Roebuck Bay, 80 Mile Beach, Ord River Floodplain and Lakes Argyle and Kununurra.

- *World Heritage Sites:* Shark Bay, the Ningaloo Coast, and Purnululu National Park. Note - The World Heritage List Nomination of Murujuga.

- *Agriculture systems adapting to significant change:*

    - *Hillslope Erosion:* Prevalent in the Pilbara and Kimberley regions.

    - *Wind Erosion:* Prevalent in the Southern Rangelands and Pilbara.

    - *Soil Health:* Across the Rangelands Region.

    - *Carbon Farming:* Across the Rangelands Region.

    - *Vegetation and biodiversity:* Across the Rangelands Region.

The degree to which these Investment Priorities lie within the Rangelands Region Management Unit is summarised in the following Table 3 below, along with notes on broader distribution across Australia. Rangelands NRM's programs intersect a proportion of these.

Investment Priority	Distribution in Rangelands MU	Proportion of species distribution, or areas of targets	Notes
Threatened Species	12 of the 70 EPBC listed species in the Strategy are within the Rangelands Management Unit		
Night Parrot	52.28% of MU	95.99% of Night Parrot distribution	The Night Parrot is indirectly supported through the Greater Bilby and Land Management Project Designs. The distribution model provided is very conservative; and this rare species is likely to occur across a much broader range than indicated.
Greater Bilby	41.29% of MU	39.71% of Greater Bilby distribution	Chosen as a key species in a Project due to significance in the region, and significance of the distribution, and complementary positive effects of management on other Threatened Species, and from the Land Management Project Design.
Malleefowl	36.15% of MU	41.56% of Malleefowl distribution	Chosen as a key species in a Project due to significance in the region, and significance of the distribution, as well as existing management actions and opportunities for collaboration, especially with indigenous groups.
Eastern Curlew	18.29% of MU	6.41% of Eastern Curlew distribution	Very linear coastal distribution makes management of coastal species across a very broad distribution difficult across the Rangelands Management Unit.
Black-footed Rock-Wallaby	Nominate race – 0.15% of MU MacDonnell Ranges race – 1.15% of MU Kimberley race – 0.86% of MU	Nominate race – 54.08% of distribution MacDonnell Ranges race – 9.09% of distribution Kimberley race – 100% of distribution	There are several races recognised under this taxon; the Kimberley Race falls entirely within the Management Unit and is covered with complementary effects from the other Threatened Species and Land Management Projects.

Investment Priority	Distribution in Rangelands MU	Proportion of species distribution, or areas of targets	Notes
Brush-tailed Rabbit-rat (Pakooma)	2.49% of MU	22.52% of Brush-tailed Rabbit-rat distribution	This species benefits from the implementation of other Projects.
Western Quoll (Chuditch)	0.88% of MU	6.29% of Western Quoll distribution	This species benefits from the implementation of other Projects.
Brush-tailed Bettong (Woylie)	0.03% of MU	4.35% of Brush-tailed Bettong distribution	This species benefits from the implementation of other Projects.
Numbat	0.02% of MU	5.04% of Numbat distribution	This species benefits from the implementation of other Projects.
Central Rock-rat	0.01% of MU	0.10% of Central Rock-rate distribution	This species benefits from the implementation of other Projects.
Rufous Hare-Wallaby (Mala)	Less than 0.01% MU	0.75% of Rufous Hare-Wallaby distribution	This species benefits from the implementation of other Projects.
Threatened Ecological Communities	1 is found in the Management Unit		
Monsoon Vine Thickets	Less than 0.1% of Management Unit	100% (2,566 square kilometres) of Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula.	Covering a potentially large proportion of the Kimberley coastline, this Threatened Ecological Community is funded by Rangelands NRM and other parties via the Environs Kimberley team and Rangelands NRM will continue to support that group in seeking funding to manage this Threatened Ecological Community.
Ramsar Wetlands	4 out of the 65 are in the Management Unit		
Roebuck Bay	0.03% of Management Unit	682 square kilometres	Roebuck Bay, and 80-mile Beach, are the focus. Our strong association with the Roebuck Bay Working Group is providing a solid foundation for this Project to be successful.
Eighty-Mile Beach	0.08% of Management Unit	1,755 square kilometres	80-mile Beach, and the nearby Roebuck Bay, are the focus of Ramsar work.
World Heritage Areas	3 of the 19 are within the Management Unit		

Investment Priority	Distribution in Rangelands MU	Proportion of species distribution, or areas of targets	Notes
The Ningaloo Coast	0.27% of Management Unit	6,045 square kilometres	The Ningaloo Coast, and our wide network of relationships built in the conservation and pastoral sectors, is the focus of our World Heritage Area work.
Hillslope Erosion	9.23% of Management Unit	211,957 square kilometres	Hillslope erosion is the focus of our work. This is one of the aspects of holistically reviewing the management of pastoral properties.
Wind Erosion	25.53% of Management Unit	580,319 square kilometres	Wind Erosion is one of the aspects of holistically reviewing the management of pastoral properties
Carbon Farming			
Soil Carbon	0.002% of MU	45 square kilometres	Soil Carbon is the focus of our work and is a key element in our land management strategies across the Management Unit, in terms of increasing soil carbon, water holding capacity and ground cover.

Table 3: *Investment Priority and Distributions*

10.2 Actions to Mitigate Threats and Deliver Investment Priority Outcomes

The codesign of projects and actions with land and sea managers, Traditional Owner and ranger groups, governments, NGOs, industry, resource sector, business organisations and individuals are an essential aspect of threat abatement planning and effective project implementation.

This approach features in all Rangelands NRM projects and fosters stronger alignment of relevant national, subregional, and local plans and investments within the priority areas to achieve the desired 5 year and longer-term outcomes.

10.2.1 Threatened Species

Greater Bilby (Macrotis lagotis)

Through improving fire regimes and managing grazing pressure and degradation from feral herbivores across a landscape scale, Rangelands NRM is addressing core threatening processes to Bilby habitat.

Through partnering with land managers including Indigenous Rangers, pastoralists and conservation groups, targeted monitoring, and management of feral predators such as foxes, feral cats and dogs/dingos can be addressed in key sites where Bilbies are active.

Malleefowl (Nganamara)

Through coordinated delivery, local communities are increasingly undertaking actions to protect the species either directly, or through activities of benefit to other values important to them.

Malleefowl and predator surveys, invasive weed management (including buffel grass control), large feral herbivore culling, opportunistic predator control and traditional prescribed burning to re-establish a finer-grained mosaic are being undertaken variously by the Spinifex, Pilki, Yilka and Ngadju Rangers teams.

In the pastoral interface groups have cooperated around feral animal control and regenerative grazing practices for multiple benefits. The combined effect of these activities is reducing threats to Malleefowl and other threatened species.

Night Parrot (Pezoporus occidentalis)

The land management knowledge of Night Parrots is improved by working with Aboriginal Ranger groups on known and likely Night Parrot habitat sites in Western Australia. Aboriginal Ranger groups will contribute to the project with their skills and expertise and learn new skills to implement the project through on-country visits to assess potential habitat, establishing monitoring and provide valuable information to extend Australia's knowledge and understanding of night parrots.

The project will also build relationships and encourage participation of pastoralists who manage potential night parrot habitat on the pastoral/desert interface. The Aboriginal rangers will address the most important aspects of the night parrot's recovery and use the improved knowledge to target key sites with appropriate planning and management.

Projects take a strategic approach and better integrate the various land management initiatives that are underway in the Region. Activities focus on threat abatement actions as described in recovery plans, implemented at a landscape-scale within Rangelands NRM priority areas, and utilising the passion and energy of the local community.

The approach also aligns with cross-regional activities by collaborating with cross-management unit community partners, other NRM Regional Groups in both WA and SA, and National Recovery Teams to support actions to halt and reverse the decline of the species.

10.2.2 Ramsar Wetlands

West Kimberley Ramsar sites Roebuck Bay and Eighty Mile Beach

The community is engaged to raise awareness, to encourage and support a holistic, sub-regional response to threats.

Rangelands NRM negotiates between parties to encourage adoption of best practice and complete information collection activities. Through working with Indigenous Rangers and pastoral land managers to support sustainable land management practices and act against nutrient and sediment runoff and invasive weeds and pests, this Project addresses core threatening processes across the entire Ramsar area.

Engagement is facilitated through the preparation of ecological and culturally aware plans and follow up works to address threats (e.g., runoff) to the Ramsar sites.

10.2.3 World Heritage Areas

The Ningaloo Coast and Shark Bay WHAs

Our primary role has been to facilitate alignment of the various land management initiatives underway across the region between State Government agencies, traditional owners, the pastoral industry and community groups to support the delivery of an integrated and community-led regional land management program along the Ningaloo Coast and the neighbouring Lyndon River catchment and expand Gascoyne Catchment and into the Shark Bay and Wooramel catchment area.

Threat abatement activities include control of predator animals, large feral herbivores and weed infestations and reducing nutrient and sediment runoff into waterways and the marine habitat.

10.2.4 Agriculture Adaptations to Climate Change

Rangelands NRM engages with a number of producer groups that represent sub-regions of the WA Rangelands – Kimberley/ Pilbara, Gascoyne, Goldfields-Nullarbor and Yalgoo (Midwest), each facing particular challenges with regards to building resiliency to climate change.

We partner with producer groups to deliver locally relevant workshops, field days and establish project concept plans and demonstration sites framed around their articulated priorities. The workshop and demonstration topics and subsequent communication materials provide opportunities to address local issues and priorities related to land manager resiliency to climate change and range of linked threatening processes to pastoral production, including loss and decline of native vegetation and biodiversity on-stations. These threats are exacerbated by increasing profitability requirements which are putting WA rangelands producers under extreme pressure.

Rangelands NRM has been working to support producers first by increasing their understanding of the specific impacts of these threatening processes and practices to manage these impacts. Efforts are initially concentrated on bringing regionally relevant information to the producers via producer groups that work within project funding constraints within the Rangelands Region Management Unit.

10.3 Current Investment Priority Funding Gaps

The funding gaps in the Rangelands Region Management Unit are:

- The unfunded RLP project proposal - Forging the Link Between Improved Land Management and Production Outcomes. This project identified the quantum of funding required for Rangelands NRM to further build capacity, resources and to develop on-ground extension and adoption opportunities with engaged champion producers and producer groups, building resiliency of producers in the Rangelands Region.
- Only 1 RALF to provide extension and adoption services across 6 sub-regions is insufficient.
- Insufficient investment to service 15,000km of coastline and 220 million hectares of management unit.

Rangelands NRM
Enabling Prosperity

11 Appendix 1 - Asset Register - Asset Descriptions

11.1 Kimberley Asset Register – Asset Descriptions

Asset number		Description	Current condition	Community and Social values	Environmental values	Economic values	Threats	Other
B001	Munkayarra Wetland	Natural wetland with permanent water (valuable in dry seasons), waterhole like a lake	Degraded to fair	Potential to become high value tourist destination (birds), used by locals as a respite and for photography, social/economic, fishing country with water	Vegetation and natural habitat values, fish, birds	Tourism (rehabilitation improves water quality and retention creating a visitor friendly destination including international bird enthusiasts), potential for bird watching	Catchment too small to provide sufficient habitat to support breeding cycle for multitude of species, grazing, fire, poor management (gates often left open and fences down), feral animals, human use, cattle, some weeds	Derby based landcare group and local government combining to progress better management of the site.
B002	Perennial Savannah Grasslands	Tropical savannah woodland with perennial grass understorey, open savannah Rangeland inter-dispersed with remnant rain forest. Diverse vegetation thicket and wetlands.	Varied but generally degraded	Tourism, traditional, lack of diversity, not generally recognised. The impact on the general biodiversity is catastrophic.	Water cycle, carbon diversity, protects wetlands, the biodiversity within the leaf litter is the basis for all life in the Rangelands	Pastoral productivity, carbon sequestration, improve pasture available and enhancement of visitor destinations	Fire, overgrazing, woody thickening (increased Acacia, Native Sorgmon) leading to decreased natural grasses and other vegetation, micro fauna and mammals. Continuous destruction of large Eucalypts.	NAFI, Savannah burning. Needs more science and practical application of resources, cooperation between agencies, pastoralists, PLB and locally based fire management authority.
B003	Savannah Woodland	Old growth Eucalypt woodland	Trend is to decline (diminishing)	Aesthetic, sense of place, shade, food source	Habitat/hollows, small mammals and birds	Tourism (tourist perception of wilderness; "Pristine" Kimberley)	Fire (late dry season wildfire without a mosaic pattern in place)	
B004	Frazier Downs Coastal Strip	Coastal strip of Karajarri country native title determined land	Varied - fair to very good	Extremely important for Bidyabanga Community, Krajarri Access to coast for fishing, many documented cultural places	Wetlands and springs, intertidal zone creeks	Tourism (Port Smith Caravan Park)	Over grazing, unmanaged tourism, climate change	Currently considered for an IPA over this lease excluding some pastoral paddocks

B007	Camballin Barrage Pool	Large pool on the Fitzroy that has been dammed with a barrage (to allow development of a cotton industry in the 1970s)	Fair to degraded	Recreational fishing, historic		Agricultural production	The barrage prevents movement of large fish such as endangered sawfish in the dry season	Some people support the barrage as it creates a good fishing spot, but others don't support it as it prevents fish movement upstream. Infrastructure is falling down and dangerous
B008	Beagle Bay	Tidal embayment with creeks, pearling farm, clear water	Good to very good	Hunting and fishing grounds	Seagrass, turtle, Dugong, whales, fish	Pearling, hybrid economy from living off saltwater resources, some outstation tourism	Uncontrolled access by tourists/visitors	
B012	Canning Basin (Timor Basin)	Good	Unknown	Unknown	Unknown	High water mineral/resource, extraction	Potential mining (fracking, water usage)	Northern Yield Project (CSIRO)
B014	Buccaneer Archipelago (Sunday Island Group) Sunday Strait	Islands and intertidal reefs off One Arm Point	Varied - Good to very good	Fishing, hunting, cultural connection	King Tidal System, fish, nursery seagrass, islands, significant reef systems	Hybrid economy, tourism	Mining activities (adjacent)	Wilson Report, National Heritage listing Report
B015	Lower Liveringa (Water Reserve)	Water Reserve	Good	High community and social values, historic	High vale, birds breeding and nesting	Hybrid economy, tourism value, cultural values	Grazing and tramping (cattle), unmanaged access, mining (extraction of water, reduction in water quality)	Nyikina Mangala Mardoowarra Wila Booroo Heritage Plan (WWF)
B016	Lake Eda and other lake and wetland systems on Roebuck Station	Lake and associated wetlands	Degraded	Community, hunting			Cattle - degrading and drying the wetlands	Yawuru Cultural Management Plan, Yawuru IPA Research
B017	Sandstone heath vegetation community	High portion of obligate seeders; occurs on rocky sandstone areas that offer some protection from fire; above 1000mm rainfall zone.	Unconfirmed	Tourist values, cultural values	High biodiversity, high numbers of endemic and threatened species.	Carbon	Fire (particularly too-frequent, large, late season wildfires)	Listed as Threatened in the Northern Territory (under EPBC); under equal or greater threat in the Kimberley.
B018	Riparian Vegetation Community	Vegetation along rivers and creeks above 1000mm rainfall zone		Recreation /cultural for food, fishing	Important habitat, shelter, soil conservation, water quality		Fire (Impact of large, hot, late season fires damaging fire sensitive vegetation along creeks and rivers)	

B019	Critical Weight Range mammal community - North Kimberley above 1000mm rainfall	Suite of mammal species average body weight in the range 35 to 4200g that are still abundant in the Kimberley. Includes threatened species.	Unknown	National Heritage, food source for aboriginal people, 'appealing' species i.e., furry and cute	Intrinsic value but also added value of whole suite collectively; critical to maintenance of ecosystem services (ie. Nutrient/carbon turnover)	Tourism (as yet largely undeveloped)	Feral animals (cats), high intensity/frequency fires, cattle, disease	Significant extinctions have occurred. DEC Report July 2012 Kimb.Sci.Cons.Str. Performance Reporting. Radford (2012) Austral Ecology, Radford and Andersen (2012) Austral Ecology.
B020	Udialla Springs (Pastoral Lease) (Oongalkakda)	Connective Springs, Peak Mounds, access to river	Good	High community and social values, historical values, high cultural values	High environmental values	High cultural and environmental tourism, hybrid economy	Weeds, unmanaged access, mining/impacts (on water quality and on springs)	Nyikina Mangala Mardoowarra, Wila Booroo Cultural Heritage Plan (WWF)
B021	Gourdon Bay	Coastal embayment. Marine life, spawning ground for salmon, storyline dreaming places.	Good to fair, high human traffic	Recreation, cultural, historical/pearling, Karajarrii country, fish traps, cultural sites	Dugong breeding/feeding, whale shark/breeching, turtles feeding, sensitive soft limestone cliff area	Tourism	Tourism, mining, high human traffic, cracking cliff area	Ranger put in bollards to stop access to tourists to sensitive cliff area
B022	Camballin Wetlands	Creeks and lakes	Fair	Strong indigenous cultural values, fishing - Indigenous, hybrid Economy	Wetlands in arid area. Flood plain	Grain growing/feed, potential tourism	Mining (coal, uranium, CSG fracking)	Fitzroy River Catchment Management Strategy
B023	Dampier Peninsula - West coast	Coastal strip	Excellent to good	Recreation - camping fishing bushwalking, cultural sites, Archaeological, Lurkjarri Heritage Trail	Coastal Monsoon Vine Thickets, drainage basins, wetlands, coastal dunes, creeks, embayments	Tourism	Industrial development (gas), mining, unmanaged access (damage to dune systems), fire, feral animals	Goolarabooloo/Jabbir Jabbir, Yawuru

B024	Dampier Peninsula - Monsoon Vine Thicket on Coastal Sands TEC	TEC - Vulnerable DSEWPaC assessing under EPBC Act for Endangered status	Degraded (most occurrences)	High cultural values, high ecological values, most bush foods occur here, also medicinal plants, bush foods diversity, shelter (shady areas), camping because of shelter	25% of Peninsula flora found here, many species in restricted locations, high invertebrate endemism ecosystem network highly fragmented (natural), rare plants and biodiversity, refuge for endemic flora and fauna, birdlife	Tourism / bush tucker tours, provides food for locals, tourism for birdwatchers	Fire, weeds, clearing, development, Cats, weeds, fire, human impact, cattle, shifting sand dunes	Current project & research work by Environs Kimberley West Kimberley. Nature Project in partnership w. Bardi Jawi, Nyul Nyul, Yawuru Indigenous Rangers and SKIPA, important to manage fire understand frugivore network. Careful development and tourism man, Biodiversity surveys have been completed between Bari Jawi, Rangers and EK documentation of the surveys are available
B025	Yarp Lake System	Claypan lake system, some ephemeral, some permanent	Fair to good	Nimmanburr/Nyul Nyul country, cultural values	Birdlife (impressive), important water source for many species including migratory birds.		Cattle (unmanaged), fire, weeds (potential).	Needs more survey work to identify important/threatened species and their role in landscape. Noted in Wetlands report as special. Limited info. Some current work happening in the Nyul Nyul Ranges and environs
B026	Dampier Peninsula - Inshore dolphins	Snubfin, Indo Pacific Humpbacks, Dwarf Spinner	Excellent to good	Iconic species	Vulnerable, not well-known populations. Rare. Poor ecological understanding, in- shore migration paths vulnerable to boat strike.	Incidental value to tourism	Human impacts (boat strike, fishing by-catch), industrial development (gas)	Potential partnership. Environs Kimberley. Marine scientists. ANU. Murdoch University. Yawuru/Bardi/Nyul Nyul. DEC. Goolaraboolloop/Jabbir Jabbir
B027	Carnot Peaks and Kings Peak	Rocky outcrop with unique assemblage of Monsoon Vine Thicket plants.	Fair	Plants have cultural values - bush foods, Djabera Djabera Country	Unique to the landscape, some flora only found here		Fire (unmanaged late season), weeds (secondary)	Flora surveys conducted here. SKIPA/BBS, TEC

B028	Yalleroo Lakes	Lakes on the Savannah Plains	Good to Fair	Recreational sites, Indigenous cultural sites.	Provides water and plants, animals and birds		Possible Coal Seam Gas Fracking	
B029	Lolly Well Springs and Bobbys Creek			Cultural, Nyul Nyul Country				On a register PEC/TEC
B030	TECs and PECs in Broome Peninsula and Dampier Peninsula	Dwarf Pindan Heath, Corymbia paractica, Monsoon Vine Thicket TECs, Mangar Community PEC		Recreation, aesthetic	Rare plant community		Fire, land clearing, weeds	PEC on Broome Peninsula. Dwarf Pindan Heath. Mangarr on relic dunes. Corymbia paractica. TEC - Monsoon Vine Thicket. Need improved vegetation mapping and description for wider area.
B031	Edgar Ranges	Headwater Geegully Creek	Good	Recreation, cultural, Mangala	Black Footed Rock Wallaby, Monjon, Pandanus spiralis		Fire, mining, feral animals	
B032	Dampier Peninsula - Gouldian Finch	Limited population, distinct from Kimberley	Unknown but high risk / high threat	Iconic loved bird	Endangered species		Fire, weeds (Buffel grass)	Initial survey work by EK, Bardi Jarwi Ranges, WWF but limited information. Need population and abundance surveys and to identify key breeding and nesting habitat and assess population viability and recovery actions.
B034	Byal Byal Freshwater Sawfish	Large endangered species	Good	Local indigenous food	One of the few places left in the world where these animals are procreating	Contributes to local Aboriginal hybrid economy. Food	Development, mining (on the Fitzroy River and the Dampier Peninsula coast)	
B035	*Pittosporum moluccanum*	Rare plant	Varied - Excellent to degraded	Rare plants, scientific	Rare species		Land clearing, fire, weeds	

B036	Fitzroy River (Mardoowarra) - Entire system	One of world's biggest rivers when in flood; 750 km in length, 90,000 km2 catchment area; much of it stops flowing in the dry season	Good	Recreation, strong Indigenous cultural values, Cherabin, tourism, fishing, agriculture (jobs)	Feeds water to the region, threatened species, deep pools (especially valuable in the dry season), sustains fauna and flora over large area, riparian vegetation, pockets of Fairy Wren habitat	Pastoral, tourism, traditional / hybrid economy, food source, agriculture, mining	Mining (cumulative impacts of coal & uranium mining and Coal Seam Gas Fracking), human refuse, weeds, erosion, siltation, fire, feral animals (pigs), unmanaged access	As nominated it includes the Christmas Creek and Margaret River tributaries. See: Northern Yeild Project (CSIRO), Northern Development Taskforce, Fitzroy Catchment Report (Fitzcam).
B037	Dampier Peninsula - Seagrass meadows	Chain of seagrass meadows supporting dugong and turtle populations (both endangered and high cultural values), and fish populations		Lyngbya, turbidity/dredging, development				Important to understand how animals move and graze along the coast and sustain populations important culturally and environmentally.
B038	Dampier Peninsula - Greater Bilby Population	Endangered Species considered locally extinct but recent surveys and observations prove otherwise.	Unknown but high risk / high threat				Fire, weeds, feral animals (cats and dogs)	Habitat needs to be further identified, species needs to be further located and managed accordingly, some preliminary work in pipeline, EK, Nyul Nyul, WWF, needs funds.
B039	Lake Louisa	Large lake (semi-permanent)	Fair. Trend is to decline	Close to Beagle Bay. People value this place, Nyul Nyul/Nimanbur Country, cultural values	Birdlife migratory and resident bats, strategic water source in landscape for wildlife		Cattle (feral and escapee), fire, weeds	Needs further survey work. Some started - Nyul Nyul Ranges and EK, Important Wetlands directory
B040	Roebuck Bay - Entire	20 x 30 sq km embayment	Generally good	Cultural values: fishing, shell collecting, hunting dugong. Other values: Fishing, bird watching, art, music, iconic to Broome's identity	Ramsar site (1990) National Heritage listed, benthos - 500 species known, shorebirds, Snubfin and bottlenose dolphins, humpback whales, Dugong, turtle, fish, seagrass meadows, mangrove communities	Fishing, maritime, tourism (bird watching, boating), jewellery, photography, art	Groundwater extraction on Roebuck Plains, nutrient and pollutant-rich storm water runoff and poor existing drainage networks, Lyngbya (algal) blooms, sedimentation, weeds, coastal vulnerability (to sea level rise)	NRM Report for the Protection of Priority Natural Resources in the Kimberley Strategic Regional land use plans. (DOP) Broome Townsite - State of Environment Report. DOW Stormwater guidelines only consider SW conditions. Stormwater guidelines required

B041	Roebuck Plains Lakes/Wetlands chain	Freshwater wetlands chain in a semi- arid environment	Degraded	Pastoral station, hunting (cultural take), traditional use, recreation, camping, ceremony, water	Birds - waders and other migratory birds, fresh water	Bird viewing tours, pastoral station, bush tucker	Fire, feral animals, unmanaged access, grazing, trampling, climate change	Report: Establishing Priorities for Wetland Conservation and Management in the Kimberley (report by Tanya Vernes at WWF), Yawuru Cultural Management Plan
B042	Coastal camping spots/free camping		Degrading	Cultural	Monsoon Vine Thickets, threatened species of flora and fauna	Tourism	Poor access management, lack of care by visitors, rubbish	
B043	Willie Creek Wetlands (Nimalarragun)	Two freshwater wetlands in an area where surface (fresh) water is scarce	Stable (?)	Traditional use (Yawuru), freshwater - recreational use (fishing, nature appreciation)	Fresh water, birdlife, freshwater fish, fish nursery (Barramundi, etc)		Climate change, weeds, unmanaged tourism	Yawuru Cultural Management Plan
B044	Fitzroy River - Lower reaches	River system	Varied - Good to degraded	Fishing, hunting and camping	Freshwater sawfish, cattle	Local economy, fish, cherabin, turkey etc, recreation, tourism	Weeds (Neem, Rubber Vine, Neopurra Burr, Parkinsonia), erosion, sedimentation, increasing saltwater upstream, camping	
B045	Roebuck Bay - Seagrass meadows	Primary driver of biodiversity - Halodule & Halophila species represented. Many endemic species in meadows, primary food for dugongs. Nursery crustaceans, young fish	Good	Cultural values	Primary driver of life in bay, stabilise sediments, carbon sink, nursery, shelter young crustaceans, fish, food source, Dugong, turtles, bottom feeding fish	Recreational and commercial fishing	Increasing industrial and residential development, coastal/storm water run-off (nutrients) algal blooms (smother seagrass causing a die off), speed- boating over the meadows, driving on the beds to launch boats, etc	
B046	Small mammals, Golden Back Tree rat, Golden Bandicoot, Dunnarts	Small mammals, planigale and dunnart are both present on the peninsula, some possums	Varied, rare	Bush tucker, community science, people would like to see more of them	Preservation of species, very rare	Nature based tourism	Feral animals (cats), fire (late dry season wildfire), dingos and human impact	Need for trapping (camera and physical) to establish and idea of their presence
B047	Roebuck Bay & Willie Creek - Mangroves	Mangrove communities (13 species)	Stable (?)	Yawuru traditional use, nature appreciation	Nursery habitat, roosting habitat, soil stabilisation	Tourism	Water quality, clearing for urban development/growth	Yawuru Cultural Management Plan

B048	Roebuck Bay - Intertidal Mud flats	A significantly high diversity of benthic invertebrates supported; is among the richest mudflats in the world. Hugely important to food web of Roebuck Bay	Stable/declining (?)	Recreational fishing (crabs), supports fish species on high tide, tourism	Roebuck Bay food web, supports huge shorebird populations, (Ramsar listed), supports very high diversity of invertebrates	Recreational fishing, tourism (bird watching), professional fishing	Nutrients (increase), pollution, sedimentation (industry and other run off, dredging), potential development (marina)	Roebuck Bay Working Group
B049	Roebuck Bay - Faunal values	Hot spot for Australia's snub fin dolphin (154). Also, Bottlenose & Humpback dolphins. Threatened dugong, turtles.	Unknown	Cultural - dugong and turtles hunted, Snubfin and dolphin much loved by community	Coastal, dolphins most threatened species of mammal in world. Largest known population Snubfin (endemic to Australia) only discovered 2005.	Tourism, art, music, photography	Algal blooms, pollution, climate change, boat strike, fishing nets, over-hunting (Dugong/turtle)	Little is known about numbers of dolphins, dugong and turtles. Snubfins have high incidence of injury on bodies, dorsal fins and tails.
B050	May River (crossing)	Popular swimming hole	Good	Easily accessible		Pastoral productivity	High visitation, rubbish, increasing crocodiles, Cane Toads	
B051	Roebuck Bay - Fish stocks	Targeted Finfish (Table species)	Declining	Recreational fishing, tourism, Yawuru traditional take/fishing (esp. threadfin salmon)	Biodiversity, food chain	Professional fishing, recreational fishing, tourism	Overfishing, anecdotal evidence of decrease in salmon stocks, declining water quality	Department of fisheries, Yawuru Cultural Management Plan
B052	Roebuck Bay - Migratory shorebirds	Roebuck Bay reputedly supports 120 000 migratory shorebirds representing 19 different species (1%) of international population. Roebuck Bay known as shorebirds capital of Australia.	Declining	Shorebird capital of Australia. Remarkable variety of shorebirds on Broome's doorstop.	Roebuck Bay critical to migratory shorebirds as a feeding site to enable moult and migration/breeding in the northern hemisphere	Bird watching, tourism, hovercraft tourism, nature-based tourism	Algal blooms impacting benthos (primary food source shorebirds), increased disturbance especially on northern shores including cars, motorbikes, uncontrolled people, helicopters, unleashed dogs	The population of migratory shorebirds is declining largely due to reclamation of wetlands in the Yellow Sea. As such, Roebuck Bay is critical to shorebird survival and benthos needs to remain in good condition.
B053	North Kimberley IBRA region	Remote/isolated high rainfall	Good to very good	Cultural	Small mammal populations, biodiversity	Tourism	Fire, feral animals (cane toads, cats), mining	
B054	Coastal Reserves including Kennedy Hill	Crab Creek, Dampier Creek, Coastline - cliffs Yawuru Conservation Estate, Shire Reserves, Dinosaur Footprints	Unknown	High Yawuru cultural use and occupancy, historical values	Connected to IT2/Marine Park, Ramsar wetland	Tourism	Urban and commercial development	

B056	P1 Public Drinking water source Area	Thin freshwater layer extending most of Peninsula	Unknown	Drinking water, directs the extent of future development.	Water quality, quantity, interactions with environment.	Drives development	Development pressure, saltwater intrusion layer, recharge rates	NRM Report for the Protection of Priority Natural Resources in the Kimberley Strategic Regional land use plans. (DOP) Broome Townsite - State of Environment Report.
B061	Tropical Rangelands	Central Dampier Peninsula				Pastoral productivity	Mineral sands mining	Production of radioactive waste and Euro damage
B063	Sea Turtles - Across the region	Australian sea turtles	Excellent to good	Recreation, aesthetic, iconic species, culturally significant species (hunting and iconic)	Rare and Threatened species	Food, tourism	Human use and impacts (by- catch, over harvesting, vehicles, lights), feral predators (foxes and dogs eating eggs)	
B064	Scaly Tailed Possum and Rock Ringtail	Rare and poorly studied species		Iconic species	Species dependent on particular ecological niches		Fire, feral animals (cats and foxes, cattle)	
B065	Vine thickets of the north and central Kimberley		Varied - good to degraded	high cultural values multiple groups	High diversity and endemism		Fire, weeds	Need survey work to identify locations, conditions and threat, TEC
B066	Myroodah Crossing	Country near Fitzroy River	Good	High Aboriginal community recreational and cultural use	High level of ground water and surface water interaction.	Pastoral productivity, tourism		
B067	Humpback Whale calving grounds	Humpback Whale calving grounds	Excellent	Aesthetic, recreational, Nyul Nyul	Largest Humpback whale population	Tourism	Industrial development, pearl farming, boat strike, tourism	
B068	Pender Bay including Pender Gardens outstation	Large bay	Excellent	Outstations, hunting and fishing, connection to country (Bardi Jawi Country), cultural values, social history, sacred site	Turtle feeding, dugong breeding & feeding (seagrass), whale resting & calving, mangroves, reef, shelling, fish, migratory birds, pandanus trees different swirl on trunk, old cattle station, cultural values / beliefs	Tourism ventures, sustenance hunting and fishing, local knowledge/history of Aboriginal female divers from past pearling luggers	Climate change - sea level rises causing beach erosion, big tides, high water mark level much higher than what it was 5 yrs. ago. Human impacts (large tourist boats anchor in bay opening, overfishing?)	Wilson report. Liquid Natural Gas site surveys. To be included in IPA Dampier Peninsula

B069	Lake Patterson	Lake (permanent)	Unconfirmed	Cultural values	Birdlife, important water source for many species in greater landscape		Cattle (feral), fire, weeds	Needs more survey work to further identify strategic important of this wetland as in the wider landscape. Threatened species and ecosystem connection.
B070	Cypress Pine, Mt Elizabeth Station	Fire sensitive cypress pine. Obligate seeder that only seeds after around 18 years.	Unconfirmed		Restricted occurrence. Indicator that fire is not being managed well		Fire (too-frequent, large, late season wildfires)	
B071	Rainforest in the Kimberley	Small rainforest patches	Unconfirmed	Shade, shelter	Important for animal habitat, high biodiversity.		Fire (too-frequent, large, late season wildfires)	
B072	Nimalaica Wetland near Willie Creek	Wetlands of National Significance	Good to degraded	Recreation, aesthetic, cultural	Wetlands of national significance		Fire, weeds, mining	
B073	Cable Beach	White sandy beach	Good	Swimming relaxing tourism social events cultural sites fishing	Turtle nesting, fish, migratory birds, beach invertebrates, sand dunes	Tourism	Human impacts (vehicles, increasing usage), industry (dredging)	
Desktop 3	Minyirr Park Coastal Reserve	Coastal bushland reserve. Significant extent of Monsoon Vine thicket vegetation (TEC) at a federal level. Jointly managed by the Broome Shire, DEC and Yawuru	Varied - Good to degraded. Trend is to decline	Amenity: cool & shady, plants and birds to observe. Cultural: meeting place, bush foods, conduct business. Social: retain community structure and traditions. Educational: for community and rangers	Monsoonal Vine Thicket vegetation. Fauna habitat, feeding, breeding, protection. Extensive diversity of fauna. Intact remnant vegetation close to urban setting	Potential for cultural tourism. Bush food opportunity development. Seed source for native flora species. Ranger employment potential. Educational/study opportunities	Water runoff (brings weed seed, pollution and creates short term flooding impacting on vegetation communities). Fire, arson, weeds, erosion	
F001	Devonian Reef	Ancient reef (inland, far from the coast)	Good	Springs/aquifers, culturally significant	Associated fossil soil type	Agricultural, mining (lead and zinc)	Fire, acid rain	350mybp - old, cultural significance, fossils, unusual amenity, amphibious fish, world status
F002	Alexander Island	Riparian /floodplain	Good		Fairy Wren, freshwater sawfish	Pastoral productivity (highly productive land)	Mining activity, human pressure	
F003	Fitzroy River (Mardoowarra) - Fitzroy Crossing town area and old crossing	Focal point along the river for human use	Varied - good to degraded	Cherabin, recreational tourism, fishing	Riparian vegetation, potential Fairy Wren habitat	Local hunting/fishing, food source, infrastructure (Fitzroy River Lodge)	Rubbish, weeds, erosion	

F004	Christmas Creek	River	Good	Locals go fishing, important source for food, stone hide	Bilbies, rock wallabies (wallaroo), blood finch and blue finch, Major Mitchell Cockatoo	Tourism	Feral animals (pigs), stock wandering, overgrazing, erosion (especially in tributaries), mining company access	
F006	Spectacle Hare Wallaby	Marsupial	Unknown		Threatened species		Development, overgrazing, feral animals (cats and dogs), fire, mining and exploration	Or possibly quokka. Six individuals seen but DPaW haven't confirmed sightings or species. Habitat is red spinifex/wiregrass (the proper dry country). DPaW Kununurra excited but haven't allocated $ to research
F007	Fossil Soil Type	Soil type with a unique ability to hold/retain water. Approx 1000 ha or more remaining.	Good	Development /jobs potential		Pastoral and agricultural, potential (water retention)	Fire	Derived from Devonian Reef, can have agriculture without irrigation using stored water
F008	Mitchell and Flinders Grasslands pastoral grazing land	High value grasslands - dominant perennial vegetation system on the black soil plains	Fair to excellent	Economic production allows regional communities to exist (economic lifeblood of the Fitzroy valley - without it the pastoralists can't make a living)	Relatively intact, native pasture, carbon store	Cattle production, tourism, sustainable development, carbon trading	Late hot fires (wildfire or intentionally lit)	If it suffers fire and drought, it can take years to recover.
F009	Lakes on Bulka Station	Freshwater spring flowing all year round, Dinosaur footprint fossils	Excellent	Culture/Kids visiting country	A lot of wildlife, musk kangaroo / wallaby, birds, finch (red, white, blue), Bilby	Hunting, bush food, fishing	Stock, mining (coal)	Early season cultural burning, dinosaur footprints, whole area unique. Set of springs on limestone soils, needs fencing and alternative water point. People on Bulka may not know about the values
F017	Cycads (ridge-loving Cycads on Fairfield Station)	Unknown species of rare cycads	Fair to good (anecdotally)	Relic of a bygone era, part of the Devonian Reef	On edge of tunnel Creek National Park boundaries		Fire (easy to wipe them out), Human impacts (one population is vulnerable to human access, one less so)	

F019	Clay soil types	Clay soil - holds water and carbon	Varied	Income	Vegetation communities, biodiversity	Grazing, farming, carbon farming, significant for cattle production - highly productive	Overgrazing, do nothing (e.g., don't rehabilitate), lack of management, sheet erosion	High potential for increasing soil carbon. Best option to effectively mitigate threat is to fence and keep cattle out for years. Ripping may also be effective (anecdotally)
F033	Sollomon Creek, Rock hide	River country, rock spinifex, rugged, stony, in middle of two ranges, gorge	Good but trend is to decline (slowly falling apart)	May be indigenous or white	Rare (not a commonly found structure)		Mining	Rock hide that may have been for indigenous hunting and other reason.
F050	Nippa Dam (mountains around)	Sacred site, songline	Good	Songline	Wallaby rock holes, permanent water, finches	Pastoral productivity (cattle)	Fire (hot and late)	Already fenced from stock
K015	Eighty Mile Beach	Ramsar Area Marine Park (to high watermark)	Varied - Good to very good	Recreation, Cultural areas	Turtle nesting beach, migratory waterbirds, salmon, dugong (seagrass bed), clean beaches and good water quality	Tourism	Human impacts (vehicles driven on beach and through sand dunes)	80 Mile Beach Marine Park (DEC), 80 Mile beach Ramsar Area
K017	Purnululu NP/Bungle Bungles	Honeycomb rocks/sandstone domes		Culturally significant, recreation	Geological, flora and fauna, waterbirds	Tourism	Unmanaged tourism (high visitation rates), fire, weeds	Large reconstruction project proposed involving state and federal govts and Traditional Owners. Protecting habitat values for potential reintroductions.
K018	Fitzroy River - Water Resource (Industry groundwater in lower reaches)	Kimberley's largest river in terms of volume	Unknown	Recreation, cultural value	High environmental values	Potential water supply for State / Region	Damming, catchment impacts	
K019	Tunnel Creek			Cultural	Springs, vegetation, specific habitat	Tourism	Tourism (camping/numbers), fire	
K020	Geikie Gorge			Cultural, recreation	Threatened Species	Tourism	Unmanaged tourism (high visitation rates), fire, weeds	

K021	Wild Rivers in Kimberley	Commonwealth/State designation based on level of moderation /human impact e.g., abstraction	Good	Recreation, tourism of international importance	International value due to unmodified condition		Decisions on ports/dams/land use changes, over abstraction of water resource	Wild Rivers are listed for the state. Currently there is no wild river strategy and therefore often little or no active management
K022	Lake Kununurra	Manmade lake as a result of damming for agricultural irrigation. Contains Ramsar site and high-value conservation areas	Good	Former river (prior to damming) highly important to Traditional Owners as it is culturally significant. Varied recreational values - boating, fishing etc. Iconic.	Ramsar site, high-value conservation areas, notable species of threatened wildlife, source of environmental flow for Lower Ord and Cambridge Gulf.	Agricultural irrigation, tourism, local icon increasing the region's attractiveness to potential residents and businesses	Human impacts (vehicles, boats and trailers, introduction of aquatic weeds, overuse), pollution, siltation (from upstream erosion), feral animals, fire	Ord Land and Water spent many years eradicating Salvinia from Lake Kununurra. This or other aquatic weeds could be accidentally introduced through poor boat/trailer hygiene. Signage and education required.
K023	Ord River - the lower part of the system	Lower River Reach flowing from Diversion Dam and out - flowing at Cambridge Gulf, flood plain	Unconfirmed	Recreational use, fishing, boating, cultural, recreation	Habitat, food source, breeding zone, Ramsar wetlands, floodplain, TEC, fringing/riparian vegetation, aquatic environment	Recreational, tourism, fishing, supply, power generation, agricultural - supply for stock? Tourism, water attraction, irrigation, stock watering	Upstream processes, agricultural run-off, sediment, weeds, irrigation discharge affecting water quality, tidal pumping, siltation, feral animals, fire, cattle	Some monitoring by Ord Irrigation. Environmental flow determined by Allocation Plan. Env monitoring from Allocation Plan, EPA and Commonwealth conditions on Ord Irrigation area.
K024	Dampier Peninsula - Water Resource	Groundwater resource on Peninsula	Largely unknown, unused	Very high cultural value and linked to Monsoonal Vine Thicket	Groundwater Dependent Ecosystem e.g., Monsoon Vine Thicket	Public water supplier, potential agricultural area	Development, over abstraction of groundwater	Present DOW groundwater investigation on Peninsula.
K025	Cape Domett turtle nesting beach	Largest population of nesting flatback turtles in Australia	Good to excellent	Natural heritage	Largest nesting site/beach (in terms of nest numbers), significant contribution to global population of flatbacks, genetic diversity		Climate change (rising sea levels and temperature. Increased frequency of severe weather events - beach erosion), development, mining, feral predators (dogs), increased public visitation/use	Site is remote and access is limited, hence its good condition

K026	La Grange Groundwater Area	Groundwater Resource - 50 Gigalitre plan; one of the region's major ground water areas	Largely unknown		Not known	Horticulture potential and land use, diversification	Over abstraction	Managed under the La Grange Allocation Plan
K027	Gouldian Finch populations Wyndham and Ord Stage II	Healthy and increasing populations of a nationally endangered species, rare bird, endangered bird, beautiful bird and charismatic species	Decreasing in numbers, poor reduced habitat size, affected by early days of bird catchers (70's), overall unknown and difficult to assess due to the rarity of the species	Iconic species, beautiful species valued because of its rarity, important bird species, culturally significant	Intrinsic value, endangered and rare species	Potential tourism, tourist attraction, bird watching	Inappropriate fire regimes (limited formation of necessary tree hollows with intense fire), cattle, feral animals like cats, fire, habitat loss/destruction, people/human impact, loss of appropriate habitat, cattle/pastoralism, impacts on water systems, fire	Approx 300 birds, population increased through use of nesting boxes by "Save the Gouldin Finch" org. Reports: Brazil-Boast et al (2010, 2011), Destine et al 2002, contact: Sarah Pryke ANU, specific nesting sites have been found and documented, multiple sightings have been recorded and documented, need more research
K030	Nulla - Nulla	Aboriginal Reserve	Good	Traditional owner access, recreational			Weeds (Acacia nilotica (?)), fire	Protection of area would protect Ramsar wetland further downstream.
K031	Rainforest (North Kimberley) particularly on Bougainville Peninsula	Vegetation type	Varied	Iconic	Intrinsic	Tourism	Fire, cattle	McKenzie et al. (1992), North Kimberley Rainforests, Kimb.Science.Cons.Strat. Performance Reporting program - Operational version 1.0 DEC.2012
K032	Lake Argyle	Manmade lake; Australia's largest expanse of freshwater (by volume)	Good	Recreational, local icon	Ramsar site, new islands and wetlands, bird, fish, reptile species have adapted well and proliferated	Part of the Ord River Irrigation Scheme (water source for agriculture), tourism	Human impacts (vehicles, boats and trailers, introduction of aquatic weeds, overuse), pollution, siltation (from upstream erosion), feral animals, fire	Ord Land and Water spent many years eradicating Salvinia from Lake Kununurra. This or other aquatic weeds could be accidentally introduced through poor boat/trailer hygiene. Signage and education required.

K033	Broome Groundwater Area	Groundwater Area - supplies Broome water supply	Good but information limited	Public water supplier		Water supplier for economic gain	Urban expansion, water quality threat from land users (nutrient loads)	Water source protection area, GW Allocation Plan Chris Gunby (DoW)
K034	Cockburn Ranges	Elevated sandstone plateau	Good to fair	Some recreational	Devoid of cattle and not burnt as often as surrounding landscape		Fire	Potential development as a tourism destination for a long-distance walking trail. Becoming National Park in 2015.
K035	Ord River - Entire catchment	Large river and wetland system	Varied	Traditional Owner cultural value. Source of drinking water, recreation, iconic	Ramsar and high - value conservation areas.	Irrigation, tourism, lifeline, pastoral productivity	Weeds (in upper catchment including mesquite)	Project currently underway to control mesquite. Due to seed longevity long term follow up and surveillance will be required. Funding necessary.
K036	Highly productive pastoral land in the Kimberley	Highly productive land systems-soils and native pasture types	Varied	Tourism, recreation, access to water ways	General habitat	Pastoral grazing land (cattle), potential irrigated agriculture/horticulture	Weeds, overgrazing, feral animals, erosion, fire, rising ground water, salinity	
K037	Miruiwung Gajerrong DEC Reserve	Ranges and associated land	Good to fair	Indigenous activities	Water bodies, limestone/sandstone ranges and associated gullies		Weeds, erosion, cattle, fire	
K039	Ord River - Ramsar site including associated land system	Ord River wetland area estuary	Good to fair	Recreation	Ramsar site, estuarine environment, riparian vegetation, aquatic environment		Weeds, human use, cattle, fire, tidal pumping	Sea level rise
K052	Wood River/Rust Range Proposed Conservation Estate	Biological Survey identified assets needed to add for CAR purposes to conservation estate	Unknown	High value connection to country for Traditional Owners			Lack of access, unmanaged cattle, feral animals (cats), inappropriate fire regimes	Condition unknown since White Book (~1980), survey required
K053	Central Gibb River Road gorges (e.g., Manning, Adcock Moll)		Degraded	Potential social and economic opportunities for Traditional Owners			Tourism (high visitation rates), unmanaged fires, low level of management generally	
K054	Critical Weight Range mammal community - Mornington & Tablelands Stations	Mammals with an average body weight in the range 35 to 4200g	Good				Inappropriate fire regimes, grazing impact from cattle, weeds, feral animals (cats)	Under management by AWC, in partnership with Traditional Owners and the State.

K055	Critical Weight Range mammal community - Charnley River, Artesian Range (ex-Beverley Spring Station)	Mammals with an average body weight in the range 35 to 4200g	Good				Inappropriate fire regimes, grazing impact from cattle, weeds, feral animals (cats)	Under management by AWC, in partnership with Traditional Owners and the State
K056	Critical Weight Range mammal community - Carson River to Yampi Military Land	Suite of mammal species average body weight in the range 35 to 4200g that are still abundant in the Kimberley	Good in far north, declining with distance from coast	National Heritage, food source for aboriginal people, 'appealing' species i.e., furry and cute	Intrinsic value but also added value of whole suite collectively; critical to maintenance of ecosystem services (ie. Nutrient/carbon turnover)	Tourism (as yet largely undeveloped)	Feral animals (cats), high intensity/frequency fires, cattle, disease	DEC Report July 2012 Kimb.Sci.Cons.Str. Performance Reporting. Radford (2012) Austral Ecology, Radford and Andersen (2012) Austral Ecology.
K057	Ord River Irrigation Area (ORIA)	Irrigated farmland	Good	Employment for community	Tourism attraction	Currently produces $150m/year, expansion will produce further income and benefit to region, expansion of another 15,000ha + in future	Rising ground water, salinity, increased sedimentation load to dam, pesticide use	
K059	Ord River - Water resource (quantity)	865 GL of water in 95% of years, State's biggest surface water resource	Good (currently 25% used)	Urban water supplier, recreational value	Ramsar wetlands, Threatened Ecological Community	Irrigated agriculture, tourism, hydroponics	Overuse, water catchment impacts, competing needs	Key documents: Ord Surface Water Allocation Plan, importance of effective / funded monitoring program.
K060	North Kimberley and Camden Sound Marine Parks	Various islands (not yet public)	Good	Proposed new DEC National Parks and Reserve Estate, cultural values, Tourism/economic	World unique flora and fauna assets	Tourism, Traditional Ecological Knowledge, fisheries	Tourism, fire, feral animals, weeds	
K073	Annie Creek	18 km long permanently watered stream with high quality riparian vegetation	Good	The site of Mornington Wilderness Camp, an important regional tourism destination. The site of AWCÆs Kimberley Conservation Program headquarters	Annie Creek provides important habitat for fauna that rely on productive riparian areas, including the vulnerable, Purple-crowned Fairy-wren.	Important destination for tourists	Intense late season fires, weeds, cattle (now removed)	The arrival of Cane Toads within the next two years is likely to have a dramatic negative impact on riparian fauna such as goannas and freshwater crocodiles.

K074	Marion Downs spring-fed wetlands	A series of freshwater springs in sandy country	Fair		Provide habitat for a range of bird species, ground-dwelling reptiles and mammals and watering points for larger macropods.		Cattle (pressure on fencing), weeds, frequent and intensive fires	The springs have suffered from considerable trampling by stock which has caused some erosion and damaged vegetation fringing the margins of the springs. Wetlands fenced in 2010.
K075	Artesian Range	192 000 ha of highly dissected sandstone range containing a range of savanna woodland, riparian, gorge and rainforest habitats	Excellent		The Artesian Range hosts a suite of endemic animals (about 25 species) and is one of the last places where mammals that have contracted from their former range persist.		Fire (extensive, intense, late season), feral animals (cats, cane toads)	The topographical complexity of the Artesian Range is unsuitable for introduced large herbivores and probably contributes to mild fire patterns by creating a series of natural firebreaks.
K076	Mornington destocked area	A 40 000-ha area was fenced and had stock removed in 2004. The area contains savanna woodlands, black soil plains, creeks, rivers and parts of the King Leopold Ranges	Excellent		The Mornington destocked area is the largest feral herbivore free area in the Kimberley and the only area in northern Australia where small mammals have increased in density in the last decade.		Weeds, fire (extensive and intense late season fires)	Since stock were removed in 2004, ground cover of grasses and herbs has improved, and density of small mammals and reptiles increased within the destocked area.
K077	Fitzroy River - on Mornington Station	55 km of the upper reaches of the Fitzroy River flows through Mornington, as well as 80 km of its major tributaries (the Hann and the Adcock) plus all their sub- catchments. The Fitzroy is a significant waterway in the Kimberley region.	Good	The gorges along this part of the Fitzroy are important destinations for tourists.	The Fitzroy River is a significant waterway in the Kimberley and the health of the upper catchment is important for river health downstream.	Tourism	Fire (hot, late season), weeds (especially Parkinsonia), cattle (along some sections), imminent cane toad invasion	The Fitzroy River on Mornington has high fish densities. Removal of cattle, weed control, and fire management, has also reduced erosion and improved riparian vegetation in the catchment.

K078	Sir John Gorge	A 14 km long gorge formed by the Fitzroy River as it cuts through the King Leopold Ranges on the eastern boundary of Mornington	Good		The rocky sides of Sir John Gorge and environs provide extensive habitat for the Kimberley's southernmost population of Northern Quolls as well as supporting substantial populations of Short-eared Rock-wallabies and Common Rock Rats.		Fire (hot, late season), feral animals (imminent arrival of Cane Toads)	Cattle have been removed from the area and fire patterns actively managed since 2004. Potential dramatic impact on Northern Quolls when Cane Toads arrive within the next two years
K079	Chamberlain River Valley	The Chamberlain River is part of the Durack River Catchment. The section on Tableland flows north-east 120 km between escarpments of the King Leopold Ranges	Fair	Is contained within an indigenous pastoral lease (Yulmbu Aboriginal Corporation).	The Chamberlain River Valley is habitat for a range of savanna bird, reptile and mammal species. Gorges coming into the valley from escarpments on either side may be important habitat for Northern Quolls, Short-eared Rock-wallabies and Wyulda.		Fire (hot, late season), herbivores (cattle and other), weeds	The Chamberlain Valley has been stocked, but not intensively, for several decades.
K080	Phillips Range	Sandstone range with gullies and complex rocky habitats	Fair		High quality habitat for the Endangered Northern Quoll, and several other species of small mammal, including the Northern Brown Bandicoot (unusual in this part of the Kimberley). A rich flora, with several species more usually distributed further.		Fire (hot, late season), herbivores (cattle and other)	The Phillips Range has been burnt too frequently, and some of its valleys are damaged by cattle and donkeys.
K082	Lake Gladstone	Seasonally flooded, freshwater lake	Good		Largest freshwater wetland in the central Kimberley. Important resource for resident and migratory water birds.	Tourism (attractive location for birdwatchers)	Trampling and overgrazing (cattle), mismanaged fire, weeds	Fence erected around lake in 2005 to exclude cattle. Program in place to maintain fence and monitor response of vegetation and birds to destocking. Bird hide built beside the wetland by AWC.

K083	North Kimberley offshore islands (31 islands)	Various islands (not yet public - proposed new DEC National Parks and Reserve Estate) along the coast between Wyndham and north of Broome	Wild / very good	Cultural values	World unique flora and fauna assets	Tourism	Tourism, fire, feral animals, weeds	Traditional Ecological Knowledge
D004	Paruku Indigenous Protected Area (wetland complex)	430,000 ha on the borders of the Great Sandy Desert and Tanami bioregions, south of Halls Creek. Includes Lake Gregory, Mulan Lake, Lera Waterhole, and Salt Pan and Djaluwon Creeks.	Good	Cultural (Men and Women's sites), Traditional foods/medicines, recreation	Source of fresh water, supports rare flora and fauna	Tourism, pastoral	Current - feral animals (wild horses). Potential - cattle (overstocking/grazing), tourism (over development)	Local people want a balance between pastoral business for income and protecting ecological/cultural values
D008	Lake Gregory (the lake itself)	Saltwater lake	Good to fair	Cultural/Kids visiting	Rare flora/fauna, birds, fish	Tourism, fishing, pastoral	Overgrazing - currently approximately 7,000 wild horses and over 10,000 cattle	
D038	Mandora Marsh	Unique inland mangroves - part of 80 mile beach, Ramsar Area	Degraded	Culturally important area	Mangroves, Migratory Waterbirds	Pastoral	Pastoral activities, weeds, feral animals	Ramsar 80 Mile Beach
D041	Dragon Tree Soak Nature Reserve	Isolated wetland refuge, freshwater spring	Fair condition	Significant cultural site, cultural site of significance,	Melaleuca woodland, restricted bat community, biodiversity hot spot, variety of animals	DEC reserve	Grazing and trampling by camels and cattle, altered fire regimes, unmanaged ground water levels due to petroleum exploration and mining	Difficult to access needs road to be regraded, DEC fund as a ecologically important site of value, rangers want to do a biodiversity survey
D045	Munro Springs Water and animal places	Song Line, special dreaming place, birds and animal resources, freshwater springs in the desert	Good/condition fair (because of feral)	Good place for Karajarri and Mangala to visit, extremely valuable because they know stories for that place, campground, cultural place	Wetlands, lots of animal life, threatened bilbies, marsupial moles		Feral animals; camels, cattle, cats, foxes, feral herbivores (camels)	Difficult to access, rangers want to do trapping (camera and physical)
D046	Wetlands of the Great Sandy Desert	Desert wetlands	Good to degraded	Cultural, recreational, scientific	Important for desert fauna, Bilbys, wallabies, birds, Jila need to be maintained for Cultural values and wildlife.		Mining, ground water depletion, predators and herbivores (camels, cattle, foxes)	Key document: Wetlands of the Great Sandy Desert by Dr Vic Semenuik
D047	Salt Creek	Inland Mangrove Creek	Good				Climate change	
D048	Walyarta (Salt Creek)			Karajarri Nygmarla Country	Ramsar site		Cattle, weeds	Needs more survey work

D049	Pepperpot Springs	Freshwater spring on Lawford Creek	Good		Freshwater spring, artesian fed, fish		Erosion, grazing. Low threat over all as low levels of access.	Flows on full moon. Needs fencing to keep feral stock out and alternative water point. Cattle can get in but landholder tries to keep them out, mainly feral stock
No Number	Mangroves	Mangrove ecosystems in estuaries	Very Good	Good for firewood and bush tucker	Refuge for unique habitat/biodiversity		People (human impact), nearby erosion	Need for baseline study
No Number	Freshwater Places	Lakes, soaks and springs of various sizes	Good, reliable rain means healthy freshwater	Drinking water, camping areas, traditional use, hunting areas, cultural significance	High biodiversity, water source for animals, habitat for some fish, birdlife		Human impact, cattle	Be a good idea to map the sites, biodiversity surveys
No Number	Fringing reef ecosystems	Rock and coral reefs that fringe the coastal areas	Good/excellent	Habitat for fish and therefore fishing, recreation and diving	High biodiversity, large tidal range means unique reef ecosystems, shellfish species	Provide good fish for people	Climate change, boats and anchor use, human impact	monitoring is important, lots of different reefs/reef systems, diversity of reefs
No Number	Fish diversity and fish stocks	High diversity of fish exists across a diversity of habitats	Excellent and pretty stable	Fishing, good tucker, education about fish types/names/breeding/spirits, passing on traditional knowledge	High diversity across the marine ecosystem	Money saved for other things by catching fish	Overfishing, increased tourism which will cause overfishing, potential damage to reef ecosystems	Monitoring of fish, fish diversity to ensure that it doesn't decrease
No Number	Middens	Shell middens	Good, becoming degraded because of human use	Traditional places, important meeting places, places for artefacts, skeletal remains	Restricted human access means important refuge for particular animals		Human impact, vehicle use (4x4's) and motorbikes, weeds	Need to restrict access and educate people about their presence and importance, need to map these sites to restrict access
No Number	Jingleja	Water holes next to Fitzroy River in the dry	Weedy and degraded	Fishing and camping spot, culturally significant	Fish, freshwater crocodiles, lots of birds (including rare birds)	Fishing spot	Weeds block access, stray cattle, incorrect human use	
No Number	Fitzroy River between old crossing and Geike Gorge (Danaggu)	River ecosystem with migratory wildlife	Good in places, degraded in others	Culturally significant for Bunuba people, fishing, camping, swimming	High biodiversity, fish, birds	Tourism, fishing and bird watching	Weeds, cattle, tourism and other incorrect human use	

No Number	Gurrigurri	Dam with wetland	healthy	Meeting place, fishing place and camping ground	Birds and fish		Rubbish, weeds around the banks	
No Number	Buttlers Lake	Wetland land area	Pretty good	nice place to go with community members	Birdlife, big biodiversity, fish		Cattle	Not many people use it anymore, not as many as used to use it
No Number	Derby wetlands	Wetlands near the town of Derby	Pretty good	Derby community use it to learn about wetland ecosystem	Wetland ecosystem that is intact, lots of birds, migratory birds	Potential for bird watching	Humans, rubbish, maybe cattle, weeds from Derby township	
No Number	Ski Lake	Wetland Lagoon on Fitzroy River Flood plain	Good/healthy	Bird watching, some fishing	high levels of birdlife/migratory birds, fish	Spot for tourists to stop and birdwatch/take photos	Pollution from vehicles, cattle	
No Number	Lake Alma	Fresh water lake and wetland system	Good, reasonably healthy	Fishing, bird watching, educations about bush/wetlands	Birds, fish, crocs, biodiversity		Cattle	
No Number	Tumblegridiron	Water holes on Fitzroy River System	Good - Fair	Good place for fishing, good place for camping and taking pictures	Fish, birds, crocodiles, biodiversity	Camping area for tourists, fishing spot for tourists	Tourism, human impact, rubbish, vehicles and erosion	
No Number	Yabagurri	Government bore that has become a wetland	Unclear but pretty healthy	Fishing and swimming hole	Birdlife/migratory, biodiversity, goannas and snakes		People/human impact, cattle	
No Number	Black Rock: Sand Dunes	Sand Dunes	Fair, partly degraded	Camping ground, access to beach for locals and tourists	Coastal dune ecosystem, coastal plants	Fishing vehicles pass through to put boats In water	Weeds, erosion, human impact, high traffic	Woman ranger doing revegetation in the
No Number	Wirrjitnirl Springs	Freshwater springs in semi-arid series of 4 or 5 springs, spring system on edge of marsh and pindan	Fair condition	Meeting place, camping ground	Birds, fish (rare species), biodiversity		Cattle	Not really used and therefore not much human impact, rangers done work (monitoring)
No Number	Mud Creek Mangrove System	Major creek mangrove and estuary system	Good (need better)	Fishing	Major marine nursery for crabs, barramundi, turtle, mangrove system, fish and crustaceans, Important for marine biodiversity, Birds, Flying Foxes	Tourism	Tourists, fishing practices	Need baseline data about biodiversity and tourist impacts

No Number	Coastal Dunes Cowrie Beach	Coastal dunes wed by tourists	Fair to good, becoming better with ranger work	Burial sites, tourism, cultural sites	Dune ecosystem, birdlife (migratory birds)	Tourism from Pt. Smith Caravan Park, fishing, tourists	Erosions from tourist vehicles	Has improved with work from rangers putting up signs and restricted access, Erosion has decreased through restricting tourist traffic and improving vegetation condition, still discovering burial sites in the area
No Number	Cork Bark	Grass area of coastal plains	Pretty good condition based on biodiversity survey	Meeting place	Biodiversity, rare species of lizards/skinks found during biodiversity survey (1 new species), 58 species, 20 bird species		Fire, cats	Rangers have conducted a biodiversity survey (with biodiversity consultant from KLC) there to establish baseline date
No Number	Injitana springs	Freshwater spring ALT reserve	Fair condition, cattle threatening health	Big cultural significance, campground meeting place	Huge biodiversity value, fish, lot of birdlife (migratory birds)	Trading place	Cattle stuck in springs	Currently monitored for birdlife by rangers and AQIS, rangers do work there
No Number	Tohamma Springs	Freshwater springs	Relatively unknown because it's difficult to access	Meeting place, campground for old people, culturally significant	Freshwater source in the desert, birds, lizards (possibly bilbies) reports from elders		Camels, cattle, greater tourist damage	Difficult to access, want to do more work there to access
No Number	Loombu Loombu	Water hole in the desert, major water hole, freshwater course, flow of water when bulrush isn't present	bad, infested by bulrush, no flow due to bulrush, camels, no open water, no fish	Main camp site, swimming hole, living water, traditional campground, water hole, swimming, water source for people	Local fish (perch) population, water source for native animals (brolga, emu, bush turkeys, kangaroo, dingo, birds, sand, goanna, Major Mitchell's Cockatoo, local biodiversity, hotspot on the edge of the desert		Weeds: Buffel grass, bulrush (*Typha orientalis* - is choking the water, big infestation), *Sesbania* , Gallions curse; Feral animals: Camels, cattle, cats	Weed work has been done, need significant investment/energy, weed work has made a difference to the bulrush. This needs to be expanded and follow up is required, ongoing work could return the health of the water hole for people and the environment

No Number	Wili	Remote water source	Okay	Camping Ground	Unique *Melaleuca population*, dingo, bush turkey, emus, Major Mitchell's Cockatoo		Camels, cats, weeds: gallons, buffel, snake weed	
No Number	Nealy's place	Rock hole (top), water hole (below)	Rock hole (top) moderate, water hole (below) poor, bottom of water hole dirty due to camels	Rock art, water source	local source of water for animals, kangaroos, birds (finch) wren, Major Mitchells's Cockatoo		Camels making water dirty through silting water, weeds (snakeweed, creepers), dirts water hole, tourism	Could be fenced off
No Number	Pirnini	Lake in desert, usually permanent source of water, currently dry, previously permanent lake in the northern part of the Great Sandy Desert	Bad, currently dry, never been dry before, dry lake, poor condition because it is dry, weeds (*Sesbania*) cover the lake	Important source of permanent water, reliable water source, campsite	wallaby, emus, reliable water source for animal populations, large aquatic area in the desert, unique ecosystem	weather station and water monitoring equipment established for research opportunities.	Losing water, camels (lots), *Sesbania* , drought, pastoral bores taking water, mining, possible changes in ground water, Madins Lake dry, *Sesbania cannabina* (a new weed) covers the lake and is thought to be increasing the rate at which the lake has dried out, feral animals (camels)	Lake is said to never previously been dry, rangers are keen to develop a strategy for managing the *Sesbania*
No Number	Kaningarra	Rock hole, water hole	Bad, thick vegetation choking water hole	Camping, hunting, swimming hole	local animals, source of water	Tourism from the Canning Stock Route	Weeds (snake weed, buffel), ferals (camels, cats), tourism brings weeds, rubbish	Near Canning Stock Route
No Number	Purlawalla	Soak water hole in the desert, main water source for animals and people	Okay, healthy	Camping ground, water source in the desert, important cultural place	Emus, Zebra Finch, brolga, dingo, hawks, bush turkey, local biodiversity hot spot, Significant stand of desert walnut trees		Ferals (lots of camels), weeds (buffel grass) choking out desert walnut trees and increasing fire intensity	Needs revegetation to protect water, weed control has been successful

No Number	Middle Lagoon	Coastal area popular with tourism	Good in places, degraded from tourism in other places	Tourism, fishing spots, family spots, camping, education about traditional knowledge	Unique environment, vine thickets, marine biodiversity, terrestrial biodiversity	Tourism, camping, bird watching	Bad tourism, vehicles, erosion of dune systems	Previous works have been successful in reducing the impacts of tourism
No Number	Whales and offshore breeding sanctuary	Humpback whales off the coast	Good	Important to cultural values and seasonal knowledge	Unique mammals and breeding sanctuary	Tourism (whale watching), potential funding for research	Human use of marine environment, overfishing, overuse, tourism	potential for research of breeding trends/sightings, behaviours
No Number	Murphy Creek Vine Thicket	Monsoonal vine thicket	Fair to good	Good bush tucker, good picnic spot, well used by locals	High plant and animal biodiversity, threatened ecological community		weeds (buffel grass), fire (nearby burning), ferals	Previous work has been done at the site with Nyul Nyul rangers and environmentalists in the Kimberley
No Number	Arrow Pearls, Pearl farm	Significant bay and seagrass bed	Fair, improving, needs more work	Fishing area, education of young people about fishing	Sea-grass beds, turtles feeding, dugong breeding and calving area, very significant biodiversity	tourism, potential for research base	Tourism, bad boat use, over hunting overfishing by locals	Previously a pearl farm, now derelict, lease is up. Nyul Nyul rangers have conducted seagrass monitoring, interest in establishing a marine research centre, interest in dolphin research
No Number	Fish traps at Norman Creek	Fish trap (rock structure that can trap fish)	Degraded but improving through work, built back up	Culturally significant, good place for fishing, hunting, camping	Crocodiles, marine biodiversity	Source of food	Tourism (although less than Middle Lagoon), strong tides	Good potential for biodiversity surveys and traditional knowledge combination
No Number	Fish traps at Middle Lagoon	Fish trap (rock structure that can trap fish)	Improving	Culturally significant, good for fishing, hunting, camping, education about traditional knowledge	Marine biodiversity, crocodiles	Source of food, tourist attraction	Tides, tourism, improper use	Potential to combine traditional practices with marine biodiversity recording
No Number	Fish traps at Weedong Beach	Fish traps are extensive in this area	Fair, needs repairs	Culturally significant, fishing, hunting, camping, traditional knowledge/education	Crocodiles, fish diversity	Source of traditional food, tourist attraction	Tourism, storms, lack of proper maintenance	

No Number	Lake Louisa (Rubbabundnin)	Large and significant lake, freshwater ecosystem	Good	Hunting area, picnic area, camping area	Rare fish; milk fish and ox-eye herring, bird life, goanna, turkeys		Ferals (donkeys, cattle)	
No Number	Weedong	Freshwater place, springs soaks, biggest lake ecosystem on the Dampier Peninsula	Good, very healthy, pristine	Camping area, meeting place, culturally very significant (man's place), cultural meeting place	Significant freshwater ecosystem, birdlife, crocodiles	Minor tourism	Weeds (coffee bush, senna), ferals (donkeys, cattle), tourists	Shell middens are also present in the area, strong spiritual presence in the area
No Number	Pearl bed at Arrow Pearls site	Pearl bed (30% of pearls remaining)	Degraded from cyclones, however 20 - 30% remaining	Tourism potential, graveyard	Seabed biodiversity	Pearls	Tourism, Storm action	
No Number	Freshwater places - Nyul Nyul country	Freshwater sources across the Nyul Nyul country on the Dampier Peninsula	Good - extensive	Meeting places, source of drinking water for people, living water is culturally important	Source of drinking water for animals, birdlife, diversity of plants and animals (biodiversity hotspots)	Potential for tourism	Climate change, ferals (cows) weeds	