# Draft for Comment





# Kimberley Natural Resource

# Management Plan

## December 2004

For further information on the Plan and to provide feedback, please contact**:**

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A copy of this draft document, plus feedback form, is available at www.rangelandswa.info

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# FOREWORD

In introducing this '**DRAFT' Kimberley NRM Plan** I am aware that you may be one of the many stakeholders who, due to other priority commitments, missed the opportunity to participate in one of a series of NRM workshops held throughout the Kimberley this year. Your views are of course of paramount importance to the process therefore we ask that you take advantage of this chance to review the 'Draft' and forward your comments and suggestions.

This is a unique opportunity for early comment before the draft Kimberley NRM Plan is integrated with the broader Rangelands Strategy.

I must acknowledge the huge contribution from those who attended the workshops, it was a great effort that achieved a worthwhile framework for attracting Natural Resource Management funding for this region. You are now encouraged to review the outcomes and make further comments if you wish.

The issues identified in this document were recommended by NRM workshop participants as priorities in dealing with the current natural resource condition of the Kimberley. We recognise the time frame for developing the **Draft Kimberley NRM Plan** was far too short. This was due, in part, for the need for this plan to be amalgamated with others prepared by the Gascoyne/Murchison, Goldfields/Nullarbor and Pilbara NRM groups towards the development of the **Rangeland NRM Strategy.**

My sincere thanks to Gill Holmes for her tireless effort in pulling this complete plan together, a mammoth task due to time constraints and the inevitable travel for frequent visits to each town in the region…and its not over yet. The facilitators (named elsewhere in this document) were intensely involved in the process and deserve special thanks for also going beyond their normal course of duty to ensure timelines were maintained and thank you the reader for your interest and time. We look foreword to your endorsement of a final plan that will serve as a tool that will enable community groups and organisations to access funding for important NRM projects in the region.

**Peter Kneebone**
**Chair, Interim Kimberley NRM Group**

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# ACKNOWLEDGEMENTS

The development of this plan has involved the contribution of many people. To assist with the gathering of information and informing the community about the development of the plan, theme facilitators have been kept busy:

- Biodiversity Facilitator – Karin Carnes
- Coastal and Marine Facilitator – Troy Sinclair
- Communications Officer – Kate Golson
- Fitzroy Rivercare Facilitators – Hugh Wallace-Smith (past) & Jean Fenton (present)
- Indigenous Land Management Facilitator – Charles Prouse
- NRM Officer – Emma Hichens
- Regional Facilitator, Northern Rangelands – Paul Bateson
- Rivercare Facilitator – Jane Rapkins (past)
- Sustainable Land Use Facilitator – Margaret Jukes

During the development of the draft plan there has been active participation and feedback from the Interim Kimberley NRM Group and Technical Working Group which includes:

- Argyle Diamond Company
- Environs Kimberley
- Kimberley Diamond Company
- Kimberley Land Council
- Kimberley Primary Industry Association
- Local Government
- Ord River Reference Group
- Ord Land and Water
- Pastoralists
- Pearl Producers Association
- Recreational Fishing
- WWF
- State Government bodies:
  - #CALM
  - #DAWA
  - #DIA
  - #DoF
  - #DoE
  - #DPI
  - #KDC
  - #Tourism WA

The Kimberley Community has also provided a lot of time and effort put into the development of the Draft plan.

# ACRONYMS

| | | | |
|---|---|---|---|
| **ACC** | Area Consultative Committee | **KNRM** | Kimberley Natural Resource Management Group |
| **AGO** | Australian Greenhouse Office | **KPIA** | Kimberley Primary Industry Association |
| **ALT** | Aboriginals Lands Trust | **KLRC** | Kimberley Language Resource Centre |
| **BMP** | Best Management Practices | **LCDC** | Land Conservation District Committee |
| **CALM** | Department of Conservation and Land Management | **MAT** | Management Action Target |
| **CSIRO** | Commonwealth Science and Industry Research Organisation | **NAP** | National Action Plan for Salinity and Water Quality |
| **DAWA** | Department of Agriculture | **NAQS** | Northern Australia Quarantine Strategy |
| **DEH** | Department of Environment and Heritage | **NHT** | Natural Heritage Trust |
| **DHW** | Department of Housing and Works | **NLP** | National Landcare Program |
| **DoE** | Department of Environment | **NRM** | Natural Resource Management |
| **DIA** | Department of Indigenous Affairs | **OIC** | Ord Irrigation Co-operative |
| **DPI** | Department of Planning and Infrastructure | **OLW** | Ord Land and Water |
| **EMS** | Environmental Management Systems | **OLWMP** | Ord Land and Water Management Plan 2000 |
| **EPBC** | Environment Protection and Biodiversity Conservation | **ORIA** | Ord River Irrigation Area |
| **FESA** | Fire and Emergency Services Authority | **PMP** | Property Management Plan |
| **DoF** | Department of Fisheries | **RCG** | Rangelands Co-ordinating Group |
| **IBRA** | Interim Biogeographic Regionalisation for Australia | **RCT** | Resource Condition Target |
| **IMCRAS** | Interim Coastal and Marine Regionalisation for Australia | **SEEKS** | Save Endangered East Kimberley Species |
| **KALACC** | Kimberley Aboriginal Law and Cultural Council | **TWG** | Technical Working Group |
| **KDC** | Kimberley Development Commission | **WC** | Water Corporation |
| **KLC** | Kimberley Land Council | **WWF** | World Wildlife Fund |

# INTRODUCTION

Welcome to the Draft Kimberley Natural Resource Management (NRM) Plan which has been developed, by and with the community. The Plan contains the goals and aspirations of the Kimberley Community for the protection and sustainable management of Natural Resources in the region.

This Plan will be used as a tool for future planning and the sustainable management of natural resources in the Kimberley.

This Plan draws together a wealth of information relating to the management of natural resources in the Kimberley. All of the information in the Plan has been gathered from State and Local Government, land managers, community groups and industry.

**Background**

In the past, land and water management has often been undertaken in isolation. Resources such as the land, rivers, wetlands and the marine environment are all interconnected. The Kimberley Natural Resource Management (NRM) Plan recognises these connections; it will be an integrated approach to natural resource management (NRM) where the whole environment is managed, not just separate, isolated parts of it.

**The Purpose and Role of the Kimberley NRM Plan**

The State and Australian Government have signed a bi-lateral agreement to work as investment partners in the development of Natural Resource Management Strategies across Western Australia. There are two agreements distinctly for this plan, the Natural Heritage Trust (NHT) and the National Action Plan for Salinity and Water Quality (NAPSWQ). It must be noted though, that there are other funding opportunities for natural resource management across Australia.

Investment for the protection of natural resources is available once NRM Strategies are developed. In Western Australia there are seven regional groups developing NRM Strategies. The Rangelands is one region (Figure 1). Due to the size and complexity of the region, the Rangelands Co-ordinating Group have decided on four sub-regional Plans, to make up the overarching Rangelands Strategy. The sub-regions in the Rangeland are the Kimberley, Pilbara, Gascoyne-Murchison and Goldfields-Nullarbor. The development of all the sub-regional strategies achieved through strong consultation with the community and other stakeholders and guided by sub-regional NRM Groups.

The purpose of the Kimberley NRM Plan will be to provide the overarching co-ordination direction for natural resource management specific to the Kimberley region in the Rangelands of Western Australia.

Currently there are some other key Plans being developed alongside the Kimberley NRM Plan, for example:

- Kija and Jaru Plants and Animals (2004)
- Draft Kimberley Regional Management Plan (CALM 1988)
- Derby Revitalisation Project
- North Kimberley Issues Investigation
- Local Government Planning Strategies
- Regional Tourism Strategy for Kimberley Region
- Draft Integrated Fisheries Management Policy

It is anticipated that these plans and others will all feed into and be linked with each other through the Rangelands NRM Strategy. To this end, discussions have been held with most of the bodies responsible for these other Plans.

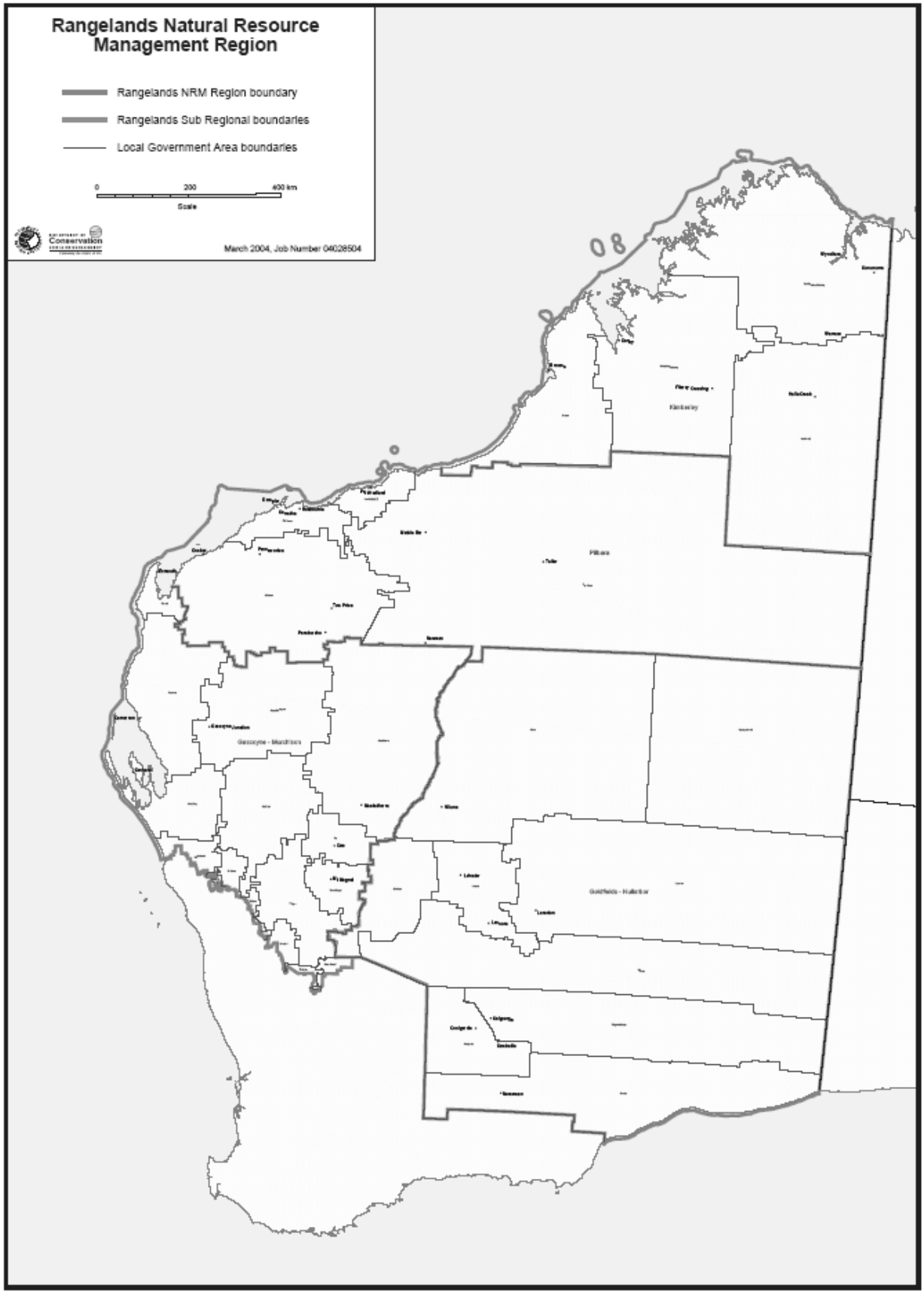


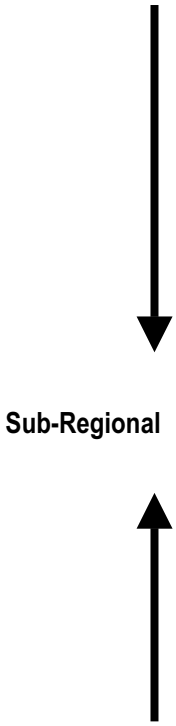

***Figure 1 – Rangelands sub-regions***

# EXISTING NATURAL RESOURCE MANAGEMENT PLANNING ARRANGEMENTS

An array of existing plans are relevant to the development of a regional NRM Strategy for the Rangelands. The following information provides a brief overview of current policy, legislation and planning for Australia and Western Australia and the Kimberley.

The Kimberley NRM Plan will address the sustainable management of assets at a sub-regional level. It will operate within a broader planning context, and is aligned with other strategic planning activities, which operate at different scales, from the paddock to the catchment.

The Plan will compliment and link to all current planning for the Kimberley with a focus on natural resource management specific to the Kimberley. Table 1 provides a visual representation of the relationship between different plans/strategies/policies that are relevant to natural resource planning in the Kimberley. Appendix 5.2 lists all National and State Strategies, Policies and Legislation.




| | |
|---|---|
| **Global** | International Conventions and Treaties (eg. Convention on Biological Diversity, Ramsar Wetlands) |
| **National** | National Policy, Planning and guidelines and Commonwealth Legislation (eg. Rangelands Management, EPBC Act 1999, National Oceans Policy) |
| **State** | WA State Level Policy, Planning and NRM legislation (eg. Local Government Act, Fisheries Act) |
| **Regional** | Regional, Rangelands wide planning (eg. Rangelands NRM Strategy – future accredited NRM Plan for the Rangelands of WA, Kimberley Aquaculture Management Plan) |
| **Sub-regional** | Sub-regional and catchment based voluntary NRM Planning (eg. NRM Strategies for the ***Kimberley,*** Pilbara, Gascoyne/Murchison and Goldfields/Nullarbor |
| **District/Shire** | Local Planning Schemes and Strategies, Coastal Management Plans – North Kimberley Issues Investigation |
| **Local** | Voluntary or legally required local, property, enterprise and site-based planning (eg. EMS & PMP) |

***Table 1 – Relationship of National, State and local plans and strategies***

# COMMUNITY - Working Together

The community had a key role in the development of this Draft Plan, and will continue to have a key role in the implementation of the Plan.

For the development of the Kimberley NRM Plan there has been an Interim Kimberley NRM Group and Technical Working Group guiding the development of the Plan. Members on the interim group include:

- Argyle Diamond Company
- Environs Kimberley
- Kimberley Diamond Company
- Kimberley Land Council
- Kimberley Primary Industry Association
- Local Government
- Ord River Reference Group
- Ord Land and Water
- Pastoralists
- Pearl Producers Association
- Recreational Fishing
- WWF
- State Government bodies:
  - #CALM
  - #DAWA
  - #DoE
  - #DIA
  - #DoF
  - #DPI
  - #KDC
  - #Tourism WA

***Figure 2: Kimberley NRM Plan Workshop participants***

The continuing role of the Interim Kimberley NRM Group includes:

1. Review and endorsement of the Kimberley NRM Plan development and processes;
2. Assess and prioritise NRM projects against recommended sub-regional priorities;
3. Make recommendations to the Rangelands Co-ordinating Group (RCG) regarding funding proposals for the Kimberley Subregion, in line with priority projects and other NRM funding (both prior to and post plan development);
4. Provide a direct link between sub-region and region through the Chair of the Kimberley Natural Resource Management (KNRM) Group who is also a community member of the RCG;
5. Provide guidance to the RCG and by definition, State and Commonwealth governments on NRM planning, through the Kimberley NRM Plan;

The responsibilities of the Kimberley NRM Group will change over time in response to changes or progress in Plan development.

The Group is currently only interim, as the membership structure is still being finalised.

# DEVELOPMENT PROCESS

The development of the Kimberley NRM Plan has included several steps. The main steps in the plan have included:

- Review of past and present planning in the region – **Discussion Paper** available
- Workshops to identify Assets and Threats – A **Workshop Summary** document is available
- Development of a **State of Environment Paper** – currently being finalised
- Presentations at organisational meetings across the region – **Presentations** by Facilitators and the Strategist
- **Workshops** for the development of **Resource Condition and Management Action Targets**
- **Draft Kimberley NRM Plan** completed and distributed for public comment.

***Figure 3 – East Kimberley LCDC meeting at Springvale Station***

# THE LANGUAGE OF THE PLAN

A language has been developed by the Commonwealth and State Government which guides what information is needed in Regional Natural Resource Management Plans that are being developed throughout Australia.

This document tries to reduce terminology into a more understandable language. Below, the language is broken down with an explanation on what it all means and how it is used in the document.

**Asset –** an *asset* is defined as something that a *value* can be assigned to, or something that is useful and contributes to the success of something. In a Natural Resource context an asset could be a good water source and the values are good quality drinking water, recreation and aquaculture. An *asset* in the context of this plan is "what *values* do we want ***to protect***?'.

**Threat** – a *threat* is defined as something; a person, plant, animal or activity/event, likely to cause harm. In a natural resource context, this could be cane toads impacting on biodiversity. A *threat* in this plan is determined by asking? 'what ***impacts*** on what we want to protect?'.

**Current Condition and Trend** – this is what the region is like at the moment and how it has been changing overtime to get to this stage. Questions to ask include, 'Where are we now?' 'What do ***we already know?'***

**Aspirational Targets** – an Aspirational Target is like a ***vision*** statement. The question asked is 'what do we want the region to look like in 50 years?' 'What do we want in the future?' 'Where do we want to be?'

**Resource Condition Target** – these targets are meant to be specific, time bound and measurable, and relate to the condition of the natural resources in the Kimberley. The timeframe for these targets is usually 10-20 years. '***What do we want the environment to look like*** in 20 years?'

**Management Action Targets** – these are short term ***action areas*** that the region would like to undertake in the next 1-5 years. These actions will assist the region in achieving the resource condition targets and the 50 year vision.

The language in the plan tells a story about the aspirations of the Kimberley community and how this will be achieved through the protection of natural resources.

## How the Plan works

The Plan is broken up into the following sections:

- ♥ # The Kimberley and Natural Resource Planning – why this plan now
- ♥ # Links to other Plans – plans that influence and link to this plan
- ♥ # Kimberley Overview – characteristic of the region
- ♥ # Assets and Threats – what the region wants to protect
- ♥ # Vision of the Kimberley – desire of the Kimberley Community
- ♥ # Objectives and Goals – what the region hopes to achieve
- ♥ # Actions to address NRM – actions to protect natural resources
- ♥ # How the Plan will be reviewed – are we meeting our targets

# THE KIMBERLEY REGION

## *PEOPLE AND PLACE*

The Kimberley Region of Western Australia, which encompasses an area of 424,517 square kilometres, is the State's most northern region. The coastline faces the Indian Ocean to the west and the Timor Sea to the north. It is bordered by the Pilbara Region to the south and the Northern Territory to the east (KDC, 2003).

Aboriginal people have inhabited the region for at least the past 40,000 years. There is abundant archaeological evidence for people's occupation of the Kimberley over a long period of time. The region is scattered with old campsites and often rock overhangs contain a rich assortment of wall paintings. The area between the Kimberley and Arnhem Land most likely contained the points of entry for Aboriginal people from the islands to the north probably more than 40,000 years ago (Shaw 1981,p.20)


***Figure 4 – The Region of the Kimberley addressed in the Kimberley NRM Plan***

The Kimberley was first explored by non-indigenous people in the late 1800s, with pastoralists being the first major settlers of the land. 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 (Taylor 2003, p.13).

As country was being opened up to settlers, gold was found in Halls Creek in 1885. This again brought many fossickers across and up from more settled country. The major towns at the time were Derby and Wyndham, with cattle and supplies being shipped in through their ports to the region.

Today the major towns of the Kimberley are Broome and Kununurra. Kununurra was established in 1963, to service the Ord River Irrigation Area. It continues to grow today with agriculture, mining and tourism being the main economic industries. The major industry in Broome was initially pearling

with Japanese and Chinese fleets battling the cyclones and harsh conditions. Broome was recognised for its tourism potential in the early 1970s (The Shire of Broome 2004 Directory, p.302). The Broome Visitor Information Centre was opened in 1976 in an old DC3, which had crashed in Broome. Today tourism is the major industry for Broome. Many tourists travel there to spend time at Cable Beach, purchase pearl jewellery and as a base for wider Kimberley travel.

The Kimberley population demographics are unique and vastly different from the rest of Australia. The Australian Bureau of Statistics estimated in 2002 that the total population of the Kimberley was approximately 33,705, with the majority of people living in and around major urban areas. Of the total population, 15,942 or 47% are indigenous people living in, often remote, communities throughout the Kimberley.

The Kimberley environment holds great cultural significance for Aboriginal people. Protection of Country, clean and healthy water and the protection of cultural and conservation significance are important to Aboriginal and non-Aboriginal people of the Kimberley.

Prior to 1960 pastoral activities were the main source of employment and income. With the development of the Ord River Irrigation Area at Kununurra and a major upsurge in mining activity total population numbers increased to about 16,000 in 1979 (Kimberley Economic Perspective, 2003). The population of the Kimberley has increased steadily over the last 20 years although it is still very sparse. There has been a steady drift of people from the stations and outside the region to move into the towns where the bulk of the population is now concentrated.

***Figure 5 - Boab Tree – Iconic species of the Kimberley***

The Kimberley sub-region of the Rangelands NRM Strategy covers the four shires as shown in Figure 4. Table 2 shows population distribution throughout the region.

| Kimberley Region | Area (a) sq km | Population Density - Persons/ Kms | Population in Urban Areas | Population in Rural Areas | Total Population |
|---|---|---|---|---|---|
| Shire of Broome | 55794.8 | 0.2 | 10,906 | 2,767 | 13,673 |
| Shire of Derby West Kimberley | 104080.8 | 0.1 | 5,274 | 3,243 | 8,517 |
| Shire of Halls Creek | 143030.4 | 0.0 | 1,273 | 2,829 | 4,102 |
| Shire of Wyndham East Kimberley | 117513.7 | 0.1 | 5255 | 2158 | 7,413 |
| **TOTAL** | **420419.6** | **0.1** | **27875** | **14094** | **33,705** |

***Table 2 - Population Statistics – Source: ABS 2002 census data.***

The Kimberley region has a young population relative to Australia and Western Australia. The median age of the Kimberley population is 28 years compared to 34 years for WA (2001 Census). Halls Creek Shire has the youngest average age for any shire in Australia; the average age being 24 years old.

## *INDUSTRY AND ECONOMY*

The Kimberley region has a diverse regional economy. Mining, tourism, agriculture, aquaculture, fishing and retail are major contributors to the regions' economic output.

### Economic Overview

The economy of the Kimberley region has steadily improved since 1960's. Mining, tourism, agriculture, pearling, commercial fishing and government services are the major contributors to a vibrant Kimberley economy. 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.

Pearling and commercial fishing predominantly generate the highest revenue off the West Kimberley Coastline. Tourism provides the second greatest all-round contributor to the economy with great potential to increase. Pastoralism is iconic and a way of life in the Kimberley and continues to make a significant contribution to the local economy. Agricultural activities, horticulture and sugar cane provide substantial economic input into the region, especially in the Ord River Irrigation Area (ORIA).

### Mining

Mining activity in the Kimberley has a long history, commencing with the discovery of gold near Halls Creek in 1885. Construction of an iron ore mine on Cockatoo Island began in 1944, with the first shipments of iron ore being made in 1951 (Kimberley Economic Perspective, 2003). In the 1980s, diamonds and zinc/lead deposits were discovered and mines were commissioned at Argyle (diamonds) and Cadjebut (zinc/lead).

Currently, the major mineral and petroleum exploration and production activities are diamonds, iron ore, nickel, off-shore gas, and crude oil.

Kimberley mining and petroleum production was valued at $665.1 million in 2001/02, which represents 2.5 per cent of the State's total. Diamond production at the Argyle Diamond Mine was valued at $488.5 million and zinc/lead mining on the Lennard Shelf near Fitzroy Crossing was

valued at $120.7 million. Other activities include iron ore production at Cockatoo Island and onshore crude oil production in the Canning Basin. At the time of the 1996 Census the mining industry employed 247 people in the region (excluding processing).

**Tourism**

Tourism is by far the fastest developing industry within the Kimberley. As such it has the potential to provide both significant advantages and disadvantages to the sustainability of the ecosystems. The natural values of the region are increasingly being recognised, and remote Kimberley destinations are attracting travellers from both domestic and international origins. A rapid improvement in the accessibility of many remote areas in the Kimberley is leading to a significant increase in the number of people visiting region.

***Figure 7 - Horizontal Falls – a major tourist attraction during the dry season***

In 2002 there were 325,000 domestic and international visitors to the Kimberley. Total overnight domestic visitor expenditure for 2002 was estimated at $237 million compared to $203 million in 2001.

From the thousand islands of the Buccaneer Archipelago to the spectacular falls of the King George River, the romance of the pearling industry and the white sandy beaches of Broome, the Kimberley offers a wide variety of outdoor recreation including swimming, exploring, mud crabbing, whale watching, camping and some of Australia's best Barramundi, sailfish and reef fishing. The main tourism activities include four wheel drive and camping safaris, scenic flights, fishing and boating, wilderness camps and adventure tours. Many pastoral enterprises are now involved in eco-tourism ventures further increasing the accessibility of previously unvisited areas. The majority of tourism is based on the larger towns of Broome and Kununurra although large numbers of transient tourists visit many of the remote sites. Cultural tourism is emerging as a prominent draw card to the region and has potential for significant growth in the future.

*The Kimberley Sustainable Tourism Strategy* - a new plan developed in partnership with key organisations outlines recommendations for sustainable tourism. Recommendations include Environmental Awareness and Promotion, Understanding and researching the market for sustainable outcomes, developing indigenous tourism and industry participation, sustainable tours and sustainable environment and connecting Kimberley tourism with the world.

***Figure 8 – A Handsome Beast***

**Agriculture**

The major agricultural activities of the Kimberley include horticulture, pastoral and agriculture. Horticultural activities comprising of market gardening and fruit production are

centred on the Ord River Irrigation Area and Broome. Major aquaculture activities are based on the pearling industry around Broome and along the north Kimberley coastline. Commercial fishing is conducted throughout the Kimberley.

In 2000/01, there were 180 agricultural establishments in the Kimberley, covering 21.3 million hectares. Irrigated agricultural production has increased significantly over the last ten years and was valued at $57.0 million in 2001/02.

Approximately 224,000 km2 of the total 320,000km2 is covered by 93 pastoral leases, 32 of which are recognised as being under Aboriginal management. The Kimberley cattle herd is between 550-600,000 head of beef cattle (Kimberley Economic Perspective, 2003). Cattle production is now focused on the live export trade, supplying mainly younger animals to South East Asian and Middle Eastern markets. The value of cattle disposals from the Region was $59.2 million in 1999/00, being 16.5 per cent of the State total.

There has been a shift out of agricultural employment, by Aboriginal people, from a generation ago. This has not yet been replaced with any firm engagement by local Aboriginal people in the emergent regional labour market which is dominated by employment in irrigated agriculture, mining, tourism and government services.

**Fisheries and Aquaculture**

The fishing industry in the Kimberley includes catches of wild stocks and an aquaculture industry dominated by pearling (KDC, 2003). The cultured pearling industry is the most significant part of the Kimberley aquaculture industry. Pearling has been an important industry in the West Kimberley since the 1880s. It has grown to a value of around $150 million, and directly employs approximately 300 people in the Kimberley. It also employs many people indirectly through servicing and downstream processing (eg. jewellery trade).

The total live catch of commercial fishery for the 2001/02 season was 1,731 tonnes, estimated to have a value of $9.5 million (KDC, 2003).

The region provides rich commercial, customary and recreational fishing opportunities. Fishing is the most popular recreational activity of the region and provides a drawcard for many tourists to visit the region.

The marine environment abounds with corals, shell and fish. Recreational diving is restricted to mostly offshore areas due to turbid waters of inshore areas.

## *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$^{o}$C and 32$^{o}$C. In the remaining months maximum temperatures exceed 35$^{o}$C and in October-November often exceed 38$^{o}$C.

*Figure 9 –* ***Spinifex country near Halls Creek***

Annual average rainfall ranges from 1,500mm in the north-west coastal areas to less than 350mm 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.

# *NATURAL RESOURCES*

The sustainable management and protection of natural resources in the Kimberley region is a priority for many people living or having visited the region. Significant areas of the Kimberley are still barely explored or documented.

## Land

The geology of the Kimberley is quite complex and unique. For this reason it is probably more interesting than most other areas of Western Australia, with geological formations and rocks ranging from extremely ancient to relatively recent. Rocks exposed in the Kimberley record a geological story that takes in the last 1900 million years of the Earth's history. The oldest rocks form the Lennard Hills in the western Kimberley and the Bow River Hills and the Halls Creek ridges in the east Kimberley. They were formed between 1920 and 1790 million years ago, when the Kimberley was part of a larger continent to the north, which was drifting towards the rest of northern Australia. The collision between the Kimberley and northern Australia finally occurred about 1830 million years ago.

The landscape of the Kimberley is ancient and has been evolving for the last 250 million years. The present landscape of hills, valleys and gorges was produced by erosion that resulted in an uplift of the Low Kimberley surface that started 20 million years ago, as Australia began to drift north toward Asia. A rise in sea level about 17,000 years ago, following the last ice age, drowned the Kimberley coastline, with the sea filling what once were river valleys. The Fitzroy River floodplain and the Cambridge Gulf Lowlands, which form the floodplain of the Ord River, started to form at this time.

To complete the picture we see today, a more recent uplift resulted in the rivers and streams, which usually flow only after heavy rain during the cyclone season, cutting down below the level of their floodplains. (CALM, 2002)

### Water

Large river systems are a significant feature of the landscape. The value of water resources in the Kimberley is enhanced by the hot climate and long dry season. Historically, rivers and wetlands were relied upon for water and food resources, and for navigation. Today, they remain important for cultural and recreational activities, and as water sources for irrigation and stock and as habitat for native birds and animals. Groundwater is used for town water supply, stock, domestic and irrigation purposes.

***Figure 10 – freshwater springs at a popular feature of the Kimberley during the wet and dry***

The Kimberley includes over one hundred rivers and many more creeks and streams which flow north or west, forming the Timor Sea drainage division. 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.

Kimberley rivers and wetlands exhibit a freshwater fauna with high levels of endemism. In particular, the fish fauna of nearly 50 species has about 25 per cent endemism. Notable for their endemicity are several families of fish, including gudgeons (Eleotridae), grunters (Terapontidae), hardyheads (Atherinidae), and rainbowfish (Melanotaeniidae). Kimberley is a regional centre of diversity with high levels of endemism among fishes and other taxa.

There are four declared Ramsar sites (listed as International wetlands of significance under a global treaty) in the Kimberley – Lake Kununurra & Lake Argyle, the Ord River Floodplain, Roebuck Bay and Eighty Mile Beach. Paruku (Lake Gregory) also satisfies criteria for listing as a Ramsar site.

**Biodiversity**

Biodiversity in the Kimberley Region is unique and highly varied. It supports a diverse and spectacular flora of more than 2000 plant species and the fauna is unique and rich in species diversity, including many threatened and endangered species. Unlike the rest of the State, the tropical north experiences heavy rainfall in the months from December to March. With the onset of this "wet' season the main flush of growth and flowering comes.

Vegetation can be generally characterised as tropical savannah, although given differences in rainfall, topography and soils there is incredible variation throughout the region. The most extensive vegetation is eucalypt woodland and open woodland, but there are extensive areas of hummock grassland, tussock grassland and acacia open woodland. Grasses almost always dominate ground layers, with grazing mostly based on native perennial tussock grasses and the introduced buffel and birdwood grasses.

Many Kimberley plants and animals have an important place in the culture of local Aboriginal people and are used as food sources, in the manufacture of implements, traditional medicine and for the indication of changes in seasons. The Region's plants also have immense environmental value, providing habitat and food sources for many of the animals (CALM, 2002).

***Figure 11 - Sunset – Halls Creek***

**Coastal and Marine**

The Kimberley coast is one of the most contorted of anywhere on the Australian coastline and its history is unique in every respect – geologically, biologically and human. The coastline is approximately 2,500 kilometres long with in excess of 3000 islands (Zell 2003).

Access to coastal areas of the North Kimberley is restricted to only a few visitors getting there to explore. Most access is achieved via boats, and this is gradually increasing the number of visitors. Currently there are in excess of 16 commercial boat operators offering cruises out of Broome, Derby and Wyndham along North Kimberley coastal areas. There are also 138 licensed boats operating in the Prawn Managed Fishery (KDC, 2003).

The Region's coastal environment also provides habitat for many important fauna species, considered world-class assets including:

- Migratory waders, notably at Eighty-Mile Beach & Roebuck Bay.
- Breeding seabirds, notably at Adele Island & Lacepede Islands.
- Benthic intertidal fauna at Roebuck Bay.
- Breeding turtles, notably at Browse Island & Lacepede Islands.
- Pearl oysters (*Pinctada maxima*) at Eighty Mile Beach

Cyclones often occur over the Kimberley coastline – it is one of the most cyclone-prone coasts anywhere in the world. They form to the northwest and an average of two per year cross the coastline. There is usually one with destructive force about every two years (Zell, 2003).

# *MAJOR CHALLENGES FOR NATURAL RESOURCE MANAGEMENT*

**Tourism**

As noted previously tourism is one of the fastest growing industries in the Kimberley. Today many people are attracted to the Kimberley for a 'Wilderness' experience. Ensuring that this attraction is maintained and appropriately managed is considered to be one of the most crucial challenges facing the Region's natural resources.

Currently there is little co-ordinated management of the increasing number of tourists accessing remote areas in the region by both vehicle and boat. Interagency discussions have recently started to develop a Gibb River Road Management Plan. Many more plans, strategies and policies will need to be developed in the near future to ensure appropriate protection of our important natural resources. There is also a lack of community based coastal management planning resulting in unregulated tourism pressures on coastal areas.

**Fire Management**

Changing fire regimes over the last decade have seen a change in the landscape. Burning practices have changed considerably in the Kimberley region since colonisation. The effects of frequent late dry season fires on populations of plants and animals is now seen as having a major impact on biodiversity and sustainable land management (Palmer et al 2002). Given that there is widespread agreement that many of the fires occurring today are harmful, management needs to reintroduce more traditional fire management to sustain our biodiversity. This will require coordination with other fire management agencies, local landholders, land managers and the general community.

***Figure 12 – late season fires impact on the biodiversity of the region***

**Cane Toads**

Cane toads are a real threat to the biodiversity of the Kimberley. Research has been conducted, for different reasons, throughout the Kimberley but most of the work is done in areas where there is relatively easy access. Many areas of the Kimberley are yet to be explored or understood. With the inevitable arrival of the cane toad, the management of endemic species is becoming an even higher priority.

In 1935 about 101 Cane Toads were deliberately introduced from Hawaii in an attempt to control grey backed cane beetles that were considered a pest of the sugar industry in Queensland. All attempts to use cane toads for controlling pests have been failures – in the Philippines, cane toads were introduced to kill rats. Instead, they poisoned the village cats and rat numbers soared (Gueho, 2004)

**Weeds**

The Kimberley Region is fortunate to have large areas of relatively natural vegetation. Increased weeds and exotic vegetation have been recorded in the Ord River as a result of damming and changed hydrological processes (Doupe & Petit 2002; WRC 2003).

Weeds including the prickly bushes, have however been moving across Northern Australia rapidly. Some infestations have been spreading more quickly than they can be controlled. There are many significant sites that are impacted on by weeds. For example, access to the Fitzroy River is restricted by the increasing occurrence of Noogoora Burr, Prickly acacia and Parkinsonia.

Weed control management is essential in protecting the Kimberley's natural resources. Much work is currently underway in terms of educating the community about the importance of weed control. Additionally, many community groups are undertaking 'hands on' programs to control and manage weeds. Such work needs to continue and be built upon to ensure the threat of weeds to the Region's natural resources is controlled.

Current Weeds of National Significance (WONS) in the Kimberley are:

- Mesquite
- Parkinsonia
- Prickly Acacia (*acacia nilotica*)
- Rubber Vine
- Salvinia

Other significant weeds in the Kimberley are:

- Belly-ache Bush (regionally significant, declared in the West Kimberley)
- Noogoora Burr (regionally significant)
- Neem (environmental weed)
- Leucaena (environmental weed)
- Calotropis (environmental weed)

**Climate Change/Greenhouse Gases**

Many human activities produce gases (called greenhouse gases) that can reduce the amount of infrared radiation from the sun that can escape from the atmosphere. Because the earth's climate system is finely balanced, increased temperatures can cause changes to the weather and climate. Over the last 100 years, there have been changes in Australia's rainfall and temperature. There seems to be reasonable agreement among scientists that climate change is already affecting species and ecosystems. There is however uncertainty as to how individual species might respond in the future.

# WHAT WE WANT TO PROTECT AND SUBSEQUENT THREATS

From discussions at the workshops, it is evident that a wide variety of natural resource assets with associated values and threats exist in the Kimberley Region. It has also become apparent that these individual assets are part of broader classes. On this basis the broad asset classes of Land, Water, Biodiversity, Coastal and Marine and Community have been adopted.

Using the broad asset classes the following tables provide a summary of the individual assets and values the Kimberley community have identified and aspire to protect. Potential impacts to the protection of the assets are also listed. More detailed information on these assets, values and impacts is provided before the Resource Condition Targets and Management Action Targets developed in this Plan.

**LAND – Values and Threats**

| Assets to protect | Associated Values | Threatening Impacts | Addressed |
|---|---|---|---|
| Land with a Productive Focus | Grazing, Irrigation, Cropping, Mining, Agriculture, Tourism, Horticulture, Pastoral, Biodiversity, Medicinal Plant Potential | Tourism, Pest Plants and Animals Climate Change, Fire, Unsustainable Land Use | 1.1.1, 2.1 |
| Irrigated Land | Irrigation, Good Water Quality, Produce, Soil Health | Pest Plants and Animals, Salinity, Water Logging Climate Change, Fire, Unsustainable Land Use, Siltation | 1.1.2 |
| Indigenous Land with Social Focus | Bush Tucker, Art, Natural Healing, Traditional Sites, Sacred Places and Sites, Knowledge | Overutilisation, Mining, Unmanaged Tourism, Inappropriate Development | 1.1.3, 2.1 |
| Land with Conservation Focus | Land Forms, Variety, Habitat, Geology Aesthetics Wilderness, Open and Relatively Unmodified, Beauty of the Region, Tourism | Pest Plant and Animals, Fire, Clearing of Native Vegetation, Unmanaged Tourism, Inappropriate Development, Climate Change | 1.1.4, 1.3.1, 1.3.2 |
| Land used for Towns, Communities And Infrastructure | Towns, Communities, Tourism, Energy Potential | Pest Plant and Animals, Unresolved Native Claims, Ad Hoc Development, Lack of Coordinated Land Use Planning | 1.1.5, 2.1 |

**WATER – Values and Threats**

| Assets to protect | Associated Values | Threatening Impacts | Addressed |
|---|---|---|---|
| Waterways | Free of Chemicals, Drinking Water, Cooking and Food Preparation, High Rainfall – Seasonal Dynamics, Industrial Use, Pastoral Use, Water Re-Use, Aquaculture, Clean Water Flows, Water Availability Fitzroy River, Ord River, Riparian Areas, Wild Rivers, Environmental Flows, Species Abundance Swimming, Fishing, Boating, Water Falls, Tourism, Water Holes, Meeting Place, Calming, | Dams, Erosion, Irrigation, Pest Plants and Animals, Unmanaged Tourism Inappropriate Development, Clearing of Native Vegetation, Pastoralism/Cattle | 1.2.1, 2.2 |
| Wetlands | Bird and Migratory Patterns Fish Stocks, Availability of Plants and Animals | Grazing, Changed Fire Regimes, Siltation, Pest Plants and Animals, Pollution, Unmanaged Tourism | 1.2.2 |
| Groundwater | Drinking Water, Irrigation | Contamination/ Pollution, Inappropriate Land Uses in Water Source Protection Areas, Excessive Pumping of Wells, Salinity, Over Allocation, Mining, Perth Water Supply | 1.2.3, 2.2 |

**BIODIVERSITY – Values and Threats**

| Assets to protect | Associated Values | Threatening Impacts | Addressed |
|---|---|---|---|
| Species | Threatened Species, Diversity of Species, Endemic species, Key Habitats, Rare Species, Richness, Health of Species, Tourism, Fishing, River systems, | Growing Population, Development Climate Change, Native Vegetation Clearing, Inadequate Knowledge, Fire, Pest Plants and Animals, Limited Knowledge | 1.3.1, 2.3 |
| Living Assemblages | Access to Icons, Eco tourism, Employment, Habitats and Species, Bright Colours, Natural Wonders of the Kimberley, Open and Relatively Unmodified, Nature-based Tourism, Health of Species, Native Flora and Fauna, Savannah, Floodplains, Riparian areas | Tourism, Pollution, Inadequate Knowledge, Fire, Pest Plants and Animals, Altered Hydrology, Unsustainable Water Extraction | 1.3.2, 1.1.4, 2.3 |
| Air | Clean Air, Health | Climate Change, Pollution, Fire, Capitalisation | 1.3.3 |

**COASTAL AND MARINE – Values and Threats**

| Assets to protect | Associated Values | Threatening Impacts | Addressed |
|---|---|---|---|
| Marine Water Quality | Fishing, Boating Species Richness, Estuaries, Mangrove Forests | Human Activity, Pollution, Nutrient Enrichment | 3.1 |
| Marine Habitat | Eighty Mile Beach, Roebuck Bay, Lower Ord Floodplain | Lack of Priority Management Actions and Resources | 3.2 |
| Marine Biodiversity | Buccaneer Archipelago, Off-Shore Islands, Mangrove Habitats, Relatively Unspoilt, Species Richness, Estuaries, Mangrove Forests, Tides, | Lack of Resources, Tourism | 3.3 |
| Seascapes/coastal | Bird Watching, Shell Collecting, Oyster Eating, Fishing, Boating Nature Based, Employment, Isolation, Frontier (Perception) | Lack of Knowledge Lack of Training | 3.4 |
| Fish resources | Pearling, Fishing, Diving, Recreation | Over exploitation, Defining Sustainability Targets | 3.5 |

**COMMUNITY – Values and Threats**

| Assets to protect | Associated Values | Threatening Impacts | Addressed |
|---|---|---|---|
| Capacity | Education TAFE, Schools, Employment, Transfer of Knowledge from Old People to Young People (Cultural Exchange), Employment | Increased Population, Transient Nature of Population, Lack of Ownership | 4.1 |
| Community | Interaction, Language, The People, Hunting Sites, Diversity of People, Value of Knowledge, Bush Tucker, Natural Medicine, Access to Riverbanks, Story Telling, History Recreation, Isolation, Remote Living, Rugged, Inaccessibility, Fishing, Community Spirit, Sense of Place, Bird Watching, Space, Clean Air and Water, Small Population, Outdoor Living, | Access, Lack of Knowledge, Lack of Training, Lack of Coordination | 4.2 |

***Table 3 – Theme – Values and assets***

# THE KIMBERLEY NATURAL RESOURCE MANAGEMENT PLAN

## VISION

Working together to care for, protect and sustain the Kimberley's rich cultural heritage and biodiversity, ancient landscapes and valuable natural resources for future generations

### Principles

The plan is based on the following guiding principles:

i. The importance of our natural resources
ii. The need for ecologically sustainability of our natural resources
iii. The recognition of the extent of degradation of natural resources in the Kimberley
iv. The need to develop and sustain partnerships to achieve outcomes
v. The importance of building capacity and community action
vi. The importance of adaptive management

***Figure 13 – Architecture of the Kimberley***

### Objectives

1) Represent the interests of the community in natural resource management
2) Create effective partnerships
3) Provide leadership in natural resource management
4) Improve wetland health
5) Improve the control of salinity
6) Protect Threatened Ecological Communities
7) Reduce soil loss
8) Maintain and improve riverine environments
9) Protect native and endemic species in the Kimberley
10) Increase the skills and knowledge in the region
11) Support the growth of sustainable regional industries
12) Reduce the impacts of pest plants and animals
13) Effectively monitor the health of natural resources in the Kimberley
14) Increase the involvement of Indigenous, urban and rural communities in the management of natural resources
15) Maintain and improve the quality of surface and groundwater in the Kimberley
16) Preserve marine ecosystems integrity through sustainable use

## PROJECT IDENTIFICATION

The symbols provide a visual link to projects addressing specific issues and areas.

| Symbol | Explanation | Symbol | Explanation |
|---|---|---|---|
|  | Pest Plants and Animal |  | Representative areas |
|  | Kimberley produce |  | Energy |
|  | Fire management |  | Documents |
|  | Salinity management |  | Irrigation |
|  | Fishing |  | Ranger Programs |
|  | Mining |  | Tourism |
| ´ | Planning/partnerships |  | Water |
| Ċ | Chemicals/Nutrients |  | Rangelands |
|  | Information/Knowledge |  | Target to be established |
|  | Climate Change |  | Waste Management |

***Table 4 – Symbol representing project areas***

# HOW TO READ THE PLAN – REGIONS OF THE KIMBERLEY

From discussions at the workshops, it has become evident that there are very distinct areas, with different management needs in the Kimberley. For this reason, the Plan has been broken up into specific areas of the Kimberley, as outlined below. Each area looks at resource condition and management actions addressing the broad asset classes of Land, Water, Biodiversity, Coastal and Marine and Community.

**1. Rivers and Rangelands**

- There is the **Ord River Catchment,** with two dams and holds value to people in East Kimberley.
- The **Fitzroy River Catchment** is still in a relatively natural state, and this is something that many people want to protect.
- The **Northern and Eastern Kimberley Rivers** area is a very distinct area with many of the States 'Wild Rivers' located here.

Assets addressed:
- × Land
- × Water
- × Biodiversity

**2. Desert Country**

- The **Desert Country/Paruku** is an area, with a small population base, covering the southern part of the Kimberley region.

Assets addressed:
- × Land
- × Water
- × Biodiversity

***Figure 14 – Mountains along the Gibb River Road***

**3. Coastal and Marine**

- **Saltwater Country** includes the coastal and marine areas of the Kimberley.

Assets addressed:
- × Coastal and Marine

**4. Community and Capacity**

- The understanding and involvement in natural resource management, **Community, Capacity and Co-ordination**, is important to people in the Kimberley. How do we continue to address and understand NRM in the Kimberley?

Assets addressed:
- × Community
- × Capacity

There will be overlaps between each of the areas, and many actions that look at the management of natural resources across the entire Kimberley are **Regional** actions.

## *SUMMARY OF RESOURCE CONDITION TARGETS*

### 1. River and Rangelands

| | Sub-Asset | Resource Condition Targets |
|---|---|---|
| **1.1 Land** | **1.1.1 Land with a Productive Focus** | **RCT1:** Western Australian Rangelands Monitoring Systems (WARMS) sites show a stable condition and upward trend, with the number of sites in poor condition being < 10% by 2020<br>**RCT2**: Average of ground cover on land in the Kimberley is greater than 40% by 2014<br>**RCT3**: Reduction in area of Mesquite by 3,000Ha and density of Prickly Acacia from medium to isolated plants by 2015<br>**RCT4**: Donkeys eradicated from the Kimberley by 2014 |
| | **1.1.2 Irrigated Land** | **RCT5:** No new occurrences of salinity in the ORIA by 2014<br>**RCT6**: A reduction in the area of salinity affected land in the ORIA by 2014<br>**RCT7:** Maintain and improve the condition of soil in the Ord Catchment, with monitoring guidelines to be developed by 2008<br>**RCT8**: Groundwater levels in the ORIA are to be maintained at/or below 2 metres by 2015 |
| | **1.1.3 Indigenous Land with Social Focus** | **RCT9:** Traditional cultural practices continue on Country to improve and enhance social wellbeing by 2007 |
| | **1.1.4 Land with Conservation Focus** | **RCT10:** The comprehensiveness, adequateness and representativeness (CAR) of the protected area systems (including formal reserves, off-reserves and Indigenous Protected Areas) is improved by a minimum of 50% by 2015, based on 2005 baseline data.<br>**RCT11:** Maintain and improve the condition of high priority native vegetation (including reserve and off-reserve) by 2020, based on 20 baseline data |
| | **1.1.5 Land used for Towns, Communities and Infrastructure** | **RCT12:** Land use for urban expansion and infrastructure is developed/consistent with its sustainable land use capacity by 2020 as measured by appropriate benchmarks developed in 2006<br>**RCT13:** All land developed for urban expansion and new and improved infrastructure is consistent with sustainable land use capability by 2010. |
| **1.2 Water** | **1.2.1 Waterways** | **RCT14:** Water Quality levels meet guidelines set for Ord/Keep and Fitzroy Catchments by 2010<br>**RCT15**: The quality and extent of riparian ecosystems is maintained and improved by 2014 on reference reaches contexted by remote sensing<br>**RCT16**: Maintain, and improve where appropriate, the diversity of aquatic species as measured against benchmarks established by 2010<br>**RCT17:** Maintain storage volumes and reduce siltation levels contributed by the catchment by 20% into Lake Argyle by 2024<br>**RCT18:** Natural river flows are maintained or in close to natural state and water allocation does not diminish environmental flows by 2020 |
| | **1.2.2 Wetlands** | **RCT19:** Maintain or improve the condition of 21 nationally important wetlands and 7 sub-regionally important wetlands by 2025, with benchmark established by 2006<br>**RCT20:** Maintain or improve important wetlands, as identified by the community and tropical rivers/CALM/WWF wetland projects, with benchmarks established by 2006 |
| | **1.2.3 Groundwater** | **RCT21:** Groundwater levels at agreed reference bores meet levels set for the Kimberley by 2020 with benchmarks set by 2006<br>**RCT22:** Groundwater quality at agreed reference bores meet levels set for the Kimberley by 2020 with benchmarks set by 2006<br>**RCT23:** Maintain or improve groundwater diversity at priority sites by 2015, with benchmarks established by 2006 |

| | | |
|---|---|---|
| **1.3 Bush Biodiversity** | **1.3.1 Species** | **RCT24:** Reduce the rate of loss of habitat for native species measured by existing surveys by 2010, with benchmarks established by 2006<br>**RCT25:** Threatened Ecological Communities are showing positive trends in condition by 2010 |
| | **1.3.2 Living Assemblages** | **RCT26:** Maintain or improve diversity and condition of native species and ecological communities as measured by existing surveys by 2020, with a need for more comprehensive information developed by 2006<br>**RCT27**: Distribution and abundance of threatened species are maintained or improved by 2025 |
| | **1.3.3 Air** | **RCT28:** Air quality is within International Standards for human use across the Kimberley by 2020 |

**2. Desert Country**

| | |
|---|---|
| **2.1 Land** | **RCT29:** Establish baseline information for condition of country by 2006 |
| **2.2 Water** | **RCT30:** Understand flow quantities, and level and pattern of flow needed for ecosystem health in ephemeral creeks, springs, seasonal lakes and rock holes by 2020<br>**RCT31:** Maintain waterbird species diversity and numbers at desert wetlands by 2010, as recorded by current surveys |
| **2.3 Biodiversity** | **RCT32:** Maintain or enhance diversity and condition of native species and Threatened Ecological Communities by 20% by 2020, with benchmarks established by 2006 |

**3. Coast and Marine**

| | |
|---|---|
| **3.1Marine Water Quality** | **RCT33:** Nearshore marine water quality in prioritised areas is maintained, benchmarked against marine water quality guidelines developed specific to the Kimberley Coast by 2010 |
| **3.2 Marine Habitat** | **RCT34:** No decline, and where possible an improvement of 80 Mile Beach habitats, beyond natural fluctuations by 2020 |
| **3.3 Marine Biodiversity** | **RCT35**: Maintain and improve condition of marine fauna in the region, as measured at representative/priority/strategic sites, by 2020 |
| **3.4 Seascapes/Coastal** | **RCT36**: Maintenance and improve the health of priority estuarine and coastal habitats by 2020 |
| **3.5 Fish Resources** | **RCT37**: No decrease in the stock status of targeted fishing species by 2020 |

**4. Community and Capacity**

| | |
|---|---|
| **4.1 Capacity** | **RCT38:** Increased knowledge and understanding of Natural Resource Management by 2020 from a benchmark established in 2006<br>**RCT39:** Empower the community in the management and understanding of the diverse values of the natural environment by 2020 |
| **4.2 Community** | **RCT40:** A vibrant and healthy community working together by 2010 |

***Table 5 – Summary of Resource Condition Targets***

# 1. RIVER AND RANGELANDS COUNTRY

The River and Rangelands area identified in this plan encompasses the broad areas of the Ord River Catchment, Fitzroy River Catchment and the Northern and Eastern Kimberley River Catchments. Each catchment is valued for the economic, environmental, social and cultural significance to the people who live there.

Each Management Action Target identifies a catchment or region of focus. This first section provides a brief overview of each catchment and region and the current understanding of the condition of resources.

Waterway condition in the rangelands is not well understood, especially in the Kimberley. Some condition assessment has been completed. 'Pristine and near pristine' catchments have been identified throughout Australia, with 33 of these catchments in the Kimberley. The waterways within these catchments are referred to as 'Wild Rivers'.

Pasture condition assessments are done by the Department of Agriculture. However, health and condition assessment of riparian and aquatic parts of waterways is not included in these current assessments carried out in the rangelands. There is minimal data on the impacts of rangelands management on water quality and quantity. This is one issue that the plan tries to address, a more integrated approach to natural resource management.

Environmental Management Systems (EMS) or whole farm plans are part of an overall approach to align good farm management with better management of our soil, water and biodiversity at the individual and community level.

***Figure 16 – Lower Ord River***

***Figure 15 – Rangeland landscape***

## *ORD RIVER CATCHMENT*

The Ord Catchment has been identified as a priority catchment under the National Action Plan for Salinity and Water Quality (NAP). The Ord is the second largest river in WA and one of the most well known.

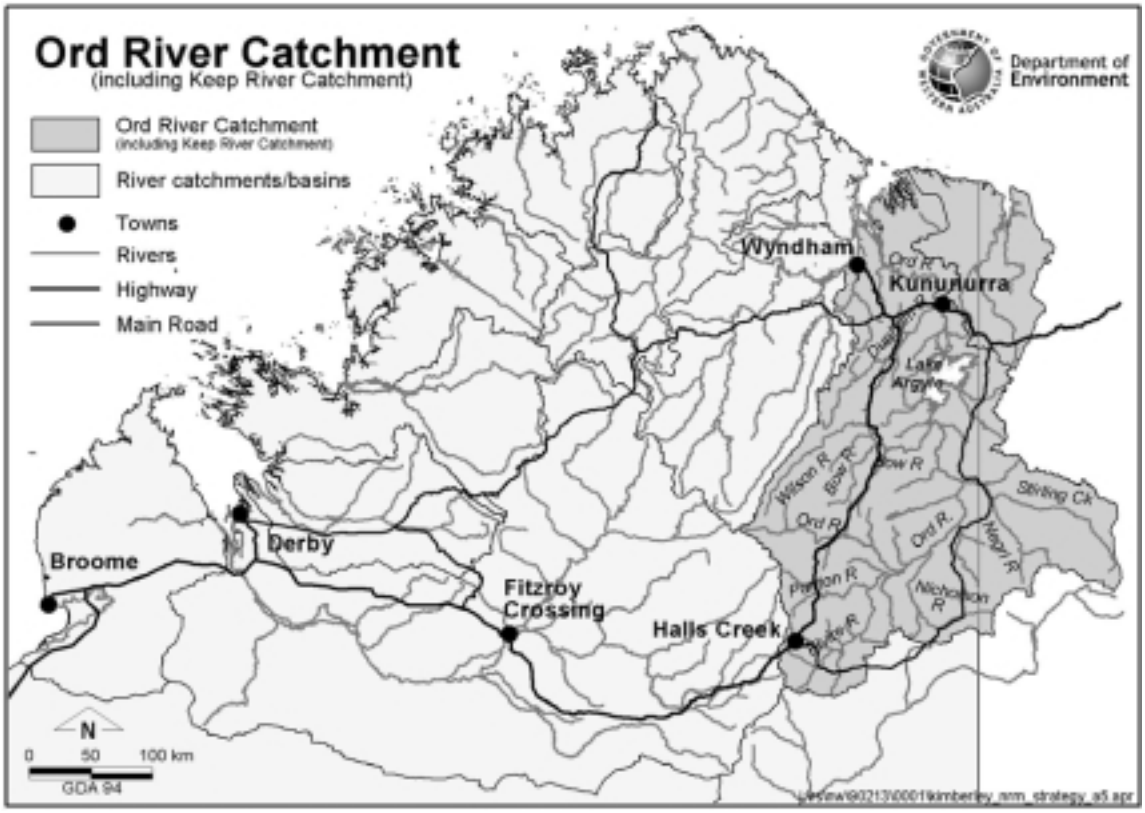



***Figure 17 – Ord River and Keep River Catchment***

The construction of two dams on the Ord River in 1963 and 1972 created Lake Kununurra and Lake Argyle, and supports the Ord River Irrigation Area (ORIA), as well as hydro-electricity generation. The Arthur Creek Pilot Dam in the Dunham/Ord River catchment is also a supply source for irrigation and aquaculture. The Moochoolabra Dam in the East Kimberley was constructed in 1971 to provide a reliable, good quality water supply to the town of Wyndham.

Damming of the Ord River has restricted certain species from following their usual migration path, such as the barramundi and freshwater crayfish (Cherabun) (OBP 2002). This can result in genetic isolation, restricted access to breeding waters and in extreme droughts, the localised loss of species in a reach upstream from a migratory barrier (Storey et al 2001). The damming of the Ord River also is thought to have resulted in a loss of habitat and reduction in some fish and other species (WRM 2003, unpub.).

The loss in seasonality for the lower Ord River has caused a considerable change in riverine flora. Regulated river systems are shown to be more prone to weed invasions than unregulated sites elsewhere in the Kimberley (WRC 2003). The reduced frequency and magnitude of flooding has also limited the potential for riparian tree seed dispersal into the riparian zone and surrounding floodplain (Doupé & Pettit 2002). An associated change in composition and distribution of aquatic fauna would be expected. Ecosystem processes such as flooding, maintenance of floodplain habitat, vegetation dynamics, composition and distribution of aquatic fauna and control of weed infestations are all impacted upon by regulation.

Changed flow dynamics has resulted in significant changes in geomorphology for the Ord river (Doupé & Pettit 2002, Trayler et al 2002, Wolanski et al 2001, WRC 1998, WRC 1997). An altered hydrological regime in the Ord River has resulted in a significant reduction of floodplain inundation frequency and extent (WRC 2003) impacting on the health of the ecosystem through the inability to

disperse seeds and juvenile aquatic fauna as widely. Sediment build up and associated vegetation colonisation has resulted from cessation of regular flood events (WRC 1997) resulting in a decrease in channel capacity, in stream habitat area and diversity (Trayler et al 2002).

The average annual sediment load downstream of the Diversion Dam has changed from 24Mt pre-dams to 0.6Mt post-dams. Of the 0.6Mt, approximately 0.015Mt comes from Lake Argyle, the rest from the Dunham River (Rodgers et al 2000). Since the completion of the dams, sediment in Lake Argyle has been deposited at a rate of 24 million $m^3$/yr. This sediment deposition effectively reduces the useable storage by 600 million $m^3$, a little over 10% of the original volume of the dam (Doupé and Pettit 2002; WRC 1998; WRC 1997).

**Ord River Catchment - Water Quality Monitoring Information**

Nutrient concentrations in the lower Ord River, which is the area below the Diversion Dam, have been relatively constant over the past 6 years, since water sampling commenced (Department of Environment, 2004). Nutrient concentrations, namely nitrogen and phosphorous, generally increase between the upstream (un-affected by irrigation) to the downstream sites (irrigation affected). Downstream sites area affected by nutrient inputs from irrigation drainage outfall, the Dunham River and a variety of small creeks.

The Australian and New Zealand guidelines for fresh and marine water quality (ANZECC 2002) provide trigger values for nutrients in tropical Australian high land and low land river systems. This area includes northern Queensland, Northern Territory and north-west Western Australia. The ANZECC guidelines acknowledge that if locally relevant guidelines have been developed, they should be used in preference to the ANZECC guidelines.

A comparison of ANZECC guidelines and the average values of nitrogen and phosphorous from the upstream sites of the Ord River, unaffected by irrigation (Figure 17) shows that the nutrient concentrations are generally above the ANZECC guidelines. This identifies a need to develop locally relevant water quality targets.

Several different Projects have been undertaken in recent years to collect and monitor data from the Ord River and Irrigation Area.

The Ord Bonaparte Program (OBP) undertook 2 main water quality, monitoring projects in the Ord River:

***The Lower Ord and Estuary Project***

This project was designed to improve the understanding of the status and function of the Lower Ord River and estuary and its response to changers in flows and loads of sediments and nutrients from the catchment. The data collected under this project will also enable comparative projects to be undertaken in the future to understand how the river has changed over time.

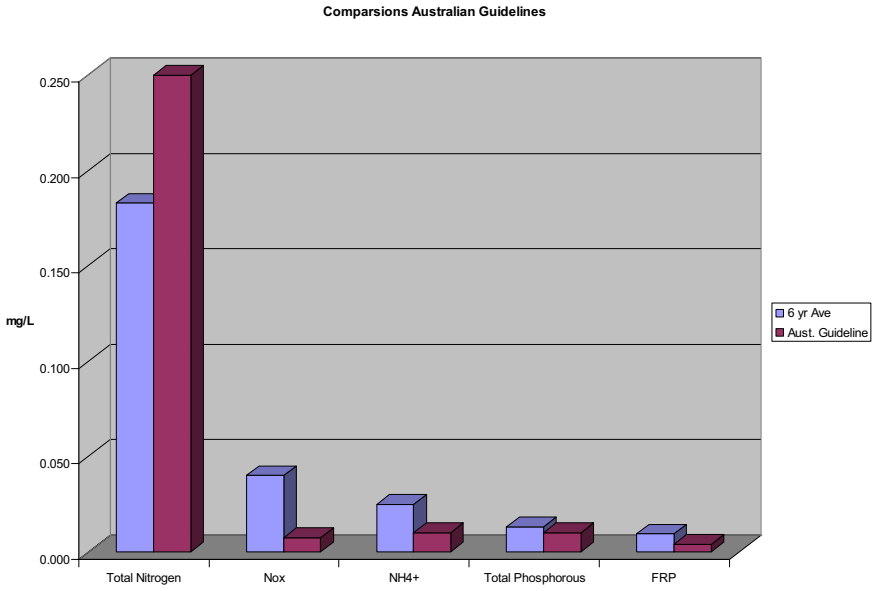



***Figure 18 – Average concentrations of Nutrients from Ord river sampling compared to ANZECC Guideline trigger levels***

- Data was collected on a monthly basis over a 2 and a half year period. Two intensive field surveys were conducted within this period to capture both wet and dry season flows. The project continues on a scaled down basis, involving the collection of data approximately every 3 months.
- Monitoring stations for the project are generally evenly spaced from the Mambi Island to the mouth of the Lower Ord River. These locations do not overlap with other existing monitoring sites for projects undertaken by Water and Rivers Commission/ Department of Environment.
- The types of parameters being monitored in this project include: water quality, nutrients, salinity, total suspended solids (sediment), water depth and physical parameters such as pH, dissolved oxygen, temperature, conductivity, chlorophyll a (algae), organic carbon etc.
- Data collected was analysed and any trends described mathematically. Predictive models were developed from the trends. The final report including the collated data and modelling is titled "The response of the Lower Ord River and Estuary to Management of Catchment Flows and Sediment Nutrient Loads."

***Irrigation Area Ground water Project***

- This project aims to obtain a better understanding of the interactions between ground water and surface water within the irrigation area. The information will be used to develop management strategies to combat rising groundwater and salinity issues.
- This project has been lead by a CSIRO research team, funded originally by the Ord Bonaparte Program (OBP). Since the OBP ceased in December 2003, the project has carried on with funding from the National Action Plan for Salinity and Water Quality (NAP).
- Groundwater bores and surface water monitoring stations are located across the Irrigation Area.
- Baseline data is collected for the following parameters: drainage flows, salinity, surface water, ground water depth etc.
- The project aims to use the data collected to develop models and management scenarios for future issues.
- Department of Environment officers advise that the main change which has occurred since the establishment of the Irrigation Area would be the rise in ground water.

**Other Monitoring Programs**

The former Water and Rivers Commission, now Department of Environment currently undertakes several water quality monitoring projects in the Ord River:

**Lower Ord Water Quality Program**

- This program is undertaken in partnership with the Ord Irrigation Cooperative (OIC) and commenced in 1998.
- Data is collected on a monthly basis from about 11 sites, 5 of which are on the river and 6 of which are located in drainage areas.
- The types of parameters being monitored in this project include nutrients, salinity, total suspended solids (sediment), water depth and physical parameters such as pH, dissolved oxygen, temperature, conductivity, etc. Approximately 30 different types of pesticides are also monitored.
- The program commenced in response to the 1997 fish kill in the Ord River. This was a significant fish kill event. It would appear that farming practices have changed since then as a reaction to reduce the risk of another fish kill event occurring. This has led to an improvement in the quality of the water over the past 7 years and is confirmed by monitoring results.

**Flood Events Monitoring**

- This program was funded by Land and Water Australia as part of the National Program of Irrigation Research and Development and is no longer operational.
- Three stations were set up to collect data regarding the composition of the river during flood event and the ecological risks associated with irrigation return.
- Two flood events were monitored, however logistical issues prevented the program continuing.
- A report written about the monitoring program is titled “Assessment of the Ecological Risk Associated with Irrigation in the Ord River Catchment”.

**Environmental Flows Initiative**

- A Commonwealth funded initiative to determine the minimum level of water flow in various rivers to maintain healthy ecosystems.
- The proposed Stage 2 of the Ord River Irrigation Area was the main driver for this project on the Ord River. The proposed extension of the Irrigation Area would significantly affect the continued supply of water during a period of drought.
- The initiative involved shutting of the Diversion Dam gates to cease water flow into the Lower Ord. Both fish and water quality was monitored to determine the results of reduced and ceased water flow.

**Ord Land and Water Management Plan 2000**

The Ord Land and Water Management Plan (OLWMP) 2000 plays a strong role is developing and implementing ‘best practices’. One of the key actions in this plan is to continue to implement the OLWMP. The OLWMP is the outcome of a four year community process that developed a series of goals to address a wide range of environmental issues. The goals addressed –

- The sustainability of the irrigation area through a ‘Land’ component.
- Healthy river systems through a ‘Water’ component.
- Sustainable native ecosystems through a ‘Conservation’ component
- An environmentally responsible community through a ‘Town’ component.

The development of the plan was conducted in a number of stages from an initial information and communication phase, identification of management issues and setting of goals, through to the implementation of recommendations. The Ord Land and Water Board, of local people, was established to over see the implementation of the Plan.

With the release of the OLWMP came a commitment from industry and the community to protect, maintain and manage the Ord Catchment environment. Goals from the Plan that specifically address this intent are:

***Figure 19 – The mighty Ord River***

- To improve irrigation management to achieve 65% average annual water use efficiency on all irrigation farms within five years.
- To improve irrigation infrastructure and management to achieve a water delivery efficiency of 75% within five years.
- To reduce the load of chemical contamination in tailwater by 40% within five years.
- To reduce the load of nutrient contamination in tailwater by 40% within five years.
- To reduce sediment loads in tailwater by 40% within five years.
- Reduce ground water levels to below two metres from the surface across the whole irrigation area within five years while preventing any new areas from rising above that level.
- Hold the quality of ground water at or above the high quality present in 2000.
- To prevent further damage and modification to the natural riparian vegetation.
- To develop a plan to allocate water from the Ord River to competing uses including the environment. To develop the plan with full community involvement within 5 years.
- Reduce the off farm exports of chemicals nutrients and soil into the Dunham River during the dry season by 50% within 5 years
- Within ten years develop a full catchment plan for the Dunham River that involves all the stakeholders.

Commitment to achieving these goals is demonstrated by outcomes already achieved by the implementation of the OLWMP 2000.

**Pressures**

Current environmental problem within the ORIA in addition to those relating to changed hydrology from the dams, include rising groundwater, salinity, decreased water quality (nutrients, chemicals and sediments returned to the Ord river via the drains) and air quality (sugarcane fires and chemical spraying) (WRM 2003, unpub). The Ord River Dam (ORD), Kununurra Diversion Dam (KDD) and construction of the M1 channel have resulted overall in rising groundwater levels and changed flow (Salma et al 2002). Some salinity has already begun in the Packsaddle area and other areas are also expected to experience this (Salma et al 2002).

The sensitivity of fish populations to irrigation practices in the Ord is highlighted fish deaths having occurred periodically in the Ord river near irrigation drains and strongly implicated pesticides as the cause (mainly DDT in the 1960s and 1970s and Endosulfan in 1997) (OBP 2001, Doupé et al 1998). Studies on the Ord river have also shown that irrigation increases the loads of phosphorus and total oxidized nitrogen going into the Ord river, and increased concentrations of nutrients (Lund & McCrea 2001, Doupé et al 1998).

Competition for the rights to use waters of the Ord River continues to increase. The area of land used for irrigation has increased.

**Gaps**

The impact of the Ord River dams on the ecology of the lower Ord wetlands has never been comprehensively evaluated (Watkins et al 1997) and there is presently no comprehensive monitoring regime to identify the range and rate of community changes in these areas. The lack of baseline data and the relatively short timeframe of regulation means that an accurate assessment of the magnitude of threats to the ecosystem is difficult.

## *FITZROY RIVER CATCHMENT*

The Fitzroy River was discovered in 1837 by George Grey in the H.M.S. Beagle and named after a former Commander of the ship, Captain Robert Fitzroy R.N. The Fitzroy River basin is a vast normally semi-arid country but during the summer monsoon from February to April the river can rise to dramatic heights as the large catchment with a very high run-off is deluged by more than 80% of its annual quota of rain.

The largest river in terms of flow in the Kimberley, and in WA, is the Fitzroy - which has floodplains several kilometres wide. It flows through rugged hills and plains for a distance of 750 kilometres before discharging into King Sound, south of Derby. The Margaret, Leopold, Mary, Hann, Adcock and O'Donnell Rivers, and Christmas and Geegully Creeks, all flow into the Fitzroy River.

The 17 Mile Dam and the Fitzroy barrage constructed at Camballin in the Fitzroy catchment in the early 1970's provide water for irrigation. Larger water impoundment and irrigation enterprises have been proposed along the Fitzroy to create a larger irrigation development. With dams, comes restricted access for fish passage. Investigation into the increasing fish access through fish ladders is currently being looked at.

There is a lack of traditional and scientific research on the wide range of social, cultural, ecological and economic values of the Fitzroy River.

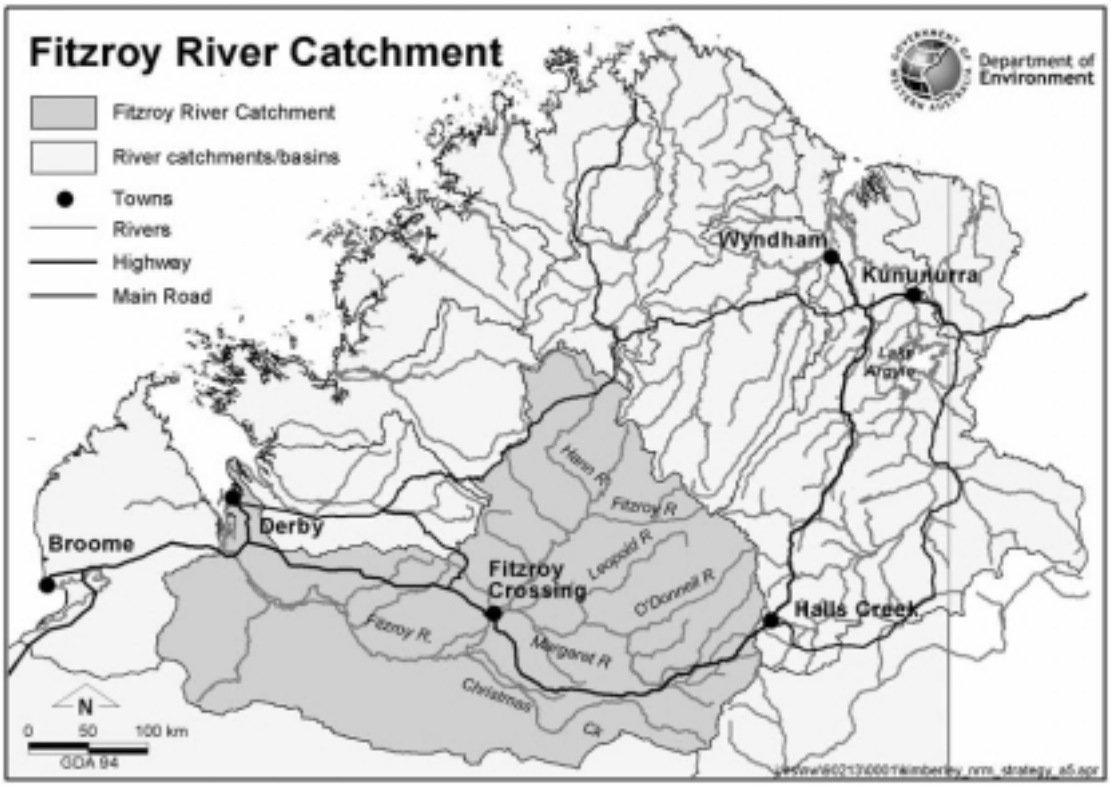



***Figure 20 – Fitzroy River Catchment***

## *NORTHERN AND EASTERN RIVER CATCHMENTS*

The major rivers of the north Kimberley include the Prince Regent, Mitchell, King Edward, Drysdale, King George and Berkeley Rivers. In the past, different groups of indigenous people depended on these rivers for their livelihoods, and until recently their remoteness and rugged catchments have protected them.

The Durack, Salmond, Chamberlain, Pentecost, Forrest, and King are part of the East Kimberley Rivers.

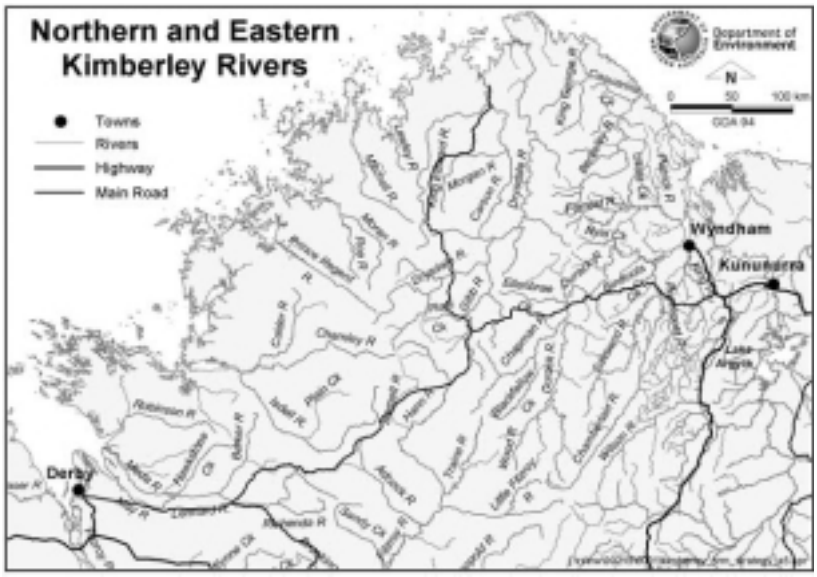



***Figure 21 – Northern and Eastern River Catchments***

**Kimberley 'Wild Rivers'**

Scientific data on the 'condition' or 'robustness' of Kimberley rivers has not been comprehensively researched or documented. In 1999 the Australian Heritage Commission program of identifying 'Wild River' catchments listed 33 Wild Rivers in the Kimberley. 17 of these are Priority 1 (out of the 26 in WA). The high number of Wild River catchments indicates that much of the Kimberley is in a 'pristine to near pristine' condition. Limited accessibility to these Wild River catchments has ensured that they remain largely unmodified, however detailed information on the catchment characteristics and condition of these sites has not been undertaken.

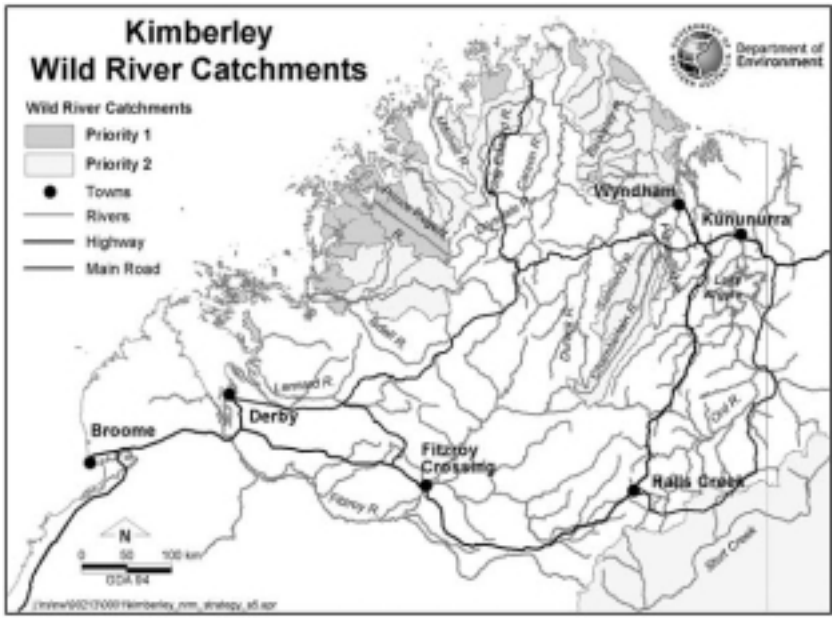



***Figure 22 – Kimberley 'Wild River' Catchments***

# 1.1 LAND

**Aspirational Target**

The management of the region's land resources is ecologically, socially and economically integrated, sustainable and able to support a diverse range of uses by 2050.

With the diversity of the Kimberley, there is a diverse range of land uses. The Kimberley region is highly dependant on the natural resource base. In 1995, the natural resource-based industries accounted for 43% of total production value generated in the Kimberley (OBP, 2003).

The productive value of the land includes:

- mining,
- cattle production
- horticulture
- tourism.

Major impacts of the land include pest plants and animals. The climate in the region provides ideal conditions for the spread of weeds, impacting on pastoral land and access to waterways. The National Prickle Bush Management Group and the East Kimberley Weed Working Group are management groups working towards the control and eradication of weeds and feral animals.

***Figure 23 – Working together to protect Country***

Fire use as a means of managing the landscape has a long history in the Kimberley. The Ord Land and Water Plan 2000, highlights that there is a need to 'maintain a frequency of fire that is conducive to natural population regeneration and enable native species to out compete weeds'. The main concern at the present is that there are too many hot and too many large late season fires, which appear to adversely impact on the land and biodiversity. The Kimberley Regional Fire Management Project is an extension of the NHT funded project. The project has been running for three years and the main outcomes are:

- Database which includes fire scar mapping, Biodiversity mapping, satellite mapping,
- Indigenous fire management, working with children and elders and training of rangers
- Training of a fire control team

A new and real threat to the Kimberley is the Cane Toad. This resilient specie has been working across the top of Australia for the past few years and it is anticipated to arrive in the East Kimberley in 2006. The cane toad was introduced into the sugar cane region of Queensland in 1935 to reduce a specific pest there.

## *1.1.1 LAND WITH PRODUCTIVE FOCUS*

Approximately 224,000 km2 of the total 320,000km2 is covered by 93 pastoral leases, 32 of which are recognised as being Aboriginal managed.

Figure 23 provides a visual documentation of changes in rangelands condition over a period of 20 years (DAWA, 2004).

A tool that can be used for land management are Property Management Plans. Property Management Plans (PMP) can take the form of Environmental Management Systems (EMS), Whole Farm Plans, and Property Resource Management Plans to name a few. Plans include nutrient management, fire management, weed management, mapping and soil health and condition etc. These tools will support appropriate pastoral diversification through practical alignment of instruments to integrate and manage impacts on land, water and vegetation in a sustainable land context.

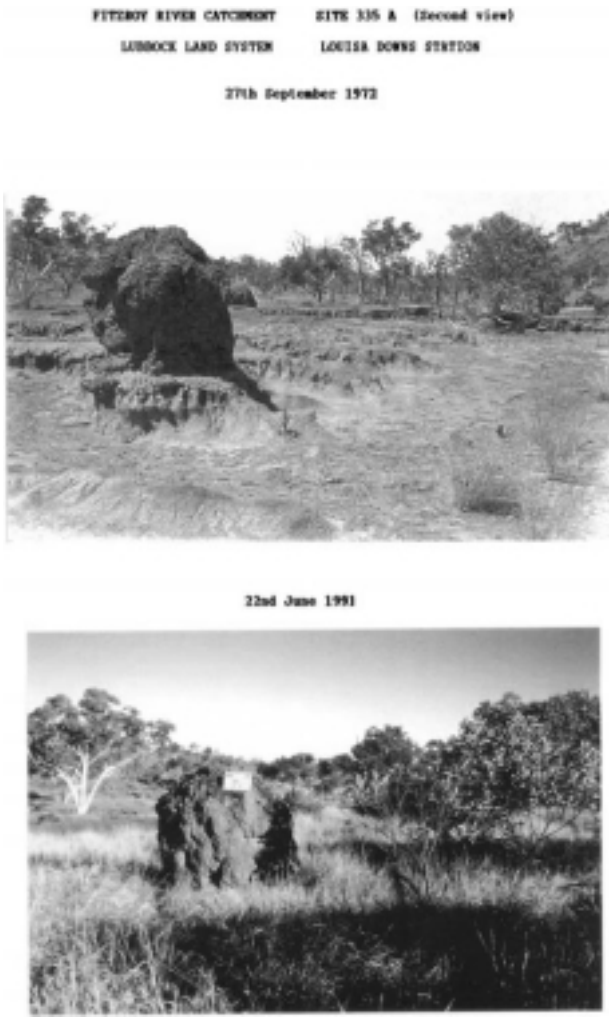



***Figure 24 – Photo records of changes in landscape Source: DAWA, 2002***

**What we know**

The condition of the land is variable. Quantitative information on the change in land can be found in the Western Australian Regional Monitoring System (WARMS). Currently there are 379 sites throughout the Kimberley and there has been monitoring of the sites every 3 years. Photos are taken, and there are permanent transects on which assessments of perennial species frequency and woody crown cover as well as Landscape Function Analysis measurements. Measures of resource condition other than WARMS include:

1) West Kimberley land degradation, Allan Payne 1972. Data was collected by querying the 250k landsystem sheets which had the traverse points overlaid
2) Station Resource Assessment Reports circa 1988 to 1996. Station data for the Fitzroy Valley assessed by Andrew McClaughlan, 1998
3) Pastoral Lease Reporting and Range Condition Reports, 1999 to current.
4) GIS based interpretation of satellite imagery eg. Veg Machine

Gaps in the data include:

- Not all data fields have been collected over time,
- WARMS only identifies trend and is only collected on pastoral productive land systems

The WARMS survey classifies land condition as Good, Fair or Poor. These classifications can be used for the development of Resource Condition Targets for productive land. A long-term goal of the plan will be to have all country in the Good to Fair range.

Land mangers work together in partnership through Land Conservation Districts Committees (LCDCs) LCDCs also make recommendations to the Commissioner of Soils for the management and improvement of catchment areas.

The management of Pest Plants and Animals has been a high priority for a long time in the Kimberley.

There are currently two main groups in the Kimberley, working on the management of weeds through Best Management Practice and education and awareness. There is the National Prickle Bush Management Group and the East Kimberley Weed Working Group.

Also, pastoralists pay the Agricultural Protection Board a levy for Declared Plant and Animal Control (DPACF) on stations. This program has been successful and will continue to operate.

Weed infestations are measured by density and area. National density standards have been agreed upon for Mesquite, Parkinsonia and Prickly acacia to aid land managers in deciding best management practices for control. The National Prickle Bush Management Group have developed BMP manuals with NHT funding, to enable land managers to identify best control method in relation to density of weed infestations.

Feral Animal Management

Donkey Management Program (DPAF) uses radio collars to track donkeys throughout the Kimberley. The tracking program has been moving from South to North and the last region, North Kimberley is currently being targeted. This has been a successful project and remains a priority.

**Gaps**

There is limited information on the condition of country. An increase in the use of land management tools by land holders would be valuable for the sustainability of land management and an increase in the understanding of changing land conditions.

Also, very little is known about the impact of climate change on the condition of land and could be a real threat in the future.

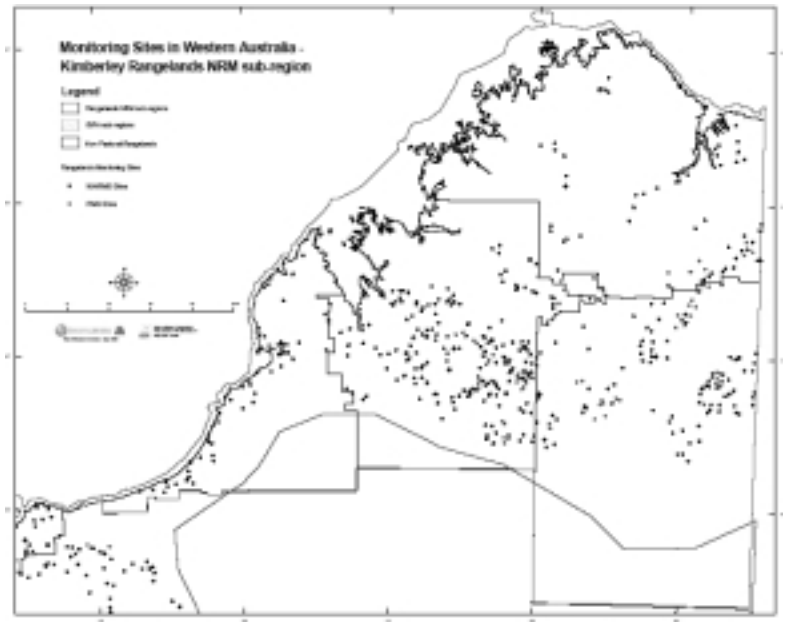



***Figure 25 – Distribution of WARMS sites throughout the Kimberley***

**What we want**

- We want to protect country, and deal with land management on a regional basis, made up of smaller areas (like the West Kimberley, East Kimberley and North Kimberley)
- We want to avoid environmental problems before they are created rather than fix up damage after it has happened.

## Table 6 - 1.1.1 LAND WITH PRODUCTIVE FOCUS

**Resource Condition Targets**

**RCT1:** WARMS sites show a stable range condition and an upward trend, with the number of sites in poor condition being < 10% by 2020

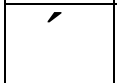
**RCT2**: Average of ground cover on land in the Kimberley is greater than 40% by 2014

**RCT3**: Reduction in area of Mesquite by 3,000Ha and density of Prickly Acacia from medium to isolated plants by 2015

**RCT4**: Donkeys eradicated from the Kimberley by 2014

| Recommended Actions/ Management Targets | | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | | |
|  | **L1.** Greater co-ordination and communication of regional monitoring program for pest plants, diseases and animals by 2008 | Regional | Distribution of Pest Plants and Animals is communicated to the community | DAWA<br>KPIA | L3 | |
|  | **L2.** Review WARMS and the Pastoral Lease Inspection Program and develop and expand if necessary by 2008 | Regional | Review use of data already collected<br><br>Condition of the soil and plant health is monitored and reported to land managers | DAWA | RCT1 | |
|  | **L3.** Review the effectiveness of new/current remote sensing technology for assessing rangeland condition by 2007 | Regional | Identification of appropriate remote sensing technology for assessing rangeland condition | DAWA | RCT1 | |
|  | **L4.** Weeds of National Significance (WONS) infestations in the Kimberley surveyed, mapped and eradicated programs in place by 2010 | Regional | Weed mapping concentrated on Weeds of National Significance (WONS)<br><br>Development of a Regional Weed Management Plan | DAWA | L1, B14 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **L5.** Identify, prioritise and undertake rehabilitation of high priority erosion areas throughout the Kimberley by 2008 | Regional | Management of cattle on high erosion areas<br>Exclusion of stock at certain times | DAWA, Land Managers | RCT2 | |
| On-Ground Actions | | | | | | |
| | **L6**. 40% of land managers using satellite data to monitor ground cover by 2010 | Regional | Guidelines for measuring and monitoring soil health are developed | landholders, DAWA, | RCT2 | |
| | **L7**. 80% of land mangers are implementing approved fire management plans by 2009 | Regional | Single fire authority proposal investigated<br><br>Fire management included in property plans | FESA, CALM, DAWA, Landholders, Shires | B14, L10 | |
| | **L8.** Adoption of Property Management Plans, which include Best Management Practice Guidelines, by 50% of land managers by 2012 | Regional | No. of Property Management Plans developed | DAWA, KPIA | L31 | |
| | **L9.** Continue Donkey Eradication Program throughout the Kimberley – on-going | Regional | Review donkey eradication program in 2008<br><br>Donkeys eradicated form the Kimberley | DAWA | RCT4 | |
| Institutional Framework, Planning and Policy | | | | | | |
| | **L10.** Develop best practice fire regimes for all land uses informed by traditional knowledge by 2007 | Regional | Guidelines developed and distributed<br><br>Endorsement process established | CALM, DAWA, Land managers, CRC, FESA, Shires | L4, B14 | |
| | **L11.**. Well managed development proposals supported by realistic rehabilitation guidelines and partnerships – on-going | Regional | Mining and exploration continue to improve compliance with current management protocols | Mining Industry, | | |
| | **L12.** Road authorities to adopt rehabilitation of borrow pits and work/site camps as standard in operation by 2010 | Regional | Rehabilitation of land | Shires, Main Roads | | |
| | **L13**. Have in place Best Management Practice Modules, using sustainability indicators which will lead to a subsequent industry certification or accreditation for Pastoral Land by 2010 | Ord and Regional | BMP Modules include:<br>Fire Management, Nutrient Management, Sediment Control, Ground Cover, Chemical Management | KPIA, DAWA, KAPA, PGA | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Education and Awareness | | | | | | |
|  | **L14**. Improved understanding of the management options for WONS and other high priority weeds in the Kimberley by 2007 | Regional | Information sourced, compiled and distributed<br><br>No. of publications distributed | DAWA, CALM | B20 | |
|  | **L15**. Land Management training programs, BMP modules, implemented for Aboriginal and non-Aboriginal land managers by 2006 | Regional | No. of training programs undertaken which include:<br>Fire management, nutrient management | DAWA | L21 | |
|  | **L16**. Implementation of the Kimberley Sustainable Tourism Project by 2006 | Regional | ⋕ Tour operators accredited<br>⋕ Leave no Trace - Educate visitors on camping etiquette<br>⋕ Signage and information campaigns to raise awareness of sustainable tourism<br>⋕ Identification and participation with Indigenous | Tourism Industry, main roads, Shires, LCDCs, DoE, CALM, DEH | CM7 | |
|  | **L17.** Development of Gibb River Road Management Plan by 2007 | Gibb River Road | ⋕ Gibb River Road Management Plan finalised and implemented | LCDCs, Main Roads, Tourism Industry, Traditional Owners, DEH, Shires | | |
|  | **L18**Assessment of potential impacts of climate change on land management in the Kimberley by 2010 | Regional | Greater understanding of the impacts of Climate Change<br><br>Trial Sites established | DAWA, Australian Greenhouse Office, CSIRO, CALM, DoE | W7, W38, B5 | |
|  | **L19**. Best Management Practice Guidelines developed for weed control by 2008 | Regional | Education package developed including: workshops, brochures, field days, bio-control, ranger programs | DAWA | | |
|  | **L20.** Public Awareness programs developed for the movement of pest plants and animals by 2008 | Regional | No introduction of new species<br>No. movement of pest species from down south | DAWA | B11 | |
| Cultural Heritage | | | | | | |
|  | **L21**. An Indigenous Land Management Traineeships program established by 2006 | Regional | Traineeship programs underway<br>Ranger Programs<br>Encourage work opportunities | DAWA, KAPA, ILC, KLC | L15 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **L22.** Demonstration days and field trips undertaken throughout the Kimberley – On-going | Regional | Educational program<br>Different land uses and issues on Country shared | KLC, KAPA, ILC, DAWA | | |

## *1.1.2 IRRIGATED LAND*

The main area of irrigation is in the Ord River Irrigation Area (ORIA) around Kununurra. The irrigated area increased from 1865 hectares in 1978 to 4407 hectares in 1990 to the current potential of the ORIA of approximately 13,000 hectares. Horticulture remains the predominant source of income for farmers in the ORIA.

Average annual growth in production value for 1982-2000 was above 21.4% (DAWA, 2003).

Recognised and potential threats to the region include:

- Excessive siltation – brought about by erosion and excessive run-off,
- Eutrophication – increased run-off of nutrients entering waterways can produce algal blooms,
- Modified flows - Impacts on the changed flow regime down stream of the Ord Dam and Diversion Dam,
- Pollution – little is known of the impacts of fire on water quality,
- Salinity and rising groundwater tables,
- Lack of knowledge of current condition and impacts of threats,
- Invasion of exotic weeds, insects, disease and vertebrate pests.

Potential weed, insect, disease and animal threats include:
***Weeds*** - Parthenium (WONS), Mimosa Pigra (this weed has the potential to choke all waterways, Cabomoba caroliniana (currently in the Northern Territory and would choke out all water courses)
***Vertebrates*** - Cane Toads (threaten biodiversity and obstruction of irrigation systems), Sparrows (attack grain crops, and out compete native birds)
***Disease*** - Citrus canker (effect viability of trees and market accessibility), Citrus greening (bacterial disease that causes trees to die, currently in Indonesia)
***Insects*** - Exotic fruit fly (maggots in fruit, impacts on market access), mango pulp weevil (makes fruit unsaleable, impact on international markets)

Salinity is not currently a major threat in the region, but has been identified as a potential threat. There has been an increase in the identification of salinity 'hot spots'. One of the key outcomes of the plan is to identify potential saline areas and develop techniques to manage this. A greater understanding of groundwater is an important tool in managing waterlogging, rising watertable and the impact of salinity.

## Table 7 - 1.1.2 IRRIGATED LAND

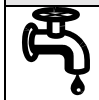
**Resource Condition Targets**

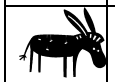
**RCT5:** No new occurrences of salinity in the ORIA by 2014

**RCT6**: A reduction in the area of salinity affected land in the ORIA by 2014

**RCT7:** Maintain and improve the condition of soil in the Ord Catchment, with monitoring guidelines to be developed by 2008

**RCT8**: Groundwater levels in the ORIA are to be maintained at/or below 2 metres by 2015

| Recommended Actions/ Management Targets | | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | | |
|  | **L23**. Identify priority areas for protection and remedial action based on salinity risk assessment by 2006 | ORIA | Salinity risk areas are identified | OIC, OLW, DAWA | RCT6 | |
|  | **L24.** Assess whole catchment for salinity risk areas by 2010 | Ord | Ord Catchment assessed and mapped for salinity risk | DAWA | RCT6 | |
| Ċ | **L25**. BMPs for chemical use adopted by industry and implemented by 100% of users by 2005 (RCT2) | Ord Fitzroy | Appropriate chemical use | Landholders, Industry, KPIA | | |
|  | **L26**. Mapping of soil texture in the ORIA is completed by 2010 | ORIA | Soil Pack developed | DAWA | | |
| On-Ground Actions | | | | | | |
|  | **L27**. Priority actions implemented as outlined in the Ord Land and Water Management Plan 2000 by 2007 | ORIA | Continued implementation of the Ord Land and Water Plan 2000 | OIC, OLW | | |
|  | **L28.** Trail recommendations from salinity strategies/actions across Australia in known saline areas in the ORIA by 2006 | ORIA | Facts sheets developed outlining salinity practices | DAWA, OIC | L29 | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **L29.** Implement successful trial in known saline areas and risk areas by 2009 | ORIA | No. of trials for Australia implemented in the ORIA | DAWA | L28 | |
|  | **L30.** Develop and implement groundwater management options by 2007 | ORIA | No. of groundwater management options implemented | DoE, DAWA, OIC, OLW, CSIRO | W45 | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **L31**. Develop Property Management Planning tools, using sustainability indicators which will lead to a subsequent industry certification or accreditation for Irrigated Land by 2007 | Ord | Property Management Plans developed<br><br>Nutrient management plans, bio-security, pesticide management are adopted and present in property management plans | DAWA, KPIA, OLW, Land Managers | L8, L34 | |
|  | **L32**. Develop management actions for saline sites or those at risk by 2008 | Ord | Adoption of whole farm plans | DAWA | L29 | |
|  | **L33.** Review salinity actions/strategies around Australia to ascertain recommendations/actions for saline sites in the ORIA by 2006 | ORIA | Salinity options reviewed | DAWA, OIC | L28, L29 | |
|  | **L34.** Ensure adoption of salinity management recommendations/actions by 70% of land managers by 2010 in property plans (EMS) | ORIA | % of land managers adopting salinity management actions | KPIA, CALM | L29 | |
|  | **L35**. Produce grown in the ORIA recognised for taste, quality and consistency by 2010– in accordance with a certified EMS program | Ord | 50% of produce grown in the Ord Valley in accordance with EMS accreditation | KPIA, CALM | | |
|  | **L36.** BMP guidelines for nutrient and pesticide management developed by 2008 | Ord | No. of guidelines developed and distributed | DAWA | W4 | |
|  | **L37.** Use the current Draft Bio-security Protection Plan for the Ord valley as a framework for the development of a Bio-security Protection Plan for the Kimberley region by 2008 | Regional | Bio-security Protection Plan developed for the Kimberley region | DAWA, KPIA | | |

| Education and Awareness | | | | | | |
|---|---|---|---|---|---|---|
|  | **L38**. Information and decision making training programs and tool kits developed by 2006 and implemented 2008 | ORIA | Tool kit developed and adopted – soil pack, nutrient management, water use, water logging, drainage, bio-security | TAFE, KPIA, DAWA | L31 | |

## *1.1.3 INDIGENOUS LAND WITH SOCIAL FOCUS*

Aboriginal land throughout the Kimberley is used for a multitude of purposes. Of the pastoral stations in the Kimberley, 30% are managed by and for Indigenous purposes. Indigenous pastoral stations are not only commercial cattle businesses, but also home to communities with the land serving a range of cultural uses and non-commercial economic activities, including hunting and gathering.

The involvement of Aboriginal peoples in the regional economy comprises both contemporary market involvement and a long and on-going history of non-market use. An indication of the extent of the non-market Aboriginal economy can be found when looking at rights and interests that Aboriginal peoples are seeking to have recognised through the Native Title process. There are a number of practices, beliefs, customs and usages that define Indigenous people, including activities such as:

***Figure 27 – Workshop participants at Bungarun***

- Hunting and gathering of food
- Building and using shelter
- Using water
- Digging for and using stone, ochres and minerals, caring for country through spiritual obligations, environmental requirements, harvesting produce
- Sharing and exchanging resources derived from country.

Each of these derives from specific social and cultural obligations Aboriginal peoples have to themselves and country.

These activities are asserted to be part of the on-going tradition and heritage of Aboriginal people. Indigenous people are the largest land holders in the regions and there is potential to develop eco-tourism ventures based on bushfood and culture that other tourist providers may not have the skills to do.

One of the main aims is to increase activities on country, which in turn will improve the transfer of knowledge from one generation to the next.

## Table 8 - 1.1.3 INDIGENOUS LAND WITH SOCIAL FOCUS

**Aspirational Target**

**RCT9:** Traditional cultural practices continue on Country to improve and enhance social, economic, environmental wellbeing by 2007.

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **L39.** Establish a Resource Condition for the portion of people/communities carrying out traditional cultural practices on Country by 2006 | Regional | Resource Condition Target developed by 2006 | KLC, KLRC, DIA, KALACC< AOED | RCT9 | |
| **L40.** Identification of commercial farming opportunities for a range of bush products completed by 2008 | Regional | Viable and sustainable bush product production identified | KPIA, KLC, DAWA | | |
| **L41** Raise awareness of opportunities for sustainable bush products by 2010 | Regional | Identify options for educating about bush tucker | KLC, KLRC | | |
| On-Ground Actions | | | | | |
| **L42**. Aboriginal people are involved in making decisions about land development by 2005 | Regional | Agreements and partnerships established to enable Aboriginal people to have a say in decisions relating to land use – incorporate Indigenous people in decision making structures (surveys of lessees and communities) | KLC | | |
| **L43**. Investigate options for cultural awareness trips to Country by 2007 | Regional | No. of options identified | KLC | L46 | |
| **L44.** Develop co-ordinated Indigenous Ranger programs and traineeships by 2006 | Regional | Pilot programs in place<br>Framework for co-ordination developed | TAFE, Tourism Industry, KLC | | |
| **L45**. Bush tucker nurseries developed in local communities by 2012 | Urban areas | No. of nurseries established | Shire, TAFE, KLC | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **L46.** Indigenous people have improved access to Country to continue cultural and environmental knowledge flow by 2008 | | Appropriate access methods investigated | DAWA | L43 | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **L47.** Investigate tourism options for Indigenous land by 2006 | Regional | Report on options available | Tourism WA, Industry | | |
| | **L48**. Continue identification of culturally sensitive/important areas on Community Layout Plans and Town Plans by 2008 | Regional | Culturally sensitive areas identified on community layout plans<br>Culturally sensitive sites identified in Town Plans | Shire, DIA | | |
| Education and Awareness | | | | | | |
|  | **L49.** Develop plain English environmental brochures for distribution throughout communities and towns by 2008 | Regional | Brochures include information on:<br>Impacts of rubbish, erosion, salinity, weeds | KLC | | |
| Cultural Heritage | | | | | | |
|  | **L50**. Encourage publication of Aboriginal seasonal calendar– what is eaten, can be eaten and when, including natural resource harvesting - annually | Regional | No. of seasonal calendars published | KLC, KLRC, KALACC | | |
|  | **L51** Protocols developed and implemented for the protection of cultural and intellectual knowledge/information by 2007 | Regional | Option identified | KLC, Communities, Language Centre, DIA | | |
|  | **L52.** Develop management plans for cultural and natural resources on Native Title Lands by 2010 | Regional | No. of management plans developed | KLC, KLRC, KALACC | | |
|  | **L53.** Identification of educational harvesting areas for younger generations by 2008 | Regional | No. of communities for which this is undertaken | KLC | | |

## *1.1.4 LAND WITH CONSERVATION FOCUS (links with Bush Biodiversity)*

The North Kimberley has a variety of rare features including mound springs, swamp rainforests including, the Airfield Swamp, a large wetland with a paperbark forest. Populations of the endangered Gouldian Finch live here, and endemic and threatened mammals include the Golden Bandicoot, Scaly-tailed Possum and Monjon (a rock wallaby). The Kimberley has a high population of endemic species, that occur only in a particular locality.

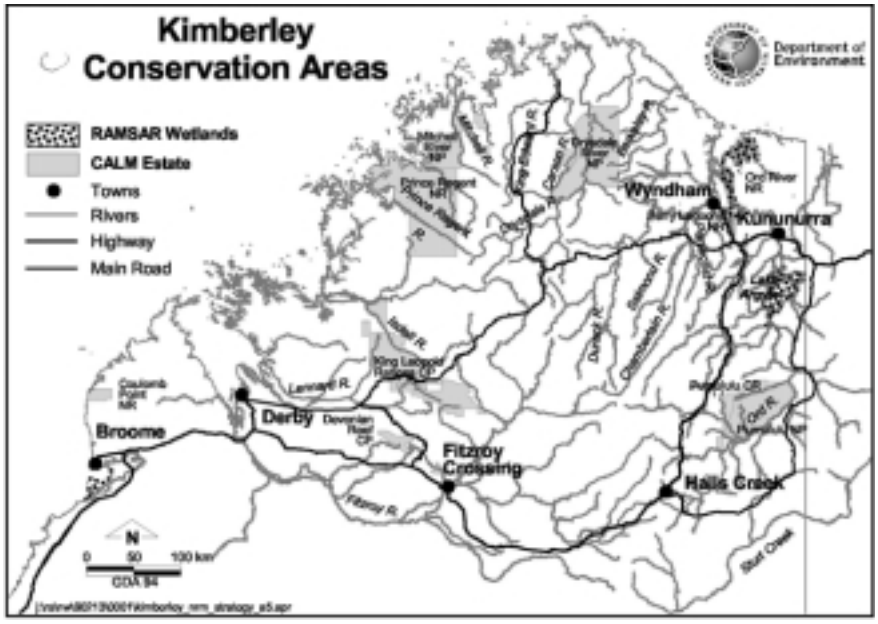



***Figure 28 – Conservation Land throughout the Kimberley***

This area is characterised by savannah woodland with significant rainforest patches in the northern area. With unmanaged grazing and fire regimes there has been a general deterioration of the landscape. Extensive dry late season fires have damaged sensitive tropical and sub-tropical forests and woodlands. Rainforest patches provide refuges for invertebrates, now under threat from fire and stock. Feral cats are common across the Kimberley, and feral pig populations are still expanding, while colonisation by cane toads is a future threat. There is a need to inform the community of the benefits of managing conservation land, especially in relation to other land uses.

### Current Conservation Estate

The current situation is:

**National Parks: Nine** : Drysdale River, Geikie Gorge, Lawley River, Mirima, Mitchell River, Purnululu, Tunnel Creek, Windjana Gorge, Wolfe Creek Meteorite Crater.

***Purnululu National Park*** was inscribed on the World Heritage List in July 2003. Purnululu National Park is a site representing: 'natural features consisting of physical and biological formations, or groups of such formations, that are of outstanding universal value from the aesthetic or scientific point of view'. Purnululu is 'an outstanding example representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms.

**Conservation Parks - Six:** Brooking Gorge, Camp Creek, Devonian Reef, Geikie, King Leopold Ranges (former Mt Hart lease), Laterite.

**Nature Reserves - 16**: Adele Island, Browse Island, Caffarelli Island (Buccaneer Archipelago), Coulomb Point, Dragon Tree Soak, Lacepede Islands, Lesuer Island, Low Rocks (near Long Reef), Ord River (Mouth), Parry Lagoons, Pelican Island, Point Springs, Prince Regent, Scott Reef, Swan Island, Tanner Island (Buccaneer Archipelago).

**Crocodile Reserve - One**: King River (near Wyndham).

**Marine Park - One :** Rowley Shoals.

**Pastoral Lease - One** :Charnley River (Walcott Inlet; intended to become a Conservation Park).

**Section 16A (Co-operative Management) Reserve**: Coastal sand-dunes of Anna Plains Station (Eighty-Mile Beach).

**Miscellaneous Reserves:** Broome Bird Observatory, Broome Wildlife Care & Rescue Centre.

**Indigenous Protected Area - One –** Lake Gregory/Paraku

The **Australian Wildlife Conservancy (AWC) pastoral property**, Mornington, which is now being managed principally for its conservation values - including significant Gouldian Finch habitat.

Under the 2015 pastoral acquisition process, a number of areas of high identified conservation values are under negotiation - including Cockburn and Ningbing Ranges, Eighty- Mile Beach coastal dunes and Roebuck Bay coastal areas. Separate from the 2015 process, Lake Gladstone (significant wetland) and part of Waterbank (north of Broome) have also been proposed as potential Conservation Parks.

***Figure 29 – Brolga – Migratory species***

## Table 9 - 1.1.4 LAND WITH CONSERVATION FOCUS

**Resource Condition Targets**

**RCT10:** The comprehensiveness, adequateness and representativeness (CAR) of the protected area systems (including formal reserves, off-reserves and Indigenous Protected Areas) is improved by a minimum of 50% by 2015, based on 2005 baseline data.

**RCT11:** Maintain and improve the condition of high priority native vegetation (including reserve and off-reserve) by 2020, based on 2006 baseline data

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **L54.** GIS based interpretation of satellite imagery indication improved vegetation cover developed by 2006 | Regional | GIS system used for interpretation | CALM | RCT11 | |
| **L55** Develop detailed and comprehensive management on Conservation Land including Legislation and joint management arrangements by 2010 | Regional | Management plans for conservation land developed<br>No. of conservation lands jointly managed | CALM, Land managers, KLC | | |
| **L56.** Investigate different approaches to increase CAR protected areas from around Australia by 2008 | Regional | Different models for land conservation established | CALM, Land managers | RCT10 | |
| On-Ground Actions | | | | | |
| **L57.** Improve areas acquired for reserve systems and off-reserve land under long term management by 2008 | Regional | % of area improved | CALM, Land Managers | L56 | |
| **L58.** Improve vegetation cover and condition by 2010 | Regional | Vegetation cover monitored by GIS<br><br>Monitoring sites established for condition | CALM, Land Managers | L54 | |
| Cultural Heritage | | | | | |
| **L59** Develop and implement agreed protocols for Indigenous engagement in biodiversity research and monitoring by 2010 | Regional | Protocol developed | CALM, Land managers, KLC | | |

## *1.1.5 LAND USED FOR TOWNS, COMMUNITIES AND INFRASTRUCTURE*

The boundary of the Kimberley Region for the purpose of this plan is the four local government shire areas. These are:

- Shire of Wyndham-East Kimberley, which includes the towns of Kununurra and Wyndham
- Shire of Halls Creek, which includes the townsite of Halls Creek
- Shire of Derby-West Kimberley, which includes the towns of Derby and Fitzroy Crossing
- Shire of Broome, which includes the townsite of Broome

All towns within the Kimberley, except Fitzroy Crossing have Town Planning Schemes, which to some extent allow for the protection of natural resources. Other projects and plans, which have recently been completed or are underway include the Derby Revitalisation Plan, Fitzroy Futures and the Lake Argyle Structure Plan.

The Shire's of Broome, Halls Creek and Wyndham-East Kimberley are all currently undertaking the development of Local Planning Strategies [LPS]. The Shire of Derby-West Kimberley is looking to commence development of an LPS in the near future. Department for Planning and Infrastructure's guidelines state that LPS's are the core of the local planning framework and their purpose is to set out the local governments general aims and intentions for future long term growth and change.

Future land use and development aspirations of the Region's large permanent aboriginal communities are being addressed in Community Layout Plans [CLP's]. The Department for Planning and Infrastructure undertake the development of these Plans in partnership with the Department of Indigenous Affairs and the Department of Housing and Works. Locations of existing and proposed essential service infrastructure is also mapped and protected from impacts of future developments.

Whilst the population of the Kimberley has been growing rapidly in recent years, development of the Region's towns has been somewhat restricted over the past ten years. In the main part this can be attributed to long processes involved in achieving satisfactory outcomes for Native Title Claims. Given the general inability to develop Unallocated Crown Land [ULC] until recently, many towns continued internal growth and development in ad hoc ways. Often this would have impacts on natural resources such as incompatible uses being located in close proximity to groundwater supplies. It is hoped that the development of Local Planning Strategies will assist in finding balances between appropriate township growth and protecting natural resources of the Region.

Significant infrastructure has been developed in the Region. Notably in terms of transport; airports service all the Region's main towns, the largest being located in Broome. Many large aboriginal communities also have airstrips. Ports are located in Broome, Derby and Wyndham, they play an important role in the export of the Region's cattle and mining outputs.

***Figure 30 – Derby jetty***

Regional road networks are also important with the Great Northern Highway traveling the length of the Kimberley. The Highway, as well as the Gibb River Road and Tanami Road have significant roles in the movement of both freight and tourists.

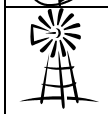
Most township supplies of water come from groundwater. Water source protection needs to be incorporated into land use and development planning. Some of the main environmental issues seen by communities are weed management, water management, fire management and waste management.

## Table 10 - 1.1.5 LAND USED FOR TOWNS, COMMUNITIES AND INFRASTRUCTURE

**Resource Condition Targets**

**RCT12:** Land use for urban expansion and infrastructure is developed/consistent with its sustainable land use capacity by 2020 as measured by appropriate benchmarks developed in 2006

**RCT13:** All land developed for urban expansion and new and improved infrastructure is consistent with sustainable land use capability by 2010.

| Recommended Actions/ Management Targets | | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | | |
|  | **L60.** Sustainable land use capability benchmarks established by 2006 | Regional | Benchmark established for sustainable development | Shires, DPI | | |
|  | **L61**. Develop a region renewable (sustainable) energy plan for regional towns and communities in the Kimberley by 2008 | Regional | Renewable energy plan developed | Western Power, Shires, Community, KDC, AGO | | |
| On-Ground Actions | | | | | | |
|  | **L62**. Increase use of local indigenous species in urban environs plantings and rehabilitation works by 2008 | Regional | A native species planting program/guide is developed for regional towns and communities<br><br>All new plantings to be native species<br><br>Native species to be used in mining rehabilitation works | Shire, Community, Kimberley Environmental Horticulture, SEEKS, Broome Botanical Society, Mining companies | | |
|  | **L63.** Nursery industry to develop state-wide bio-security plan, only supply native plants species by 2008 | Regional | Nurseries only supplying native species | Industry, Shires | | |
|  | **L64.** Continue community plantings and preservation of existing townsite native bush – on going | Regional | Community groups undertaking local plantings | SEEKS, Broome Botanical Society | B21 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | on-going | | | Society | | |
|  | **L65**. Water sensitive urban design guidelines adopted for 30% of communities and towns by 2008 | Regional | No. of education programs to raise awareness of water urban design guidelines | Shires, WALGA, DPI, DHW, Water Corporation | | |
| Institutional Framework, Planning and Policy | | | | | | |
| ´ | **L66**. Refine development approval processes to a consistent standard across the region to ensure development is appropriate to the capacity of the region by 2005 | Regional | Uniform development guidelines developed for the Kimberley | Shires | | |
| ´ | **L67**. Regional and local planning strategies and Town Planning Schemes reviewed to ensure consistency with NRM plans in the region by 2006 | Regional | Natural Resource Management incorporated in planning schemes<br><br>Recycling opportunities, waste management | Shire | | |
| Education and Awareness | | | | | | |
|  | **L68**. A community 'water wise for gardens' program developed by 2006 | Regional | 'Waterwise' program implemented in the Kimberley | Shire, DoE, Water Corporation | B11 | |
|  | **L69**. Stormwater education programs developed in urban areas by 2005 | Urban | Educational Tools developed<br><br>Weed management undertaken in stormwater drains<br><br>Sewage discharge | Shires, DoE | | |
| Cultural Heritage | | | | | | |
|  | **L70**. Culturally sensitive areas are identified on Community Layout Plans | Regional | Areas identified and present on layout plans | Shires | | |

# 1.2. WATER

**Aspirational Target**

All currently unmodified rivers in the Kimberley maintain natural flows free of barriers, into the future.

***"Our River holds our culture, our lives, our future"***
Quote from Bungarun NRM meeting September 2004

The Kimberley NRM sub-region includes over one hundred rivers and many more creeks and streams which flow north or west, out of the Timor Sea drainage division. Kimberley Rivers exhibit high seasonal flow variations with the river systems and their associated flora and fauna having adapted to the floods.

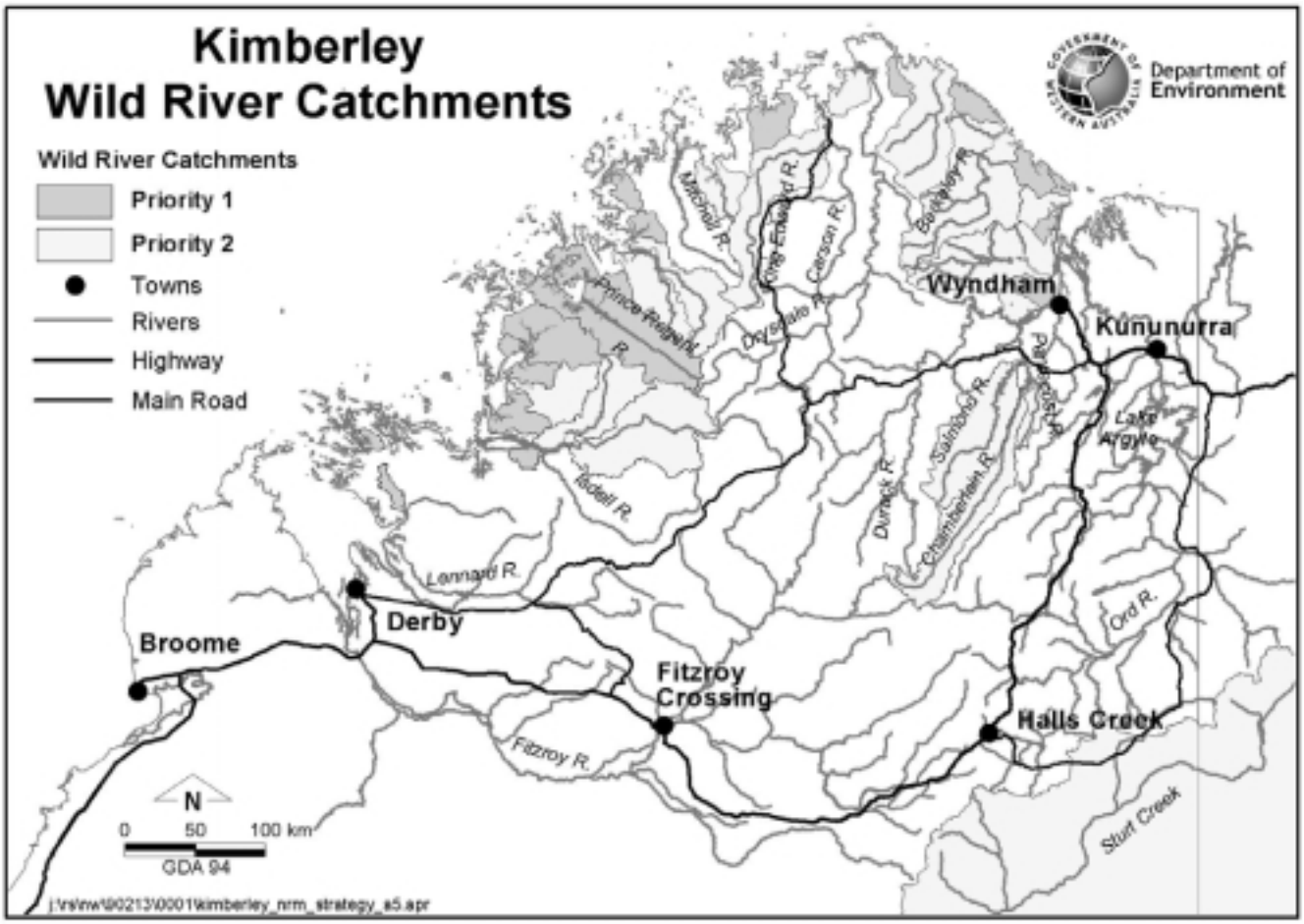



***Figure 31 – Kimberley Wild River Catchments***

Scientific research on the region's rivers has not been extensive, with most interest shown on the Ord and Fitzroy prompted by existing and proposed developments. Gauging stations are located at 24 sites for flood warning and resource information purposes. 13 of these are located in the Fitzroy catchment and 9 in the Ord. Water quality monitoring has been focussed on the Ord River around the irrigation area. The Ord upstream and downstream of the irrigation area is monitored monthly for physical and chemical parameters including nutrients and pesticides.

Riverine landscapes in much of the Kimberley remain largely unmodified. Rivers with catchments in near to natural state have been classified by the Department of Environment and Heritage as "Wild Rivers".

Many cultural beliefs and stories are focussed on rivers, and fishing continues to provide resources and enjoyment to the Aboriginal communities within the Kimberley.

The Kimberley region is an area of unique natural and cultural heritage values including many important wetlands and coastal areas which support some of Australia's highest populations of migratory shorebirds and waterfowl (Lane *et al*. 1996). However, there is currently insufficient recognition of water-related assets in this region and in northern Australia generally. Many other economic and social values such as commercial fisheries, tourism, recreation, human health and cultural heritage rely on the health of the river systems. Hence, there is a need to protect the high biodiversity freshwater ecosystems of tropical and arid Australia to also protect a wide range of economic, social and cultural values.

When water is used by industry they may have a responsibility as a licence condition issued under the Rights in Water and Irrigation Act 1914 to measure storage, usage, release and other flows caused by use and regulation (control) of river flows.

## *1.2.1 WATERWAYS*

Rivers are the focus of tourism, fishing and boating activities. The majority of visiting and local campers choose to stay alongside rivers, for aesthetic reasons as well as access to water for swimming, fishing, cooking and washing. Fishing and boating, particularly in the East Kimberley, is a significant leisure activity.

Properties use many of the rivers for stock water, fattening paddocks and transport routes. The rivers on some leases also define the property boundaries.

Tour companies run boat and fishing charters on major Kimberley rivers, including the Ord, Fitzroy, Berkely and Chamberlain.

***River story (River womens' words)***

When you sing out (rock in water) introduce yourself to the river.

When it's flowing, you don't cross the river after midday – bad luck otherwise – can't cross even a creek (must walk around).

When the river is not flowing, you still have to sing out – still dangerous.

Land and water still. Fishing – no fresh bait – bad news – go home.

River sand, throw a handful of sand into the water as a greeting.

Junba – sing for river – Martawarda (health for river).

**What we know**

The different land types within catchments underlie their robustness. Sandy plains and river banks in the east and west Kimberley catchments are more susceptible to catchment deterioration and soil erosion from the impacts of cattle and flooding.

It has been noted that the most serious cause of river degradation in the Kimberley was the removal of the natural riverine and catchment vegetation resulting in soil erosion and sedimentation. Overgrazing by domestic and feral herbivores prior to the 1970s over wide areas had destroyed the vegetation and exposed the fragile soil structure to the impact of highly intense rainfall. This resulted in widespread sheet and gully erosion across much of the Kimberley. Once eroded from the landscape, soil washed into the rivers, making them highly turbid when flowing, and was then deposited along river banks, in pools and across estuaries.

The AusRivAS monitoring of Kimberley Rivers between 1994-99 selected 50 Reference sites. These sites are intended to indicate the expected natural state. Assessment of these found 37 sites to be ranked 'A' ie close to expected natural state, and 13 sites ranked 'B'. An additional 34 test sites produced results of 19 A's, 13 B's, one C and one site with results greater than expected in a natural state. These AusRivAS results tend to indicate that Kimberley rivers are in good condition. Unfortunately not enough research on sites in the Kimberley has been done to validate the model used and therefore the results conclusively. Currently no widespread program of monitoring river condition exists and therefore knowledge of systems, and any changes or impacts from land use, are not well documented.

**Pressures**

Kimberley rivers are subjected to pressures from both natural and human impacts. Natural conditions that provide stress to riverine systems include long dry periods, intense rains, flooding and fire.

Across the Kimberley, the majority of catchment impacts and potential pollutants of rivers come from diffuse sources including broad scale grazing. Human activities that can threaten river condition include tourism, pastoralism, irrigation and mining. Potential impacts include exacerbated erosion, pollutants, litter, vegetation and biodiversity loss.

In terms of tourism, river reaches at road crossings are particularly susceptible to impacts and pollution from vehicles and campers. Vehicle tracks disturb vegetation, spread weeds and may increase erosion. Visitors

may leave litter at campsites and can pollute the waterway with soaps, detergents, sunscreen and insect repellent.

Unmanaged animals such as feral pigs, donkeys, horses and cattle, are mostly concentrated along rivers – their source of food and water. These animals can cause fouling of waters and erosion of banks around river pools, destroy riparian vegetation and cause soil compaction.

As already discussed, the major irrigation area in the Kimberley is based on the Ord River. Programs and initiatives are currently being implemented to reduce run-off from irrigation properties returning via drains to the lower Ord River. This aims to minimise the risk of increased sediment, nutrient and pesticide loads in the waterway. Smaller irrigation developments such at Camballin may also provide a threat of pollutants entering the Fitzroy. Changed hydrology and weeds are major impacts as well.

Environmental effects from mining in the Kimberley are intensely managed. The Department of Environment licence all groundwater abstraction, as well as surface water diversions in proclaimed catchments. Rivers in unproclaimed catchments (all except the Ord and Fitzroy) are not managed in terms of water diversion or extraction permits and are therefore potentially at risk from mining or other water dependent developments. Some mining enterprises require large volumes of water and whether extracted from groundwater or surface water supplies, this can affect waterways in the immediate area of the mine.

As the water demand increases on ground and surface resources by industry, measures taken to manage water use and impact will also increase. This may cause other catchments to be proclaimed under the Rights in Water Irrigation Act 1914.

## Table 11 - 1.2.1 WATERWAYS

**Resource Condition Targets**

**RCT14:** Water Quality levels meet guidelines set for Ord/Keep and Fitzroy Catchments by 2010

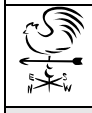
**RCT15**: The quality and extent of riparian ecosystems is maintained and improved by 2014 on reference reaches contexted by remote sensing

**RCT16**: Maintain, and improve where appropriate, the diversity of aquatic species as measured against benchmarks established by 2010

**RCT17:** Maintain storage volumes and reduce siltation levels contributed by the catchment by 20% into Lake Argyle by 2024

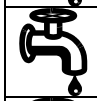
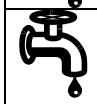
**RCT18:** Natural river flows are maintained or in close to natural state and water allocation does not diminish environmental flows by 2020

| Recommended Actions/ Management Targets | | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | | |
|  | **W1.** Guidelines are developed for river water quality specifically for the Ord Catchment by 2006 | Ord | Total Phosporus, Total Nitrogen, Electrical Conductivity and pH guidelines are developed using information already sought for the Ord River | DoE | RCT14 | |
|  | **W2.** Guidelines are developed for river water quality specifically for the Keep and Fitzroy Catchments by 2008 | Keep and Fitzroy | Develop knowledge and understanding similar to information already sought on the Ord | DoE | RCT14 | |
|  | **W3.** Improve the understanding of sediment loads and declining water volumes into Lake Argyle by 2010 | Ord | Reliability of water supply<br><br>Key indicator of catchment health | DAWA, Water Corporation | | |
|  | **W4**. Monitor and assess pesticide and nutrient impacts on ecosystem function/process to set benchmarks by 2010 | Ord and Fitzroy | Benchmarks established in line with tropical river information | CSIRO, DAWA, OIC, DoE, OLW | L36 | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **W5**. Identify priority rivers and river reaches to develop techniques to assess river health at a regional scale by 2009 | Regional | Techniques developed<br><br>Support and resource Aboriginal organisations and community to undertake monitoring | DoE, KLRC, Communities | | |
|  | **W6.** Monitor recreational and commercial fishing impacts on ecosystem function/process to set benchmarks by 2010 | Regional | Benchmarks developed<br><br>Local knowledge sought | DoF, | | |
|  | **W7.** Investigate the impacts of climate change on waterways, understanding the impacts on current and future activity by 2008 | Regional | Develop strategies to mitigate against impacts | AGO, Shires, DoE | L18, W38, B5 | |
| On-Ground Actions | | | | | | |
|  | **W8**. BMPs for chemical use adopted by industry and implemented by 100% of users by 2007 | Ord | Appropriate chemical use undertaken in the ORIA<br><br>Establish guidelines for best management of fertiliser use | Landholders, OLW, KPIA | L25 | |
|  | **W9** Industry developed guidelines for BMPs for chemical use adopted prior to future development by 2007 | Fitzroy | Appropriate chemical use undertaken in the Fitzroy<br><br>Establish guidelines for best management of fertiliser use | Landholders, KPIA | L25 | |
|  | **W10**. Develop and implement or trial methods, designed to strip nutrients and toxins from run-off by 2009 | Ord | No. of Trials<br><br>Report on success of trials developed | DoE, OIC | L25, W4 | |
|  | **W11**. Priority waterways sustainably managed by 2010 | Regional | Reduce cattle impacts on waterways<br><br>Investigate alternative water sources<br><br>No. of Kms protected and restored<br><br>Greater collaboration and partnerships between government, NRM agencies and Aboriginal organisations | DAWA, DoE, KLRC, KLC, Communities | W30<br>W5 | |
|  | **W12.** Establish and support a network of Indigenous Rangers to manage high value aquatic systems where the need is identified locally by 2006 | Regional | Rangers distributed around the Kimberley<br><br>Management of weeds | AFFA, Shires,, CALM | | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **W13.** Impacts of fire on riparian health, water quality and weeds is benchmarked by 2008 | Regional | Greater understanding of the impacts of fire | OLW | | |
|  | **W14**. Multi lingual signage at a minimum of 10 active fishing and tourist areas across the Kimberley by 2007 | Regional | No. of signs developed and erected<br><br>Signs include information on bag limits, rubbish, catch sizes, species, weeds and history of the area<br><br>Ensure that the intellectual and cultural property rights of Aboriginal people are recognised<br><br>Promotion and survival of endangered languages of the Kimberley | North West Tourism, Fisheries, CALM, KLRC, Tourism WA, CALM, Land managers, DIA, Education, RFAC, Shires | | |
|  | **W15**. Community driven management plans developed for priority rivers and implementation commenced by 2007 | Regional | Management plans for priority areas developed | DoE, DoF | W11 | |
| | **W16.** Collaborative research between government, Universities, NRM bodies and Aboriginal people regarding species of concern in riparian areas by 2008 | Regional | Research undertaken in partnership | DoE, Communities, Land managers | | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **W17.** Legislative protection and management for all Priority 1 and 2 freshwater assets (identified through DEH), through community driven models as part of the National Reserve System by 2010. | Regional | Management plans developed<br><br>Aboriginal people involved in all levels of planning and implementation | DEH, DoE, CALM | | |
|  | **W18**. Develop specific catchment management plan to address different land uses by 2010 | Regional | No. of plans developed<br><br>Protect 'Wild Rivers' catchments<br><br>Increased involvement of River people in research, planning and management of waterways | DoE, CALM, Community, KLC | W11 | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **W19**. BMP guidelines developed for commercial and recreational activities conducted on waterways by 2009 | Regional | No. of guidelines developed and published<br><br>Guidelines developed for appropriate irrigation management | DoF, DoE, OIC | | |
|  | **W20**. Four fish management plans developed for threatened and iconic species by 2008 | Regional | Protection plans developed for threatened and iconic species | DoF | | |
| | **W21**. Guidelines established for future development to ensure that development is undertaken in a sustainable and appropriate manner by 2007 | Regional | Guidelines developed for future development proposals | Shires | | |
|  | **W22.** Water Allocation Plans developed and finalised for all surface and groundwater – as required | Regional | No. of plans developed<br><br>Water Allocation Plans completed for future sources prior to development proposals<br><br>Reduce poorly planned development of water resources<br><br>Incorporate Aboriginal values and priorities for water resources | DoE | W51 | |
|  | **W23**. Protection plans in place for all public water supply areas by 2009 | Regional | Water supply areas protected | DoE | | |
|  | **W24**. Representation in conservation reserve systems improved for river reaches currently poorly represented – priority sites identified by 2006 | Regional | No. of site identified | DoE | B6 | |
| Education and Awareness | | | | | | |
|  | **W25.** Conduct community water understanding/capacity building programs over next 5 years eg. Ribbons on Blue, Indigenous cultural and heritage | Regional | No. of schools and groups monitoring water quality<br><br>Water quality training programs | DoE | | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **W26.** Develop and extend educational programs on riverine fauna, flora and aquatic life, focussing on environmental, social and cultural aspects by 2007 | Regional | Education programs developed<br><br>Culturally appropriate communication of ecosystem processes associated with rivers. | DoF, KLC, CALM | | |
|  | **W27.** Sediment loss educated to the broader community by 2008 | Regional | | DAWA, DoE | | |
|  | **W28.** Continue to implement the Water Use Improvement Program – on-going | Ord | No. of programs in the Plan implemented | DoE, OLW, OIC | | |
|  | **W29.** Continue to implement the Ord Land and Water Management Plan – on-going | Ord | Continue education programs as identified in the Ord Land and Water Plan | OLW, Community | | |
| Cultural Heritage | | | | | | |
|  | **W30**. Aboriginal fishing management integrated on sector, regional or fishery basis into mainstream management plans by 2008 | Regional | Implementation of the Indigenous Fishing Management Strategy by<br><br>Capture local knowledge | DoF | | |
|  | **W31.** Resource Aboriginal people to develop protocols for tour operators in the appropriate use of Aboriginal cultural information in marketing campaigns and tourism products by 2008 | Regional | Increase recognition and protection of River peoples' values for waterways<br><br>Develop cultural awareness raising programs<br><br>Develop a regional Aboriginal authenticity label<br><br>Cultural training workshops undertaken | Tourism WA, North West Tourism, KLRC, Communities, KLC | CM22 | |

## *1.2.2 WETLANDS*

Kimberley wetlands are unique ecosystems with special aesthetic and conservation values. With rainfall in the Kimberley restricted to four to six months of the year, waterholes, river pools, marshes and cave systems are vital to the existence of numerous mammal, bird, fish, reptile, amphibian and invertebrate species. The ecology of many seasonal claypans and other ephemeral wetlands is also currently poorly documented and inadequately understood.

Within the Kimberley there are a number of internationally recognised wetlands and many of national importance. The Kimberley has four wetlands listed under the Ramsar Convention, 21 listed in the Commonwealth Department of Environment and Heritage (formerly Environment Australia) Directory for Important Wetlands, and 9 on the Register of National Estate Wetlands.

Some of the more prominent wetlands, such as the Ord and Roebuck Bay, have had a number of studies undertaken, and ecological, social, cultural and economic values have been considered. Many of the less accessible wetlands in the Kimberley, however remain largely undocumented.

The ecological communities supported by these wetlands are often quite unique combinations of plants and animals. Springs, marshes and floodplains support a diverse establishment of sedges and herbs that help to stabilise the sediment and provide habitat for animals. Reeds and grasses, and algae grow in or around these wetlands. Some invertebrates found in the springs include small crustaceans such as isopods, ostracods and snails which are sometimes endemic to one group of springs. Wetlands provide important habitat diversity and refuge areas to many native birds and animals during the long dry season.

Wetlands are culturally significant areas through provision of food and water resources, and often being spiritual places of importance. Most wetlands in the Kimberley have cultural stories associated with their formation and features.

Residents and visitors to the Kimberley region of north west Australia value wetlands to swim in, take water to wash, cook and clean-up with, and then bed down for the night next to. Wetlands are valued as places to do some birdwatching or exploring, or relax and enjoy the natural environment.

The most comprehensive understanding of the condition of wetlands is by Traditional Owners and land managers, however in most cases this has not been documented. Limited research using western science has been undertaken, with most studies on areas under pressure or proposed for future development

***Figure 32 – Lake Kununurra at sunset***

Pressures or threats to wetlands vary with a range of factors, including the geomorphology of the wetland and land use or tenure. Many of the registered wetlands are located on CALM Estate and therefore are managed for ecological sustainability. Organic mound springs can easily become threatened because they are located on pastoral land, and may be impacted by trampling stock or modification of the spring flow. Other types of wetlands including estuaries and rock-based pools are more resilient to impacts. Wetlands located within major waterways are subject to the natural pressures of high velocity flows and consequent changes to the site characteristics. Limited research using western science or Indigenous knowledge systems has been undertaken.

## Table 12 - 1.2.2 WETLANDS

**Resource Condition Targets**

**RCT19:** Maintain or improve the condition of 21 nationally important wetlands and 7 sub-regionally important wetlands by 2025, with benchmark established by 2006

**RCT20:** Maintain or improve important wetlands by 2020, as identified by the community and tropical rivers/CALM/WWF wetland projects, with benchmarks established by 2006

| Recommended Actions/ Management Targets | | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|---|
| On-Ground Actions | | | | | | |
|  | **W32**. Techniques and methods identified by 2007 for the management of large animal access to wetlands | Regional | Access guidelines to important wetlands developed<br><br>Look at alternative off-site watering points | DAWA, Land managers, CALM | W11 | |
|  | **W33**. Community driven management plans commenced and implemented for four regionally significant wetlands by 2010 | Priority wetlands | No. of plans developed and implemented | DoE, WWF, CALM | | |
|  | **W34.** Two new Ramsar sites established through culturally appropriate and community based processes by 2008 | Regional | Sites taken from National Directory of Important Wetlands | Land managers, CALM, WWF | RCT20 | |
| | **W35.** Wetland conservation and management actions developed on leasehold or private land by 2008 | Regional | Funding opportunities such as Envirofund and National Landcare Program accessed | | | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **W36.** Undertake traditional and cultural surveys and monitoring programs of priority wetlands in the Kimberley region as identified in the NHT Funded project “Establishing priorities for wetland conservation and management, Kimberley Region” to inform management and conservation of rivers by2006. | Regional | Establishment of priority wetlands<br><br>Increased knowledge on wetland extent, values and threats | Rangelands Co-ordinating Group | RCT20 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **W37.** Documentation and nomination of additional wetlands to the national Directory of Important Wetlands and increased representation in conservation reserves by 2010 | Regional | Directory of wetlands developed | DoE, WWF, CALM, DEH | | |
| | **W38.** Assessment of potential impacts of climate change on wetlands in the Kimberley by 2010 | Regional | Greater understanding of the impacts of Climate Change<br><br>Trial Sites established | DAWA, Australian Greenhouse Office, CSIRO, CALM, DoE | | |
| | **W39.** Community driven Ramsar management plans developed at all Ramsar sites in the Kimberley by 2010 | Regional | Review existing Ramsar Management Plan<br><br>Management Advisory Committees established for Ramsar wetlands<br><br>No. of management plans developed | Land managers, CALM, WWF | W33 | |
| Education and Awareness | | | | | | |
| | **W40**. Raise awareness of the importance of wetland ecosystems and cultural importance by 2010 | Regional | Develop a series of educational tools for the Environmental, Economic and Social importance of wetlands - Ribbons of Blue, Brochures, signage<br><br>Increased understanding of ecosystem processes for the protection and management of wetlands | DoE, KLC, Communities, CALM | W41 | |
| Cultural Heritage | | | | | | |
| | **W41** Culturally appropriate communication to promote the importance of wetlands through Back to Country Camps by 2010 | Regional | Signage and interpretation | KLC, DoE, Communities | L43 | |
| | **W42** Promote and implement conservation and heritage mechanisms for wetlands by 2008 | Regional | No. of wetlands identified<br>No. of wetlands listed for conservation and heritage mechanisms | WWF, KLC | | |
| | **W43** Develop Cultural Indicators for wetland health by 2008 | Regional | Document the cultural importance of wetlands<br>Identify what makes wetlands healthy<br>No. of indicators developed for specific wetlands | KLC, WWF | | |

## *1.2.3 GROUNDWATER*

Groundwater ecosystems and groundwater-dependent ecosystems are an integral part of natural and cultural resource management of the Kimberley. Many wetlands and vegetation communities are fully or partly reliant on groundwater for their survival – these springs and soaks are termed "groundwater dependent ecosystems". Mangrove systems are even thought to be dependent on groundwater. Some of these groundwater dependent ecosystems include world renowned sites such as the Ramsar-listed Mandora Salt Marsh, however there are many more that are known but for which traditional or scientific knowledge has not been documented.

Groundwater ecosystems are thought to contain unique biodiversity values containing rare or endemic fauna (stygofauna). Some preliminary studies have been undertaken in the East Kimberley (Ord River Irrigation Area and Argyle minesite) looking at the stygofauna, in an attempt to understand the biodiversity of these ecosystems. Four of the eight bores investigated in the Ord River Irrigation Area were found to have stygofauna present. At the Argyle mine sixty five sites, including three springs, were sampled. Of these, 17 samples yielded stygofauna.

The Canning-Kimberley Groundwater Area covers the entire Kimberley region. It was proclaimed in 1997 under the *Rights in Water and Irrigation Act 1914* to protect public water supplies. Broome and Derby also have proclaimed Groundwater Areas. The majority of the Kimberley hydrogeology is fractured rock, with a small area north of Kununurra and the area around Broome, Cape Leveque and south of Fitzroy Crossing sedimentary basin.

Groundwater ecosystems are culturally significant either in spiritual relationships or through contemporary traditional usage. "*We have to look after this water. If the water go, everything will be finished. Life gone. Spirit gone. People gone. The country will have no meaning.*" (Interview with John Dudu Nangkiriny, Bidyadanga, 8/10/99 quoted from Ngapa Kunangkul, Sarah Yu (see below).

***Figure 33 – Kimberley watering point***

Literature on Kimberley water ecosystems, including groundwater and groundwater dependent ecosystems is scarce. However, groundwater is widely used in the Kimberley for domestic, stock, irrigation, mining and other purposes. Irrigated agriculture developments using groundwater currently operate near Broome, Derby and Kununurra, as well as trial areas on several pastoral stations and at Beagle Bay community. A number of mines in the Kimberley utilise groundwater for mine processes and accommodation supplies. The Department of Environment manages the protection and use of the resource.

Almost all domestic water supplies in the Kimberley come from groundwater. Groundwater is the most economical water supply option for many remote towns and communities. Public Drinking Water Supply areas have been proclaimed over urban groundwater supplies for Kununurra, Halls Creek, Derby and Broome.

The potential of the resource has not been fully scoped. The fractured rock areas are unlikely to be able to support high yields for substantial industry or irrigation use. The sedimentary basin aquifer may have future potential for uses such as expanded irrigation or aquaculture. However, information on the risks to endemic species and groundwater systems due to abstraction has not been undertaken. With such limited scientific

research, there is minimal understanding of what can be reallocated away from the environment for other uses.

The health of the groundwater ecosystems including biodiversity maintenance, groundwater levels and quality are all important for the continuing use of this water resource. Other associated issues with groundwater use include the impacts on biodiversity from broad scale clearing and irrigated agriculture such as species and habitat loss, erosion, salinity and pesticide contamination.

Groundwater de-watering infrastructure exists at some mine sites and in the Ord River Irrigation area in an attempt to lower the static water level.

## Table 13 - 1.2.3 GROUNDWATER

**Resource Condition Targets**

**RCT21:** Groundwater levels at agreed reference bores meet levels set for the Kimberley by 2020 with benchmarks set by 2006

**RCT22:** Groundwater quality at agreed reference bores meet levels set for the Kimberley by 2020 with benchmarks set by 2006

**RCT23:** Maintain or improve groundwater diversity at priority sites by 2015, with benchmark information established by 2006

| Recommended Actions/ Management Targets | | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | | |
|  | **W44**. Continue to monitor water quality of groundwater in and around the ORIA – on-going | Ord | Evaluate trends, risks and levels<br><br>Groundwater quality meet ANZECC guidelines | DoE, OIC, DAWA | | |
|  | **W45.** Implement options for groundwater level management by 2008 | Ord<br>Regional | Guidelines developed<br><br>Management plans in place for groundwater system management areas<br><br>No. of trials established | DoE, DAWA, OIC, OLW | L30 | |
|  | **W46.** Groundwater diversity monitored and understood to develop benchmarks by 2006 | Regional | Diversity monitored at representative sites | DoE, CALM, OIC | RCT23 | |
| On-Ground Actions | | | | | | |
|  | **W47.** Investigate the use of treated effluent on ovals and golf courses | Urban | Guidelines developed for treated effluent reuse<br><br>Investigate the impact on effluent pond diversity | Water Corporation, Community, Shires | | |
|  | **W48.** Cap 50% of free flowing bores by 2010 | Regional | Investigate the feasibility of capping bores | DAWA, Water Corporation, OLW | | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **W49.** Encourage the uptake of the State Governments initiatives to use grey water in townships and communities by 2007 | Regional | Grey water used in towns and communities<br><br>% of houses using grey water | Water Corporation, DoE | | |
|  | **W50.** Manage mine dewatering to reduce changes to water regimes and associated vegetation from uncontrolled discharge by focusing on improvements to water use efficiency on site through best practice tools and water licences by 2010 **.** | Regional | Mine dewatering managed | Mining companies, DoE | | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **W51**. Water Allocation Plans developed and finalised for all surface and groundwater - as required | Regional | Identify local plans and respective time frames<br><br>Environmental requirements for all surface and groundwater a priority when developing plans | DoE | W22 | |
|  | **W52**. Ensure the monitoring of groundwater wells through licensing of bores by 2010 | Regional | Audits conducted on bore licences | OIC | | |
| Education and Awareness | | | | | | |
| | **W53.** Empower local communities to participate in defining values of groundwater systems, and communicating those values by 2007 | Regional | Participation of community in groundwater management<br><br>Identify the cultural, social and biodiversity values of groundwater | DoE, Community | RCT23 | |
|  | **W54.** Develop education package for Waterwise management and use of bore water from wells by 2008 | Urban | Education delivered | DoE | | |

# 1 3. BIODIVERSITY

**Aspirational Target**

The cultural, social, environmental and economic choices we make are integral to maintaining the diversity of plant and animal species by 2020.

The northern and western part of the Kimberley comprises marine plains, mangrove creeks, coastal dunes with vine thickets and mound springs with monsoon forest. Further inland red and black soil plains with savanna woodlands dominate the landscape intersected by sandstone and limestone ranges with a network of permanent springs and riparian zones supporting an outstanding diversity of native plants, animals and ecosystems. Large areas of the region, especially the north-western margins, are still intact and essentially uninhabited. The proportion of threatened and endemic species is high. 126 endangered fauna species, four declared rare and 132 priority listed flora species, 11 threatened ecological communities and a further 46 communities at risk have been listed within the Kimberley. In addition there are four wetlands of international significance, listed on the Ramsar convention, 21 nationally important wetlands and 7 wetlands of subregional significance (see Appendices 5.3, 5.4,5.5).

***Figure 34 – Ornate Frog***

The Region includes the North Kimberley, Central Kimberley and Dampierland and parts of the Victoria Bonaparte and Ord Victoria Plain, Interim Biogeographic Regions of Australia (IBRA). IBRA regions represent a landscape based approach to classify the land surface from a range of continental data on environmental attributes.

The **North Kimberley** bioregion is identified as an Australian Biodiversity Hotspot (DEH), based on species richness, a high presence of threatened and endemic species and a high level of threats to species and ecological communities. A sunken coastline with extensive coastal archipelagos presents an opportunity to protect intact ecosystems on islands. Mound springs, swamp rainforests and rainforests on laterite and volcanics, including the largest single rainforest patch in the Kimberley, support a unique biodiversity. Many animals of special interest have been recorded such as the Golden Bandicoot (*Isoodon auratus*), the Scaly-tailed Possum (*Wyulda squamicaudata*), the Monjon (*Petrogale burbidgei*), the Nabarlek (*Perodorcas concinna*) and the Golden-backed Tree-rat (*Mesembriomys macrurus)*.

The geology of the **Central Kimberley** bioregion includes shales, granites, sandstones, extensive areas of dolerite outcropping and volcanics. The exposed folding of the rock strata within the King Leopold Ranges is a unique geological feature. Extensive woodland savannas with tussock and hummock grasslands dominate this region.

The **Dampierland** bioregion comprises patches of rainforests, coastal vine thickets, mangrove communities, large floodplains at Camballin, a cave system in the Lawford Ranges, extensive mudflats at Roebuck Bay and Eighty Mile Beach supporting an enormous number of migratory birds and the stranded remnants of a Devonian barrier reef system including Geikie Gorge, Windjana Gorge and Tunnel Creek. Tunnel Creek is an important location for bat colonies and the only known example in Western Australia of a river passing through a range via a cave. Extensive Pindan woodlands dominate large areas of this bioregion.

The Ramsar listed wetlands of the Ord Floodplain and Lake Kununurra are situated within the **Victoria Bonaparte** bioregion. An extensive mangrove community of the False Mouths of the Ord, mound springs

with rainforest and the Devonian reef system of the Ningbing Range with an extensive cave system and rainforest patches are some of the rare features of this region.

Purnululu National Park, world heritage listed in July 2003 and famous for the unique structure of the Bungle Bungle range, is part of the **Ord Victoria Plains** bioregion. Permanent springs supporting remnant rainforest vegetation in the Osmond ranges, the enormous, man-made freshwater Lake Argyle and unique geological formations within the Halls Creek Fault are also within this region.

**Gaps**

Significant data gaps exist within natural resource mapping and flora and fauna surveys. This means that many species and ecological communities have not yet been described and the conservation status of others is unknown. Soil and environmental geology maps do not yet exist at a finer scale than 1:250 000 scale. A much finer scale is needed for vegetation and regional ecosystem mapping. No systematic quadrat based flora and fauna sampling data across the region exists as a basis for modelling species distribution and status.

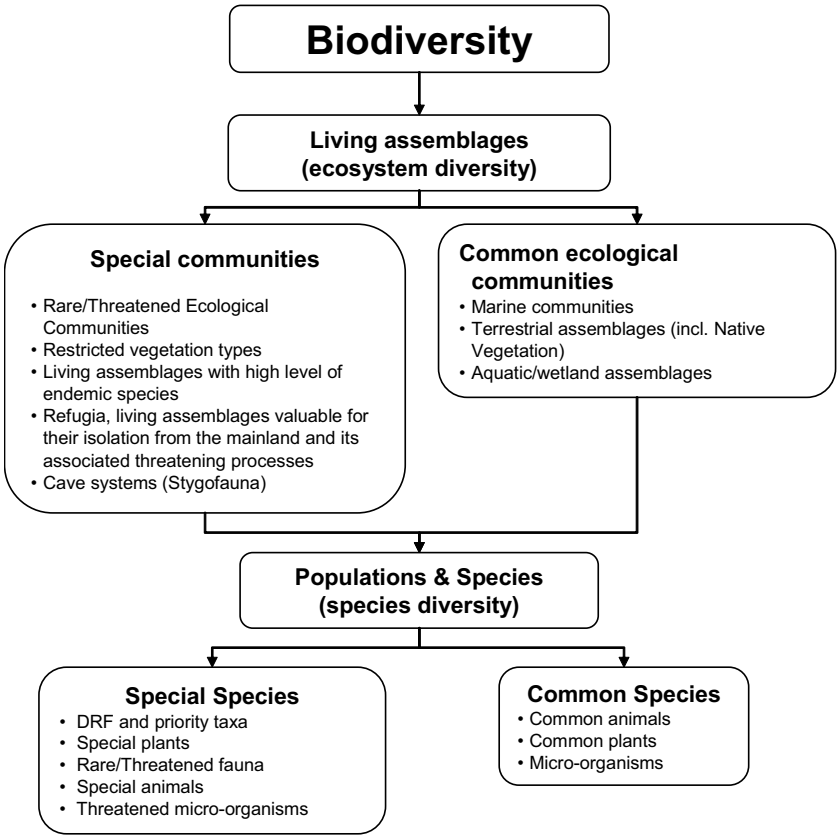



***Figure 35 – Biodiversity Hierarchy***

**Threats**

The existing reserve system is biased towards unproductive habitats, so that the majority of ecosystems are unreserved within most bioregions. There is reasonable evidence about a continuing loss of species and changes to assemblages at a landscape level due to threatening processes like changed fire regimes, feral animals, exotic weeds and grazing pressure.

In recent history the frequency, extent and intensity of fires has increased on a broad landscape level. This change in fire regime has a significant impact on many vegetation communities, changing their species composition and reducing habitat size and quality for many animals. The range of numerous plant and animal species is now reduced and often restricted to fire protected areas.

Introduced predators like feral cats pose a serious threat to native wildlife. Many smaller mammals and lizards have lost large areas of their shelter habitat, like large Spinifex tussocks and vegetation thickets, due to changed fire regimes and grazing pressure and are therefore an easy target for predators. Habitat loss has also critically reduced the range of many medium and larger sized mammals. With the inevitable arrival of the cane toad, native fauna will be faced with another major threat to their survival.

Exotic weeds are posing a major threat to many vegetation communities. Seeds are often spread by birds, grazing animals and waterways, enabling introduced weed plants to spread quickly and colonise even very remote and hardly accessible areas.

There is general agreement that climate change will impact on the biodiversity of the region, but to what extent it is unknown. Will species adapt to the changes, or does a slight change in climate impact dramatically on specific species?

**Biodiversity 'Hotspots'**
Many land holders understand the importance of conserving biodiversity and representative land systems. The biodiversity hotspot program will provide an opportunity to increase areas managed specifically for biodiversity conservation.

Action is being taken through regional funding from the Australian Government's Natural Heritage Trust. Examples of conservation action being undertaken in hotspots are:

- habitat protection for endangered species
- improvement of knowledge of fire management practices
- research into the impacts of and control measures for feral animals and weeds
- supporting private landholders in protecting biodiversity

**'Land for Wildlife'**
Land for Wildlife is a voluntary property registration scheme. By registering in the scheme, landholders show their interest in managing areas for wildlife on their property, alongside their other land management objectives.

The Land for Wildlife scheme is free to join and is not legally binding. On sale of the property, the registration ceases - although the new owners can join the scheme if they wish.

Land for Wildlife supports people who want information about wildlife management on their property. It also allows landholders to share their experiences with other land managers. If you register, you gain:

- access to education programs and activities
- information about wildlife management
- information about the role of wildlife and native vegetation in controlling pest species, provide shade and shelter, manage salinity and control wind and water erosion
- links and contacts with like-minded people
- notes and news on particular management issues and ecology
- 'Land for Wildlife' signs

***Figure 36 –Flowering Kapok Tree***

**Existing NRM actions**

- Threatened species recovery plans including the Gouldian Finch Recovery Plan, the Recovery Plan for the Greater Bilby and Action Plans for Australian Bats, Birds, Marsupials and Monotremes and Reptiles
- Pastoral lease inspection
- The Western Australian Rangelands Monitoring System (WARMS)
- Concerted and coordinated effort by the Department of Agriculture in the control of Donkeys
- Land Conservation District Committees (LCDC) providing a venue for discussion on conservation matters and integration of land management activities

**NRM aims**

- Reverse degradation of natural ecosystems and the ongoing loss of habitat
- Identify, protect and better manage threatened species and ecological communities
- Identify and control the impact of feral animals and exotic weeds on ecological communities
- Develop and implement biodiversity driven approaches to fire management strategies, avoiding frequent, broad scale, hot, late dry-season burning at a landscape level
- Improved communication between all stakeholders
- Involvement and capacity building within all stakeholder groups

## *1.3.1 LIVING ASSEMBLAGES*

All freshwater mound springs and permanent soak systems clearly exhibit an array of vegetation assemblages and are gradually being studied to determine the level of fauna and flora complexity.
Eighty Mile Beach, Roebuck Bay, Lakes Argyle and Kununurra and the Ord River Floodplain are wetlands of international significance, listed on the Ramsar convention. The extensive coastal mudflats in Roebuck Bay, supporting an enormous number of migratory birds, have also been listed as a Threatened Ecological community.

Threatened Ecological communities include also vine thickets on coastal sand dunes of Dampier Peninsular, rainforest swamps of Theda Soak, Walcott Island and Roe River and organic mound springs of Dragon Tree Soak, Bunda Bunda, Big Springs, Black Spring, North Kimberley mounds and Mandora.

**Table 14 - 1.3.1 LIVING ASSEMBLAGES**

**Resource Condition Targets**

**RCT24:** Reduce the rate of loss of habitat for native species measured by existing surveys by 2010, with benchmarks to be developed by 2006.

**RCT25:** Threatened Ecological Communities are showing positive trends in condition by 2010

| Recommended Actions/ Management Targets | | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | | |
|  | **B1**. Ecosystem health indicators developed and reference sites identified by 2006 | Regional | Indicators developed | CALM | RCT24 | |
|  | **B2**. Biodiversity priority areas identified through community based processes and management plans developed by 2007 | Regional | No. of areas identified | CALM, Community | L55 | |
|  | **B3.** Regional monitoring systems for biodiversity priority areas, identified in Biodiversity Audit 2002 in place by 2010 | Regional | No. of monitoring sites in place | CALM, DEH | | |
|  | **B4**. Weed and pest occurrences identified and mapped in an accessible data base by 2008 | Regional | Database developed is accessible to all organisations and land managers | CALM, DAWA, Fire Management Project | L4 | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **B5**. Assess impacts of climate change on biodiversity by 2012 | Regional | Greater understanding of the impact | CALM, Greenhouse Office | W7, L18, W38 | |
| On-Ground Actions | | | | | | |
|  | **B6**. Comprehensive and representative conservation reserve systems (including formal reserves, off-reserves and Indigenous Protected Areas) expanded across the region by 2015 | Regional | No. of reserves established<br><br>Representative areas cleared of feral species<br><br>Representative areas of the Kimberley are managed for preservation<br><br>Identify and support two new water based Indigenous Protected Areas (IPAs). | CALM, DoF, Land managers, Community, Aboriginal communities, DoF | CM24, B6, W24 | |
|  | **B7**. Criteria developed to identify high risk erosion areas and support in place to assist in the maintenance and improvement of riparian vegetation communities by 2007 | Regional | Improvement of perennial, deep rooted vegetation on river and creek banks and around springs to reduce erosion and sedimentation of waters | DAWA, CALM | | |
|  | **B8**. 70% of land managers are implementing approved and endorsed fire management plans by 2009 | Regional | No. of implemented fire management plan | DAWA, Fire Management Project, Land Managers, Shires, Department of Defence, FESA, CALM | L10 | |
| | **B9.** Stewardship payments for Traditional Owners, land holders and land managers in the North Kimberley Biodiversity Hotspot are agreed upon in a consultative way and implemented by 2005 | North Kimberley | Preparation of management plans that identify removal of stock, uncontrolled grazing, fire management and weed control<br><br>Stewardship programs established | DEH, CALM, Biodiversity Advisory Group, Land managers | | |
| Institutional Framework, Planning and Policy | | | | | | |
| | **B10**. Conservation Land management is done in partnership with Traditional Owners and community groups by 2008 | Conservation Land | Management of Conservation Land done in partnership with Indigenous communities | CALM, KLC, KALACC. DoF | B2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Education and Awareness | | | | | | |
|  | **B11.** Continue to educate the community on weed identification and removal programs – on-going | Regional | Education programs developed | DAWA, Shires, CALM | L20 | |
|  | **B12**. Education programs on the importance of wetlands, springs and mound springs developed and accessible to land managers by 2008 | Regional | Increase number of springs protected and fenced<br><br>Ecological communities protected | CALM, Land managers | | |
|  | **B13**. Education programs on the use of natives species in gardens and parks by 2008 | Regional | Increase in number of native trees | Shires, CALM | B11 | |
|  | **B14.** Source and distribute information on best fire management practices by 2006 | Regional | No of publications distributed / Educational programs in place / No of land managers accessing regularly fire information on websites | CALM, FESA, Regional Fire Project, DIA for ALT estate | B25, L10 | |
| Cultural Heritage | | | | | | |
|  | **B15.** Document cultural and traditional knowledge to be transferred across community to facilitate NRM outcomes by 2005 | Regional | Knowledge is transferred | KLC, KALACC, KLRC | | |

## *1.3.2 SPECIES*

Many endangered and threatened species like the Bilby, the Gouldian finch and medium sized mammals are affected by changed fire regimes and grazing pressure operating at a broad landscape scale. Wetlands and sandstone communities may provide some protection of fire and often display high species and ecosystem diversity. Rainforests with their distinct vegetation associations are resource centres for a large variety of fauna, either directly linked to rainforests or dependant on them in some aspects.

Incentive programs, through lease agreements or voluntary management agreements, may pose an opportunity to expand land managed with a conservation focus outside the existing formal reserve system. This could be in form of property management plans that include areas managed for conservation or land stewardship over and above normal land management responsibilities and promoting active management of land with high biodiversity values.

***Figure 37 – Magnificent Tree Frog***

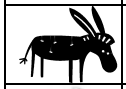
### Table 15 - 1.3.2 SPECIES

**Resource Condition Targets**

**RCT26:** Maintain or improve diversity and condition of native species and ecological communities as measured by existing surveys by 2015, with a need for more comprehensive information to be developed by 2006

**RCT27**: Distribution and abundance of threatened species (World Conservation Union - IUCN) are maintained or improved by 2025
.

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **B16**. An accessible database developed identifying native species populations and distribution by 2006 | Regional | Species identified and documented on a database | CALM, Fire Management Project | RCT26 | |
| **B17:** Current knowledge and understanding of common native species is improved and more accessible by 2015 | Regional | Improved involvement and awareness by local people | CALM, Fire Management Project, community | RCT26 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **B18.** Identify key threatening processes on native species by 2008 | Regional | Plans developed to mitigate against threats | CALM | | |
|  | **B19.** Increase research (scientific and ethno-ecological) into population status, pressures and protection mechanisms for threatened species listed under state legislation and National EPBC Act by 2006. | Regional | Greater understanding developed | CALM, DEH | | |
| On-Ground Actions | | | | | | |
|  | **B20**. Innovative control methods for halting entry into the Kimberley, and reducing the extent of cane toads by 2006 | Regional | Trial innovative control methods for halting cane toad entry into the Kimberley<br><br>expanded and implemented | CALM, DoE. TWA, Shires, Universities | | |
|  | **B21**. Removal of invasive weeds from residential communities and reward use of native plants – on-going | Regional | Examples include Neem and Leuceana<br><br>Area of weed removed | Shires, CALM, DAWA | B22<br>L64 | |
|  | **B22.** Weed management plans are developed and implemented by 50% of land managers by 2010 | Regional | % of managers with weed plans | DAWA | L13 | |
|  | **B23.** Weed management implemented by remaining 50% of land managers by 2015 | Regional | % of managers with weed plans | DAWA | L13 | |
|  | **B24.** Develop and implement incentives that promote active management for biodiversity conservation outcomes on priority off-reserve land by 2005 | Regional | Preparation of management plans that identify removal of stock, uncontrolled grazing, fire management and weed control<br><br>Stewardship programs established | DEH, CALM, Biodiversity Advisory Group, Land managers | | |
|  | **B25.** Increase knowledge of best fire management practices for endangered and threatened species by 2008 | Regional | Development of recommendations for best fire management practices with a focus on biodiversity conservation | CALM, Fire Management Project, community, FESA | B14, L10 | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **B26**. Management plans developed and implemented for four threatened species in the region by 2007 | Regional | No. of management plans developed<br><br>Endangered and vulnerable species breeding programs underway if | CALM | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | feasible | | | |
| Education and Awareness | | | | | | |
|  | **B27**. Public awareness campaign on weed and pest identification, potential impacts and appropriate control methods implemented by 2007 | Regional | No. of brochures developed<br>Media campaign | DAWA | L1 | |
|  | **B28.** Education programs on the benefits of local native species in gardens and parks by 2008 | Regional | Education programs implemented | Shires | B21 | |
|  | **B29**. Education programs on Cane Toad identification implemented throughout the Kimberley - 2005 | East Kimberley | Brochure, signage, forums run | DAWA, CALM, DoE | | |
|  | **B30**. Expansion of freshwater sawfish community education and scientific research undertaken in the King Sound and Cambridge Gulf systems by 2006 | Cambridge Gulf, King Sound | Sawfish recognised as a threatened species in WA | KLC, DoE, KLRC, Universities | | |
|  | **B31.** Develop and distribute information on best fire management practices with a focus on biodiversity conservation by 2006 | Regional | Educational programs in place<br><br>No of publications distributed | CALM, FESA, Regional Fire Project, DIA for ALT estate | L10 | |
|  | **B32.** Undertake long term collaborative programs, linking traditional and science knowledge, to assist in the recording of and transfer of traditional knowledge – on-going | Regional | Traditional land management knowledge is maintained | KLC, KLRC, ILC, KAPA | | |

## *1.3.3 AIR*

Air quality continues to be a key environmental concern for the community. Research has clearly shown that air pollution, depending on its nature and concentration, can adversely affect human health and the environment.

Pollutants are emitted to the air from various sources. These include the combustion of wood and fossil fuels (e.g. coal, petrol and diesel), emissions of hydrocarbons from oil and gas refining, odours from industrial processes or intensive agriculture, transport networks, planes for tourism and dust associated with mining or land clearing. When these emissions are discharged during periods of poor dispersion, or conditions conducive to smog formation, episodes of poor air quality may result

***Figure 38 – The frequency of fires impact on air quality***

Regional areas of WA can also experience poor air quality at times. Pollution can be caused by natural sources like bushfires and windblown dust, or by man-made sources such as industrial facilities and hazard reduction burns.

## Table 16 - 1.3.3 AIR

| **Resource Condition Target**<br><br>**RCT28:** Air quality is within International Standards for human use across the Kimberley by 2020 |
|---|

| **Recommended Actions/ Management Targets** | **Focus** | **Performance Indicators/Actions** | **Potential Partner Groups** | **Links to other targets** | **Priority** |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **A1**. Document the impacts of fire on air quality by 2007 | Regional | Report impacts | Shire, Fire Management Project, DoE | L10 | |
| **A2.** Document the impacts of fire on tourism by 2007 | Regional | Report impacts | Tourism Industry, Shires, Tourism WA, CALM | | |
| **A3.** Alternative sources of transport fuels are investigated by 2008 | Regional | Report on alternative fuel developed | Industry, DoTARS | | |
| On-Ground Actions | | | | | |
| **A4**. Best Management Practice guidelines developed for sugar cane burning in the ORIA by 2005 | Ord | Guidelines developed | Industry, KPIA | | |
| **A5**. Best practice fire regimes are implemented by 70% of land managers throughout the Kimberley by 2009 | Regional | % of land managers who have best practice fire regimes | Fire Management Project, Land managers | L7 | |
| Institutional Framework, Planning and Policy | | | | | |
| **A6**. Develop options and appropriate guidelines for the use of green sugar cane harvesting by 2006 | Ord | Options and guidelines developed | Industry, KPIA | | |
| **A7.** Assess impacts of climate change on air quality by 2012 | Regional | Campaigns developed | AGO, Industry | | |

# 2. DESERT COUNTRY

The Region includes parts of the Tanami and Great Sandy Desert Interim Biogeographic Regions of Australia (IBRA). Paruku Indigenous Protected Area (IPA) was established in September 2001 and is situated within the **Tanami** bioregion, including the Lake Gregory system, a potential Ramsar wetland site. Within the **Great Sandy Desert** bioregion lays the very complex and diverse wetland system associated with the Mandora Marsh area. It features the most inland distribution of mangroves and a salt creek. Dragon Tree Soak and several mound springs and permanent pools are of particular importance within the desert environment.

The Paruku region is an Indigenous Protected Area (IPA). Through this program, Indigenous landowners are being supported to manage their lands for the protection of natural and cultural features in accordance with internationally recognised standards and guidelines for the benefit of all Australians.

The Paruku IPA was established in September 2001 and covers 434 600 hectares, including a potential Ramsar Site, south of Halls Creek. It was the first IPA declared in WA and the 15th in Australia. The Paruku IPA provides an opportunity for the Aboriginal Traditional Owners to protect their places of cultural significance, to develop an ecologically sustainable pastoral enterprise, and to conserve the Paruku wetlands.

Apart from specific survey work there has been no systematic review of biodiversity resulting in a lack of adequate data on the condition of this region. Widespread vegetation types exist and are affected by widespread threats such as changed fire regimes. Little is known on the status of critical weight range mammals. There is reasonable evidence about continuing loss of species and changes to assemblages at a landscape level.

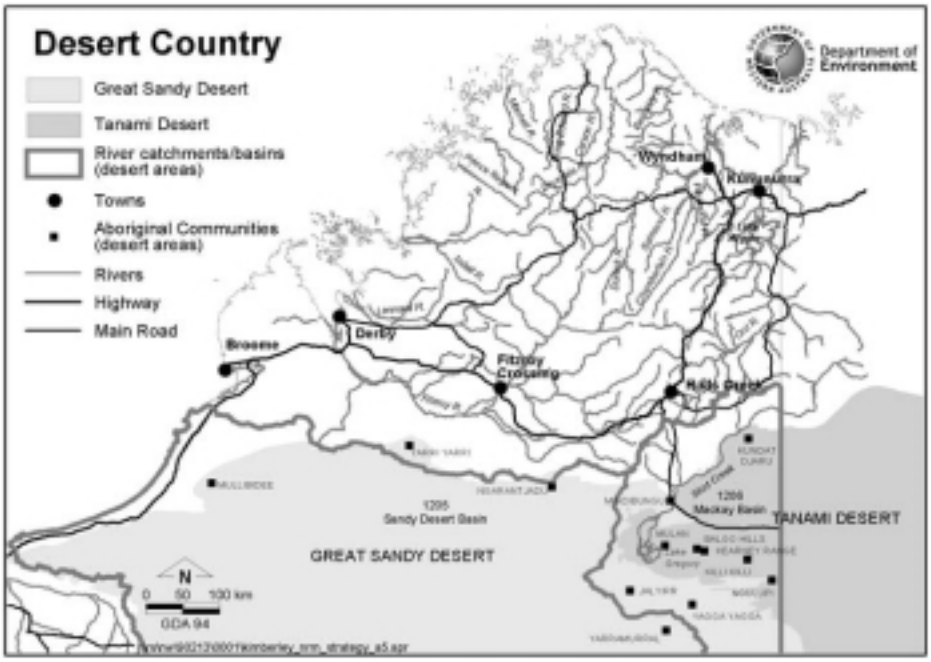


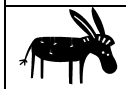

***Figure 39 – Desert Country region***

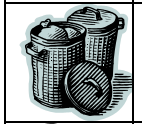
Action is required to identify in more detail existing biodiversity and threatening processes, like changed fire regimes, exotic weeds, feral animals and uncontrolled grazing, and to develop appropriate management practices. A priority will be the need to identify and implement appropriate fire regimes. The next most important may well be predation of fauna by cats. This calls for practical management research, an improved implementation of existing legislation and better coordinated efforts between Government agencies, Traditional owners and the wider community.

## *2.1 LAND*

### Table 17 - 2.1 LAND

| **Aspirational Target**<br><br>**RCT29:** Establish baseline information for condition of country by 2006 |
|---|

| **Recommended Actions/ Management Targets** | | **Focus** | **Performance Indicators/Actions** | **Potential Partner Groups** | **Links to other targets** | **Priority** |
|---|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | | |
|  | **L71.** Local and historical knowledge mapped/documented so as to include traditional land management across Desert Country by 2006 | Desert Country | Identify the most appropriate way to monitor rangeland condition<br><br>Establish a series of monitoring points across the region | DAWA<br>KLC | RCT29 | |
| On-Ground Actions | | | | | | |
| | **L72**. Develop and implement a strategic access management plan that limits the number of roads required to access country by 2008 | Desert Country | Extent of vehicle activity impacting on sand dune integrity<br><br>No. of tracks closed | DAWA, KLC, ILC | | |
|  | **L73**. Develop an Indigenous Ranger program for desert country in priority areas by 2007 | Desert | Enhance surveys of desert country<br><br>No. of Indigenous Rangers | KLC, CALM | | |
|  | **L74**. Develop a strategy for weed and feral animal control in the Desert Country by 2010 | Desert | Areas fencing for stock and feral animal control | DAWA, Communities | L1 | |
|  | **L75** Establish sustainable harvesting protocols for subsistence and commercial use by 2010 | Desert | Protocols developed | KLC | | |
| Institutional Framework, Planning and Policy | | | | | | |
| | **L76**. MoU between Aboriginal people and station people developed to define access | Desert | No. Of Memorandum of Understanding developed and signed | KLC, KALACC | L72 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | to places and working together to look after country by 2008 | | | | | |
|  | **L77** Implement a waste management plan by 2007 | Regional | Plan developed and implemented | Shires, Communities | | |
|  | **L78.** Undertake long term collaborative programs, linking traditional and science knowledge, to assist in the recording of and transfer of traditional knowledge – on-going | Desert | Traditional land management knowledge is maintained | KLC, KLRC, ILC, KAPA | | |
| Education and Awareness | | Desert | | | | |
|  | **L79**. Best Practice fire regimes developed by 2006 and adopted by 70% of communities and land managers by 2012 | Desert | % using best management practice fire regimes | DAWA,FESA, CALM, Fire Management Project | L7 | |

## *2.2 WATER*

### Table 18 - 2.2 WATER

**Resource Condition Target**

**RCT30:** Understand flow quantities, and level and pattern of flow needed for ecosystem health in ephemeral creeks, springs, seasonal lakes and rock holes by 2020

**RCT31**: Maintain waterbird species diversity and numbers at desert wetlands by 2010, as recorded by current surveys

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
|  **W55.** Best Management Practice Guidelines developed for the management and provision of water quality/quantity specific for Desert Country by 2008 | Desert | Investigate and document fauna changes (ecological impacts) associated with increased water points<br><br>Identify impacts on desert water systems, current and projected usage including irrigation<br><br>Traditional Owners and land mangers working collaboratively in the development of management plans | DoE, Communities | RCT30 | |
| On-Ground Actions | | | | | |
|  **W56.** Best Management Practice Guidelines implemented for the management and provision of water quality/quantity specific for Desert Country by 2008 | Desert | Investigate and document fauna changes (ecological impacts) associated with increased water points<br><br>Look at alternative off-site watering points<br><br>Control access to waterholes and dams | DoE, Communities | | |
|  **W57.** Increase Aboriginal peoples participation in managing, rehabilitating and looking after waterholes – on-going | Desert | Aboriginal people managing waterholes | DoE, Communities | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Institutional Framework, Planning and Policy | | | | | | |
|  | **W58.** Community water quality monitoring programs established within schools – ribbons of blue | Regional | No. of schools and groups monitoring water quality | DoE, KLC | | |
| Education and Awareness | | | | | | |
|  | **W59.** Map recreational localities and identify high use areas through culturally appropriate community input, to develop management plans for tourist areas by 2010 | Desert | Areas identified | Tourism WA, North West Tourism, Communities | | |
| | **W60.** Undertake long term science and cultural collaborative programs to assist in the recording of and transfer of traditional knowledge relating to water hole management – on-going | Desert | Maintain and increase the transfer of traditional land management knowledge | Communities, KLRC, KLC | L78 | |

## *2.3 DESERT BIODIVERSITY*

### Table 19 - 2.3 DESERT BIODIVERSITY

**Resource Condition Target**

**RCT32:** Maintain or enhance diversity and condition of native species and Threatened Ecological Communities by 20% by 2020, with benchmarks developed by 2006

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **B33.** Establish current desert condition through appropriate survey techniques by 2008 | Desert | Target developed | DAWA, CALM | RCT32 | |
| On-Ground Actions | | | | | |
| **B34**. Research and experimentation to identify sustainable use for a range of bush products completed by 2008 | Regional | Marketing of bush foods established if feasible | KLC | | |
| **B35**. Undertake flora and fauna surveys to improve knowledge of biodiversity values across poorly documented areas of Desert Country by 2007 | Desert | Monitoring program established<br><br>Collation of traditional knowledge systems and existing information | CALM, Communities, KLRC, DIA, KLC, KALACC, Landholders, Universities | B1 | |
| **B36.** Develop protection policies and strategies for Intellectual Property by 2006 | Regional | Policies developed | KLC, KALACC | | |
| **B37**. Reintroduction of missing animals – management programs developed in conjunction with cat and fox control by 2020 | Desert | No. of animals introduced | Communities, CALM | | |
| **B38.** Develop and implement appropriate fire management practices for Spinifex country by 2010 | Desert | Guidelines developed | Kimberley Fire Project, DAWA, FESA, CALM | L7 | |
| Institutional Framework, Planning and Policy | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **B39.** Investigate tourism options for Desert Country by 2006 | Desert | Report on options available | Tourism WA, Industry | | |
|  | **B40.** Survey and identify priority areas for future conservation by 2010 | Regional | No. of areas identified | CALM, | | |
| Education and Awareness | | | | | | |
| | **B41**. Connection to Country understanding developed by 2007 | Regional | No. of brochures developed | KLC | L43 | |
| | **B42**. Tourism training programs developed and implemented by 2008 | Regional | No. of training programs undertaken | TAFE, Tourism Industry, Tourism WA | | |
| | **B43.** Establish link with other tour businesses, Mentoring programs – learn and be educated on tour management | Regional | Mentoring – adopt 5 Indigenous tourism businesses | DPI, Dept. Industry, Tourism & Resources, Tourism WA | L47 | |
| Cultural Heritage | | | | | | |
| | **B44**. Develop management action priorities for heritage sites by 2010 | Regional | Programs established to get young people back onto Country and learn about their heritage | KLC | | |

# 3. SALTWATER COUNTRY

**Aspirational Target**

Integrated and sustainable management of the marine environment to ensure the maintenance of the natural integrity and species diversity by 2050

The Kimberley coast is approximately 2,500 km in length and it is one of the most contorted of anywhere on the Australian coastline and its history is unique in every respect - geologically, biologically and culturally.

The coastal and marine resources of the Kimberley region are important from both an environmental and social/economic perspective. It is unique from a Western Australian perspective due its large tidal range, with a movement of up to 12m.

The inshore coastal areas contains habitats for important marine species such as turtle, dugong, ands sharks. The area has some of the largest populations of these species left in the world. The coastline also offers many protected areas that are suitable calving grounds for humpback whales.

***Figure 40 –The contorted Kimberley Coast***

Access to the coastal area of the North Kimberley is restricted due to the rough terrain, which reduces the number of people who live or travel in the region although the number of visitors is on the increase. The coastline of the West Kimberley is more accessible and prone to public pressure.

The coast has important connections to about different 18 language groups of Aboriginal people that traditionally lived along the coast. Many of these groups still live in or near their traditional lands and rely on the coastal and marine resources for their sustenance and spiritual connection. This has not been the case for many North Kimberley people due to logistics of living in the remote region and circumstances of history. Despite this disconnection the people of this region still have strong feelings to their country and have desires to reconnect with their homelands.

**Saltwater Country Coastal Project**

This project is intended to conserve traditional knowledge pertaining to the use and future management of the Kimberley coastline from the Buccaneer Archipelago (north of Derby) to Wyndham.

The project targets coastline culturally significant to the traditional owners of the Kimberley coast and will compliment and effectively integrate into the larger NRM planning process currently underway in the Kimberley. This will be achieved by providing a better definition of indigenous coastal country and it's assets and documenting their associated values. The impact that current and future uses have or may have on these assets and values will also be defined. A series of suggested management actions to reduce the impacts of the threats on the assets will be detailed.

The project and its associated final document will signifcantly assist the traditional owners of the Kimberley coast in expressing their natural and cultural resource management planning aspirations and concerns to the wider community and NRM processes in the Kimberley region.

The regions coastal and marine resources have been classified into discrete areas by the Interim Coastal and Marine Regionalisation for Australia (IMCRA). This uses an ecosystem-based classification for marine and coastal environments, similar to the processes used for lans areas (IBRAS); These areas are:
Eighty Mile, Canning, King Sound, Kimberley, Bonaparte Gulf, Cambridge and Off-shore.

**Eighty Mile Beach coast**

Almost all the Eighty-mile Beach consists of a white siliceous sand beach about 100 metres wide with a 0.5 metres drop to tidal mudflats on the western side. Sand dunes occur behind the beach. However, there are a few small bays where mud collects and mangroves have become established.

In terms of bird numbers, Eighty-mile Beach is the most important area for waders in north-western Australia It is especially important as a landfall for southwards-migrating birds. Around 500,000 birds are counted on the beach during annual surveys. These surveys have shown there can be large fluctuations from year to year due to seasonal variations. Based on counts taken during 1981-83, 98 and 01 the most abundant species are:

| **Species** | **1982*** | **1998**** | **2001**** |
|---|---|---|---|
| Great Knot | 161068 | 158082 | 169044 |
| Red Knot | 80700 | 24891 | 39679 |
| Curlew Sandpiper | 60510 | 2859 | 7984 |
| Red-necked Stint | 60035 | 16766 | 24005 |
| Greater Sand Plover | 41170 | 63482 | 64584 |
| Bar-tailed Godwit | 34267 | 110290 | 97403 |
| Oriental Plover | 18410 | 57619 | 41278 |
| Red-capped Plover | 15182 | 2512 | 3077 |
| Grey Tailed Tattler | 8466 | 10436 | 14647 |
| Greenshank | 5296 | 1738 | 2432 |
| Terek Sandpiper | 3000 | 7989 | 9820 |

*Source: Watkins 1993
**Source: Minton et. al. 2003

80 Mile Beach is mostly bounded by pastoral leases, which reduces public access to around 6 areas.

A feature of the area is the Mandora Salt Marsh, which consists of a number of spring fed fresh-water swamps. It is the most western portion of a palaeo-drainage system extending from the East Kimberley, through Lake Gregory to Eighty Mile Beach. Thus the springs in the Salt marsh date from the Holocene. The most spectacular of these is Mandora Soak, one of the Eil Eil Springs, which is a classical raised peat bog thought to be 7000 years old.

These springs drain into Salt Creek which is lined with mangroves that cover an area about 20-50 m wide and stretch over 5 km. It is not directly connected to the ocean but is possibly indirectly connected by an aquifer. Salt Creek contains the most inland mangroves that are isolated from the coast (by up to 40km) in Western Australia. The springs support unusual plant assemblages, however their principal conservation value is the seasonal presence of many wader birds

**Canning**

This region runs from South of Bidyadanga to One Arm Point and it features rocky headlands, wide bays and v shaped creek systems. One of the key areas of coast is Roebuck Bay located adjacent to Broome, it holds a great diversity of cultural and natural heritage values for all peoples. Covering an area of approximately 66,000ha, a large area is comprised of intertidal mudflats with a rich diversity of marine life. The mudflats, together with big tides, mangroves, red cliffs and aqua blue water, makes Roebuck Bay a natural and visual wonder.

The invertebrate-rich tidal mudflats make the Bay an outstanding and internationally renowned shorebird location. Roebuck Bay is the first place many migratory birds land during their annual migration from breeding grounds as far away as Arctic Siberia. The sheer numbers of birds qualified the Bay for listing in 1990 under the international Ramsar treaty for the protection and wise use of wetlands.

Roebuck Bay has also been nominated to join the East Asian-Australasian Shorebird Site Network, as it is recognised as one of the three most important sites in Australia for shorebirds, both in terms of the number of shorebirds occurring there, and in terms of the number of shorebird species it supports in internationally significant numbers (Watkins 1993a). The Action Plan for the Conservation of Migratory Shorebirds in the East Asian-Australasian Flyway: 2001-2005 states under Action 7 that as a Network Site it is a priority to provide "…management planning information to all Network sites to promote the development of a management plan".

The species-rich faunal community of the intertidal mudflats of Roebuck Bay is recognised by CALM as a Threatened Ecological Community and listed as vulnerable. This listing will facilitate the preparation of a Recovery Plan or Interim Recovery Plan to ensure the ecosystem is maintained and managed appropriately. At present, no recovery plan exists.

There is increasing concern about appropriate management of the Bay, particularly in relation to shorebirds given the expansion of Broome to accommodate tourism as a major industry in the area. The shorebirds of Roebuck Bay are becoming increasingly vulnerable to the effects of expanding development in Broome and high visitor numbers to the Bay. The Roebuck Bay Shorebird Conservation Project proposes to raise community and visitor awareness of the importance of the Bay to shorebirds and to ensure appropriate management of the Bay to maintain the values for which it is admired (ecological, cultural, social, heritage and economic).

Other iconic areas and industries include Roebuck Bay, Cable Beach, Willie Creek, Cape Leveque, and Pearling. Access to areas is usually 4WD tracks leading to coastal camping sites, especially on the Dampier Peninsula. The coast of the Dampier Peninsular is mostly reserves.

**King Sound**

This region runs from One Arm Point around the Fitzroy River mouth to about 50 km North of Derby. It features large tidal ranges, low wave action and turbid sediment laden waters (especially in its more southern reaches). The coast is a mixture of Aboriginal reserves and Pastoral Leases and accommodates pearling leases. The mud crab, usually found in the intertidal mud and mangroves, is popular for eating and can grow to 200mm.

**Kimberley coast**

Runs from the Buccaneer Archipelago close to Kalumburu, which the locals refer to broadly as the North Kimberley Coast. It has a very complex shoreline with many islands. There are sandstone and dolerite escarpments, with the protected inlets characteristic of turbid waters and muddy banks. There is large fluvial run-off through the 6 major rivers and many smaller creeks, creating a stunning display of waterfalls during the wet season.

Tidal range becomes more predominant along the north coast, with tides ranging up to 12.5 metres. The port of Derby at 10.8m has the highest tidal range at any port in the southern hemisphere. The coastline is known for spectacular scenery and the iconic areas of the Montgomery reef, Horizontal falls, King George Falls and Buccaneer Archipelago. The North Kimberley has been identified as a biodiversity 'hotspot' for its uniqueness, variety of habitats and relatively intact mammal populations. There are abundant mangrove communities and Adele Island is renowned for seabird nesting.

***Figure 41 – North Kimberley coast***

There are only four established Aboriginal communities due to logistics of access; many people are living isolated from their country such at Mowanjum, near Derby
There are approximately six pearl farm leases bases along the coast, one iron ore mine and four charter fishing camps. Main road access to the coast is via Kalumburu and limited 4WD access tracks, due to the very rough terrain.

The area is mostly bordered by Aboriginal Lands Trust lands; there is also the Prince Regent Nature Reserve (medium coastal frontage) and Kimbolton Defense Reserve (large coastal frontage).

**Bonaparte Gulf, Cambridge Gulfs**

These two regions run from near Kalumburu to beyond the Northern Territory border. There is very little coastal access (apart from near Wyndham) due to the rough terrain. The land to the Northwest of Wyndham is Aboriginal Lands Trust; to the Northeast is nature reserve (False mouths of the Ord) and Pastoral leases to the East

**Offshore Atolls**

North to South order of reefs and atolls
⊄# Ashmore reef is NT state waters
⊄# Scott Reef and Browse Islands are WA state waters
⊄# Rowley Shoals made up of three reefs, two WA state waters (Imperieuse & Clerke), one Commonwealth (Mermaid)

The Rowley Shoals are unique in that they are located on the outer edge of the continental shelf and are recognized as a high conservation area. There is limited visitation by 5 licensed charter boats. There is very little visitation to the other areas except for differing levels of fishing activity from Indonesian fishermen (some legal and some illegal). There are large natural gas reserves near Scott Reef and Browse Island.

**Pressures**

The Kimberley regions local and visitor populations place a high value on the coastal and marine resources of the region. There are several reasons for this:

- large resident and tourist population located on the Broome and Dampier Peninsular coastlines
- inaccessible interiors and harsh landscapes push people to the coastal fringe, and the rivers that drain into them
- Ideal climate for water related activities
- High participation rates in recreational fishing eg Broome boat ownership rate
- Reliance on marine and coastal resources for income by many sectors of Kimberley community
- Enjoyment of swimming, surfing and diving

These factors combine to exert a potential for impact on the regions coastal marine resources if they not managed correctly

The annual change of seasons also heavily affects the coast and how people utilize it:

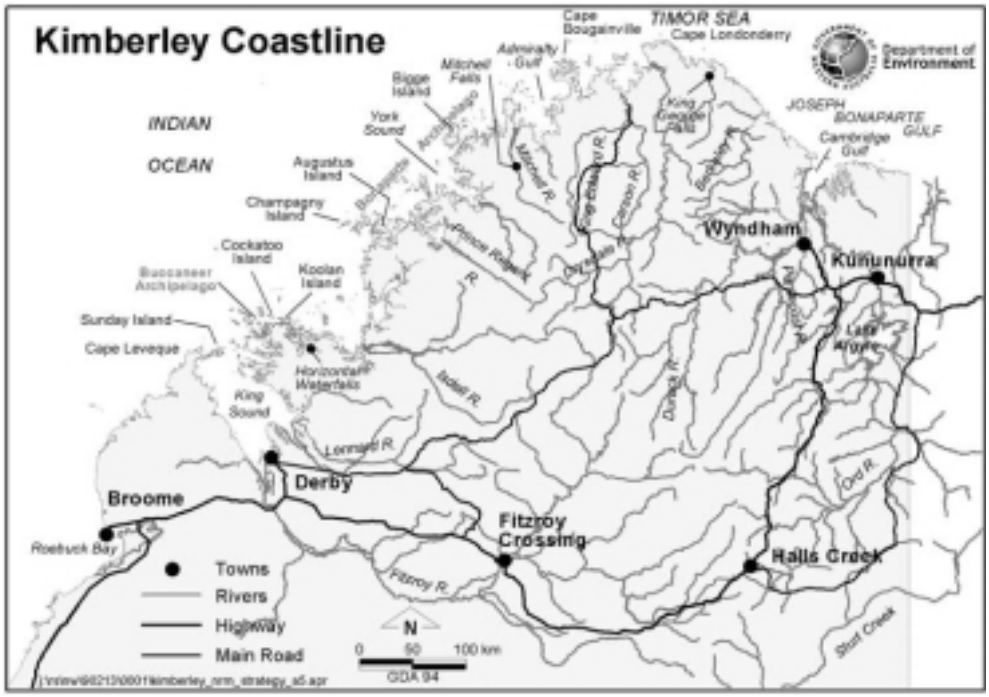



***Figure 42 – Prominent features of the Kimberley Coastline***

The prevailing winds swap from Easterlies during dry to Westerlies during the buildup and wet, which influences the preferred location for coastal activities during the year eg Westerly facing boat moorings are preferred during the dry.

Cyclones, which most often occur Dec-March, usually run parallel to the Kimberly coast affecting large areas of the marine environment. They do cross the Kimberley coast, but usually on its more southern areas eg Eighty Mile Beach. The wind, swell and or storm surge can cause substantial environmental damage to shallow and coastal areas such eg dune vegetation and shallow fringing coral reefs. Cyclones have a substantial economic impact on coastal industries such as pearling, requiring the costly evacuation of boats and people, and through damage to pearling lines and stock as the sand movement buries oysters. They also result in increases in river flows, which can push large bodies of turbid, nutrient rich fresh water offshore into marine areas.

**What we want**

There is limited information available to set many resource condition targets at the current time. A priority action for the management of the coastal and marine environment is the development of a Coastal and Marine Management Plan for the Kimberley Coast. The type of plan that has been discussed for the future management of the coast will include information on:

The social, economic, cultural and environmental importance of the Kimberley Coast;
Identification of conservation areas – Fish and Fish Habitat Protection Areas, National Parks and Marine Parks;
Current fish stock status and the sustainable management of fish stocks, including pearl oysters;
Control and access to country and marine sites for industry;
The management of increased tourism on the Kimberley Coast;
Future development and planning guidelines;
Pest plant and animal management.

The plan will provide the first step towards co-ordinating the current effort for sustainable management of the Kimberley Coast.

***Figure 43 – Tidal influences can take many by surprise***

## *3.1 MARINE WATER QUALITY*

There is very little data on water quality and its seasonal changes for the marine waters of the Kimberley. There are currently no significant fixed point sources of pollution due to limited coastal based industry that output wastewater into Kimberley coastal waters. The main source of pollution would possibly occur during large rainfall events that wash sediments, rubbish and nutrients into estuaries.

**Table 20 - 3.1 Marine Water Quality**

**Resource Condition Target**

**RCT33**: Nearshore marine water quality in prioritised areas is maintained, and benchmarked against marine water quality guidelines developed specific to the Kimberley Coast by 2010

*There is not enough data available about marine water quality on the Kimberley coast to be able to set an appropriate RCT at present- one will be set by 2006*

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **CM1**. National Water Quality Management Strategy (NWQMS) guidelines are adopted and monitoring commenced in prioritised areas by 2006 | Regional | Priority areas for water quality monitoring are identified by 2005<br><br>Review current sampling programs along the Kimberley coast<br><br>Identify aspects of water quality that should be monitored in each prioritised area, ensuring consistency.<br><br>Encourage adoption/Support continuation of water quality monitoring in prioritised areas.<br><br>Gain an understanding of natural environmental changes to water quality and | CALM, DoF, DoE, Community, ARFAC, WWF, Industry | CM12 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | nutrient values due to the dynamic nature of tidal flows | | | |
|  | **CM2**. Encourage development of guidelines for appropriate tourism development at six specific sites across the Kimberley by 2010 | Regional | No. of guidelines developed for specific sites | Tourism WA, DoF, CALM, DoE, DPI | | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **CM3**. Environmental Management Plans for port areas are developed and adopted by 2006 | Regional | Drafting plans<br><br>On-going implementation | Shires, Port Authorities, Industry, State Agency | | |
|  | **CM4.** Manage the impact of tour boat operations on remote coastal areas by 2006 | Regional | Develop a Code of Practice for Tour boat operators in the coastal regions by 2007<br><br>Tour operators 'eco' accredited and licensed to limit numbers against management objectives | Tourism operators, DoF, CALM, Tourism WA | CM12 | |
| Education and Awareness | | | | | | |
|  | **CM5**. Increase community understanding on local water quality issues by 2008 | Regional | Water quality issues of near community areas assessed by consulting with locals on rubbish, sediment, nutrient runoff and changes to water cycle.<br><br>Review consultations and report to local community<br><br>Improve catchment management of town areas | CALM, DoF, DoE, DPI | CM1 | |
|  | **CM6.** Better understanding of water quality monitoring results of prioritised areas in the community and stakeholders of the Kimberley by 2006 | Regional | Results of marine water quality monitoring are promoted to the community<br><br>Promote adoption of best practice catchment management of priority areas | CALM, DoF, DoE | CM1 | |

## *3.2 MARINE HABITAT*

There is a diverse range of marine habitats along the Kimberley coast, with it containing substantial representation of WA habitat resources. For example it contains large assemblages of mangroves, which have been estimated to be 80% of WA's mangrove area (Pedretti and Paling, 2001). The region also has large intertidal habitats due to its large tidal ranges. Examples of important intertidal areas are Roebuck Bay and 80 Mile Beach, which have been recognised by the Ramsar convention. There is a lack of base line information, planning and active management of the Kimberley coast, which has implications in the management of the developing tour operating sector and recreational access to the coast.

**Table 21- 3.2 MARINE HABITAT**

| **Resource Condition Target** |
|---|
| **RCT34.** No decline, and were possible an improvement of 80 Mile Beach habitats, beyond natural fluctuations by 2020<br><br>*There is not enough information for other marine habitat in the Kimberley to be able to set a resource condition target at this stage. One shall be set by 2006. |

| **Recommended Actions/ Management Targets** | **Focus** | **Performance Indicators/Actions** | **Potential Partner Groups** | **Links to other targets** | **Priority** |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **CM7.** Prioritised areas of the Kimberley coast requiring marine habitat mapping identified by 2005 | Regional | Determine priority areas for management/mapping based on threat analysis<br><br>Eg. Roebuck bay and 80 mile | CALM, DoF, DEH | CM12 | |
| **CM8**. Marine habitat mapping undertaken in prioritised areas by 2006 | Regional | Develop habitat maps and undertake threat analysis to those habitats<br><br>Marine habitat data of prioritised area available for marine planning purposes by 2007 | CALM, DoF, DEH | | |
| **CM9.** Identify 100% of marine habitat areas 'at risk' from introduced marine pests by 2008 | Regional | Identify at risk areas and establish/support monitoring program (in collaboration with | DoF, AQIS, Customs | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | National IMP initiatives) | | | |
| On-Ground Actions | | | | | | |
|  | **CM10**. Community based Rangers are distributed around the coast by 2008 | Regional | Similar program to the Northern Territory Sea Rangers is implemented on the Kimberley Coast | DoF, CALM, Customs | | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **CM11.** Implement Sustainable Tourism project by 2006 | Regional | Tour operators accredited and licensed | CALM, DoF, Tourism WA, North West Tourism | L14 | |
|  | **CM12.** Development and implementation of a Kimberley Sustainable Resource Management Plan (KSRMP) for the Kimberley Coast by 2008 | Regional | Management Plan developed and implemented through adoption by State agencies in specific management processes eg. Pearling Management Plan<br><br>Updated or current coastal management plans are reviewed to prioritize implementation of On-ground action recommendations by 2006<br><br>Involvement of local government in coastal planning | State Agencies, Industry, Community | CM1, CM4, CM7, CM17, CM18, CM19, CM24 | |
| Education and Awareness | | | | | | |
| | **CM13.** Reduce conflict and impacts of resource users by education and understandings of access into key management areas by 2008 | Regional | Use the KSRMP to develop coastal maps which include prohibited areas, access areas and user responsibilities eg how to report problems by 2007 | KLC, CALM, DoF | | |

## *3 3 MARINE BIODIVERSITY*

The tropical waters of the Kimberley supports a wide variety of flora an fauna. From diverse coral cays, productive mollusc populations of intertidal areas, seagrass beds and extensive sponge and marine algae populations. It also contains a variety of threatened species including: turtle, dugong, crocodiles, speartooth sharks and humpback whales. Also, as already discussed, there are very large populations of migratory wader birds. Unfortunately little is very little known about some of the near shore populations, such as seagrass beds, due to turbid water and threats posed by predatory animals. Also with some of the threatened species such as turtle and dugong there is still a limited understanding of population dynamics and migration patterns.

**Table 22 - 3.3 MARINE BIODIVERSITY**

**Resource Condition Target**

**RCT35:** Maintain and improve condition of marine fauna in the region, as measured at representative/priority/strategic sites, accounting for natural fluctuations by 2020

**A quantified target to be set by 2006*

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **CM14** Establishment of marine community monitoring programs undertaken along the Kimberley coast by 2006 | Regional | Programs to monitor local intertidal areas and other key areas of interest. | DoF, CALM, DEH | CM1 | |
| On-Ground Actions | | | | | |
| **CM15** Identification of keys areas for marine conservation planning initiatives for the Kimberley coast and marine waters by 2007 | Regional | Considers Biodiversity 'Hotspots' and important habitats for iconic/keystone species.<br><br>Refinement of potential RCA reserves for 80 mile and Dampier Peninsula<br><br>And plans for bioregional planning process | CALM, DoF, DEH, KLC, Indigenous Community | CM12 | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **CM16**. Improved protection and management of resources by Community based Sea Rangers positions are established at strategic locations along the Kimberley coast to promote the values of marine biodiversity by 2006 | Regional | Sea Rangers positions similar program to the Northern Territory Sea Rangers are established at strategic locations along the Kimberley coast | DoF, CALM, Customs, NAQS, DIA | | |
|  | **CM17** Protection of key species by 2010 | Regional | Turtle and dugong management plans– indigenous catch NAILSMA project | CALM, KLC, NAILSMA | CM12 | |
|  | **CM18.** Continue to Implement the National Ballast Water Policy and Marine Pest Incursion Strategy – on-going | Regional | Continued management of exotics | DoF, CALM, DoE | CM12 | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **CM19.** 100% of marine threatened species (as listed by State and Commonwealth governments) occurrence in the Kimberley identified with recovery plans established by 2008 | Regional | Implement prioritised actions in existing recovery plans for threatened species (State and commonwealth listed species – including turtle and dugong)<br><br>Support the development or review of new or existing recovery plans. | CALM, DoF, KLC | CM12 | |
|  | **CM20** Improved protection/management of the Ramsar listed Roebuck Bay and 80 Mile Beach commenced by 2006. | Roebuck Bay | Management planning for the establishment of a marine protected area at Ramsar listed sites within Roebuck Bay and coastal parts of 80 Mile beach commenced by 2006<br><br>Management planning involving the community | WWF, CALM, Broome Bird Observatory, DoF, Shires, Roebuck Bay Working Party | | |
| Education and Awareness | | | | | | |
|  | **CM21** 30% increase in community and stakeholder participation in education, awareness and remediation activities related to marine biodiversity protection by 2006 | Regional | General public has better understanding of activities<br><br>Greater participation rates in activities | CALM, DoF, KLC | | |
| Cultural Heritage | | | | | | |
|  | **CM22.** Investigate the feasibility of Community cultural centres established on the Coast by 2007 | Regional | Centres include cultural knowledge, language, art, awareness raising and heritage protection | Tourism WA, North West Tourism, CALM, KLC, DoF | | |

## *3.4 SEASCAPES/COASTAL*

The high value of the seascapes of the Kimberley is reflected in the high rates of artists painting and photographing the wide variety of coastal scenes. It is this resource that is the main drawcard for coastal tours, such as live-aboard charters, as well as one of the reasons for the high participations rates of coastal recreation by locals and tourists.

**Pressures**

- Lack of planning protection eg. marine parks or Fish & Fish habitat protection Areas
- High usage of certain areas eg Broome coast
- Increasing pressures on the remote Kimberley coast
- Construction of unauthorised structures overlooking the coast
- Loss of cultural knowledge of coastal Aboriginal people, especially in remote locations like the North Kimberley
- Lack of active management.

***Figure 44 – Entrance Point Beach***

**Table 23 - 3.4 SEASCAPES/COASTAL**

| **Resource Condition Target** |
|---|
| **RCT36:** Maintain and improve the health of priority estuarine and coastal habitats beyond natural fluctuations by 2020<br><br>**A quantified target set by 2006* |

| **Recommended Actions/ Management Targets** | **Focus** | **Performance Indicators/Actions** | **Potential Partner Groups** | **Links to other targets** | **Priority** |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **CM23.** Improve understanding of flora and fauna of the North Kimberley by 2008 | Regional | Gaps in data assessed<br><br>Continue data collection by surveying remote coastal areas<br><br>At-threat iconic species prioritised<br><br>Indigenous information of flora and fauna included in surveys | CALM, KLC, DoE, Communities, Universities | Salt water country | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **CM24.** Identify areas for specific conservation and management on the Coast – Marine Parks, Fish & Fish Habitat Protection Areas and National Parks by 2008 | Regional | Areas identified | CALM, DoF | CM12, B6 | |
|  | **CM25** Improve our understanding of priority estuaries – by 2009 | Regional | Habitat mapping of estuary areas, one in each of the main catchments by 2008 | CALM, DoE, DoF | CM1 | |
|  | **CM26.** Improve protection for heritage sites by 2010 | Regional | Identify and prioritise important indigenous and non indigenous heritage sites for protection<br><br>Information used in Kimberley coastal planning and management initiatives, allowing multiple resource use areas and prioritised indigenous sites<br><br>Management plan developed | KLC, CALM, DoF, DIA | Salt water country | |
| On-Ground Actions | | | | | | |
|  | **CM27** Prioritised on-ground works for coastal management plans funded and implemented by 2006 | Regional | Assist coastal managers with the development of projects to implement prioritized on-ground works.<br><br>Assist coastal managers with the implementation of funded projects | CALM, DoF | | |
|  | **CM28**. Improved protection and management of resources by Community based Sea Rangers positions are established at strategic locations along the Kimberley coast to promote the values of coastal resources by 2006 | Regional | Sea Rangers positions similar program to the Northern Territory Sea Rangers are established at strategic locations along the Kimberley coast | DoF,<br>CALM, Customs, NAQS,<br>DIA, Community, KLC | | |
| Institutional Framework, Planning and Policy | | | | | | |
|  | **CM29.** Better planning of the use of marine resources by the development of a Kimberley Sustainable Resource Management Plan (KSRMP) that includes economic, cultural, control and access to country, fish stocks and tourism by 2008 | Regional | Priorities areas identified<br>⋕ Involve interested parties<br>⋕ Implement planning<br>⋕ formalise reserve areas<br>⋕ implement plan | CALM, Tourism WA, DoF, DPI | CM13 | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **CM30** All local governments of the Kimberley region have current coastal management plans by 2006 | Regional | Promote Coastal Planning Program<br><br>Assistance provided to local governments on the development of coastal management plans. | Shires. DPI, WAPC | | |
| Education and Awareness | | | | | | |
|  | **CM31**. Improve knowledge of resource users by 2007 | Regional | Use the KSRMP to develop coastal maps which include prohibited areas, access areas and user responsibilities eg how to report problems by 2007 | CALM, DoF | | |
| Cultural Heritage | | | | | | |
|  | **CM32.** Investigate the feasibility of Community cultural centres established on the Coast – by 2007 | Regional | Centres include cultural knowledge, language, art, awareness raising and heritage protection | Tourism WA, North West Tourism, KLC, Community, DoF | CM22 | |

## *3 5 FISH RESOURCES*

The fisheries resources of the Kimberley are important to people of the region. Commercial fishing industry, including pealring, generates $109.5 million (01/02). Whilst the value of recreational fishing is unquantified but substantial, for example the Ord River barramundi fishery was estimated to generate $1.14 million in spending by local residents in 1996 (Kewagama Research). Recent trends in recreational fishing (ie last 10y) have seen a substantial shift in attitudes of:

- Widespread acceptance of tighter fishing regulations eg reduced bag limits and tighter size limits
- Increasing level of catch and release
- Enjoyment of the fishing experience over the actual take of fish
- Recognition of the need to take of fish for cultural reasons by indigenous people

**Pressures**

- Lack of knowledge on sustainable rates of harvesting for some species
- Increasing fishing pressure in highly visited recreational areas
- Increasing fishing pressure in some commercial sectors
- Illegal fishing near offshore atolls, especially for shark fin

***Figure 45 – Soldier Crab***

### Table 24 - 3.5 FISH RESOURCES

**Resource Condition Target**

**RCT37:** Maintain fish stocks at sustainable levels against ESD principles/criteria by 2020

**A quantified target set by 2006*

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **CM33** Identify key fish habitats, breeding and fishing areas along the Kimberley coast using community knowledge by 2006. | Regional | Breeding areas of major sp ID<br>ID changes historical in Marine environment | DoF, CALM, Industry, Community | CM12 | |
| **CM34** Quantify the impact of fishing activities on non- target species by 2006 | Regional | Review the accidental take of by-catch both of iconic species (eg turtle and dugong) and non target fish | DoF, CALM Industry | CM12 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | target fish<br>Review the impact of people on intertidal areas<br>Collate ideas from stakeholders to reduce by-catch and impacts on intertidal reef areas | | | |
|  | **CM35** Determine the level of impact of fishing on stocks- by 2009 | Regional | Better understand the effect of fishing on individual species | DoF, Industry | CM12 | |
| On-Ground Actions | | | | | | |
|  | **CM36** Reduce the impact of fishing activities on non-target species by 2008 | Regional | Develop and trial ideas to reduce by-catch<br>Record by-catch data<br>Accredit fisheries that meet standards of low by-catch (EMS) | DoF, Industry | CM12 | |
|  | **CM37** Encourage best practice to minimise the impacts of commercial fisheries by their adoption of Environmental Management Systems (EMS) by 2012 | Regional | Assist key fisheries to adopt best practice for current operational methods that fit within an EMS<br>Assess management options for aspects which require improvement for an EMS<br>Develop markets that offer a premium for EMS products | DoF, Industry | | |
| Institutional Framework, Planning and Policy | | | | | | |
| | **CM38** Protection of offshore atolls by cooperating with International parties by 2008 | Regional | Review current shark fin fishery<br><br>Liaise with Indonesian Government on current issues including improved protection for breeding Green Turtles at Browse Island<br><br>Develop policies to respond to issues | DoF | | |
|  | **CM39.** Protection of fisheries resources by the support of Integrated Fisheries Management by 2008 | Regional | Assess the resources required to apply IFM to NW fish stocks | DoF | | |
| Education and Awareness | | | | | | |
| | **CM40** Protect fish stocks by promoting sustainable take fishing activities by 2006 | Regional | Kimberley Recreational fishing review adopted and extended to the public<br><br>Promotion of the sporting and enjoyment aspects of modern fishing methods rather than the take | Recreational Fisheries, DoF | CM12 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Education of best practice fish release methods | | | |
| Cultural Heritage | | | | | | |
| ´ | **CM41.** Formal recognition and involvement of Indigenous people in fisheries management process by 2005 | Regional | Implement recommendations from the Aboriginal Fishing Strategy – on-going<br><br>Support the development of Indigenous Aquaculture developments | DoF, KLC, Community | Saltwater Country | |

# 4. COMMUNITY, CAPACITY AND CO-ORDINATION

**Aspirational Target**

A dynamic region that is socially integrated, environmentally responsible and economically prosperous and diverse by 2050

**Background**

The management of natural resources in the Kimberley region is a priority for anyone living or having visited the region. Significant areas of the Kimberley are still barely explored or documented.

**Social Values**

The socio-economic situation of the Kimberley is vastly different from the rest of Australia. The current population of the Kimberley is approximately 30,000 with the majority living in and around major urban areas. Of this, 48% of the population are Aboriginal people living in remote communities throughout the Kimberley.

**Economic Values**

The economy of the Kimberley is strongly tied to its natural resources, with tourism, mining, fishing, pearling, irrigation and pastoralism the primary industries in the region. Tourism is growing everyday in the region, providing the highest employment. The pearling industry is the major marine economic activity.

**Culture Values**

The Kimberley environment holds great cultural significance for Aboriginal people. Protection of country, clean and healthy water and the protection of cultural and conservation significant areas are maintained and managed sustainably. This is important to the people of the Kimberley.

**Environmental Values**

The diversity of the Kimberley landscape and marine embayments, provides opportunities for experiencing may different environments when travelling through the region.

***Figure 46 – Kimberley Region Aboriginal Communities***

## *4.1 CAPACITY*

### Table 25 - 4.1 CAPACITY

**Aspirational Target**

**RCT38:** Increased knowledge and understanding of and capacity to participate in Natural Resource Management by 2020 from a benchmark established in 2006

**RCT39:** Empower the community in the management and understanding of the diverse values of the natural environment by 2020

| Recommended Actions/ Management Targets | Focus | Performance Indicators/Actions | Potential Partner Groups | Links to other targets | Priority |
|---|---|---|---|---|---|
| Benchmark & Monitoring | | | | | |
| **C1.** Benchmark the current understanding of Natural Resource Management throughout the community by 2006 | Regional | Benchmark completed and education programs developed | Community, Kimberley NRM Group | | |
| **C2.** Development of a Resource Library – bring together all work, research and investigation for the Kimberley Region by 2005 | Regional | Resource information on the Kimberley accessible | Kimberley NRM Group | | |
| On-Ground Actions | | | | | |
| **C3**. All organisations and people looking after country working in partnership – on-going | Regional | Partnerships in land management continue | State and Local Government, Community, Industry | | |
| **C4.** Empower the Aboriginal community by financing administrative arrangements within Aboriginal organisations to support and participate in NRM programs as identified in the plan – on-going | Regional | No. of Ranger Programs<br>Amount of science and traditional research<br>Resource representatives on decision making structures | KLC, Communities, State Government | | |
| Institutional Framework, Planning and Policy | | | | | |
| **C5.** Promote and record endangered languages in the Kimberley by 2008 | Regional | No. of languages recorded | KLRC | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| ´ | **C6.** Increased assistance to Aboriginal organisations and Land and Sea Units to build the capacity and resources for Aboriginal people to actively and equally manage land and sea country sustainably, especially for the Aboriginal owned, or managed land by 2005 | Regional | Assistance provided | DAWA, CALM, DIA, DoE, DoF, DPI | | |
|  | **C7.** Develop an Information package for Consultants from outside the area – when undertaking work in the Kimberley by 2006 | Regional | Package developed | Kimberley NRM Group | | |
|  | **C8.** Develop and implement local government capacity building program for integration of NRM in local planning and Council operations for on-ground outcomes by 2009. | Regional | Land managed by local government, included in local planning schemes, will integrate NRM principles. | Shires, Kimberley Zone of WALGA, DPI | | |
| Education and Awareness | | | | | | |
|  | **C9.** Support intergenerational transfer of skills and knowledge on natural and cultural resource management practices - on-going | Regional | Flow of information – caring for country trips | KLC, Communities, KLRC | | |
|  | **C10.** Protection and increased understanding of Heritage and Culture practices – Continue expand and support Ranger Training Programs – on-going | Regional | No. of rangers trained and employed<br><br>Continue to record Traditional Owner's natural and cultural practices and aspirations<br><br>Continue to raise community awareness | KLC, Communities, Government | | |
| ´ | **C11.** Facilitate community understanding and appreciation of the values of the natural environment and their participation in natural resource management, by providing assistance to the NGO sector for the development and delivery of programs identified in the NRM Plan by 2006 | Regional | No. of programs developed<br>No. of projects undertaken by NGO sector<br>No. of community education programs developed and delivered by NGO sector | State and Local Government | | |
| ´ | **C12.** Continue to involve the community in management and understanding of the natural environment – media, brochures, field days –on-going | Regional | Education programs developed | Kimberley NRM Group | | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  | **C13.** Traineeship/ support officer package developed by major government stakeholders for NRM by 2008 | Regional | No. of packages developed | TAFE, State and Local Government | | |

## 4.2 COMMUNITY

### Table 26 – 4.2 COMMUNITY

| **Resource Condition Target** |
|---|
| **RCT40:** A vibrant and healthy community working together by 2010 |

| **Recommended Actions/ Management Targets** | **Focus** | **Performance Indicators/Actions** | **Potential Partner Groups** | **Links to other targets** | **Priority** |
|---|---|---|---|---|---|
| On-Ground Actions | | | | | |
|  **C14.** Cultural museum/resource centres established throughout the Kimberley by 2010 | Regional | No. of centres opened | KLC, State and Local Government, Communities | | |
| Institutional Framework, Planning and Policy | | | | | |
| **C15.** Ensure that the Kimberley community has the opportunity to be engaged/involved/included in a culturally appropriate way in the development and implementation of any projects-on-going | Regional | Consultation protocols developed | State and Local Government | | |
| Education and Awareness | | | | | |
| **C16.** School curriculum includes Aboriginal; History, languages and heritage and ecological values of the Kimberley and threats to these values by 2008 | Regional | All schools in the Kimberley teaching Indigenous local history 2010 | TAFE, Department of Education | | |
| Cultural Heritage | | | | | |
|  **C17.** Community Layout Plans – ensure future appropriate planning of Aboriginal communities by 2010 | Regional | No. of plans developed | Shires, Communities | | |

# 5. The Kimberley Natural Resource Management Plan

## *5.2 Implementing the Plan*

The Kimberley NRM Plan will be a reference for the community in developing and implementing actions and programs for natural resource management. The plan will be adaptive to reflect current and new information, and be reviewed and revised on an on-going basis as more information becomes available.

Implementation of the plan will require effective partnerships. The plan will be implemented through voluntary action by land managers and the community, through partnerships with peak bodies and industry and through the implementation of funding applications.

There are many elements to successful implementation of the plan:

- Effective capacity building to provide relevant information, support, skills and tools to increase participation – increase the capacity of people to manage the natural resources
- Access to appropriate resources – prioritisation of projects and the development of an Investment Strategy outlining the resources needed to implement the plan
- Benchmarking, monitoring and evaluation to provide assessment of progress - a reporting tool for the implementation of the plan.

The sustainable management of natural resources will be driven by all actions in the Plan, not just by one area. All management actions are interrelated with other management actions.

## *5.3 Plan review and reporting*

This plan provides an assessment of natural resource management priorities in the Kimberley. The plan sets out actions and targets designed to guide stakeholders involved in NRM and provide a framework for investment.

***Figure 47 – Landscape near Fitzroy Crossing***

This plan will be subject to an on-going review process. The plan refers to many instances where more information is needed, or where resource condition targets need to be set, as there is not enough information available. Many of the actions will assist in the development of good baseline data that will provide a better information base to improve on-ground action and target setting.

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# 7. APPENDICES

***Figure 48 – Landscape of the Kimberley***

# *7.1 ROLES AND RESPONSIBILITIES*

## ROLES AND RESPONSIBILITES

| Agency | **Role and Responsibility** |
|---|---|
| Broome Bird Observatory | The observatory was established by Birds Australia in 1988 as a research and education facility. The principle aim of the observatory is the conservation of the migratory shorebirds that use Roebuck Bay along with the many birds of Broome. |
| Department of Agriculture (DAWA) | Assists the State's Agriculture, Food and Fibre sector to be sustainable and profitable, focusing on export-led growth.<br><br>To enhance the international competitiveness of the State's agribusiness by working together to meet the increasingly demanding standards for safety and quality of food and fibre products produced in an environmentally sustainable way. |
| Department of Conservation and Land Management (CALM) | Has the lead role for conserving the State's diversity of native plants, animals, natural ecosystems and many of its unique landscapes, and Wildlife management<br>Also has prime management responsibility for whales, dolphins, dugong, turtle and crocodiles. |
| Department of Environment (DoE) | ⋕ Co ordination of water resource management, environmental protection and catchment information activities. Management of groundwater and surface water resources through licences issued under the Rights in Water and Irrigation Act<br>⋕ Planning for future water use and management under the Rights in Water and Irrigation Act<br>⋕ Advice on waterways and catchment management<br>⋕ Protection of water sources under the Country Area Water Supplies Act and through planning instruments<br>⋕ Advice on development proposals<br>⋕ Protection of native vegetation through clearing permits issued under the Environmental Protection Act<br>⋕ Management of prescribed activities with the potential to cause pollution or environmental harm through licensing and registration issued under the Environmental Protection Act<br>⋕ Response and investigation of pollution issues contravening the Environmental Protection Act<br>⋕ Surface water flow measurement for flood warning and floodplain management information<br>⋕ Water quality monitoring in target areas. |
| Department of Fisheries (DoF) | Undertake management of the State's fish resources and pearling industry.<br>Provision of marine compliance and sea safety inspections<br>Provide marine research<br>Management of Fish and Fish Habitat Protection areas |
| Department of Indigenous Affairs (DIA) | Works in partnership with Government agencies and community to promote social and economic equity for indigenous people, respect for the land and an appreciation of the State's unique heritage. |
| Department for Planning and Infrastructure (DPI) | This agency undertakes a number of roles, however the areas relevant to the Kimberley region include: Regional Planning, Crown Land, Licensing Services, Marine Information and Pastoral Leases. |
| East Kimberley Weed Working Group | Weed control and community education concentrating around Kununurra and Lake Kununurra |
| Environs Kimberley (EK) | Independent community organisation dedicated to protecting the nature and culture of the Kimberley region.<br><br>Provision of support for development that is locally based and compatible with the qualities and values of the Kimberley region. |
| Kimberley Aboriginal Law and Cultural Centre | A Centre developed to represent different facets of Aboriginal peoples well-being and survival. |

| | |
|---|---|
| (KALACC) | |
| Kimberley Aboriginal Pastoralist Association (KAPA) | |
| Kimberley Development Commission (KDC) | To promote the economic and social development of the Kimberley region. |
| Kimberley Interim NRM Group | To review and endorse strategy development and processes<br>Assess and prioritise NRM projects against recommended sub-regional priorities including provision of technical feedback to proponents<br>Make recommendations to the Rangelands Co-ordinating Group (RCG) regarding funding proposals for the Kimberley Subregion, in line with priority projects and other NRM funding (both prior to and post strategy development);<br>Provide a direct link between sub-region and region through the Chair of the Kimberley Natural Resource Management (KNRM) Group who is also a community member of the RCG; |
| Kimberly Land Council (KLC) | Representation of the interests of Traditional Owners in the Kimberley region. |
| Kimberley Language Resource Centre (KLRC) | The Language Centre is an independent community based organisation with members from across the Kimberley. It produces an extensive range of Language Resources. |
| Kimberley Primary Industries Association (KPIA) | Provision of a wide variety of information and resources regarding industry in the Kimberley Region including climatic information, crops grown, agronomy and potential for new industries or value adding opportunities to be developed. |
| Kimberley Regional Fire Management Project | A Fire management project which seeks strategies to pro-actively manage fire in ways that maintain productivity and biodiversity. |
| Land Conservation Districts Committees (LCDCs) | Make recommendations to Commissioner of Soils for the management and improvement of catchment areas<br>Develop greater partnerships between land managers |
| Local Government | Local Government have wider ranging regulatory control and responsibilities. They continue to have a major role in tradition aspects such as the provision and maintenance of streets, footpaths, drainage and rubbish removal. They look after street lighting, sweeping and signposting, the numbering of houses and other buildings. But their responsibilities have increased to include intricate town plans, major recreation centres, libraries, crèches, pre-school centres, food inspection services, immunization clinics and nursing services. They are responsible for the control of bushfires, dogs, parking, cemeteries and aerodromes. They may subsidise a doctor, dentist or veterinary surgeon or - with the consent of their electors - guarantee an income for these people. They may establish public transport services, quarries, school hostels, abattoirs, saleyards, aquatic centres and markets. They may also provide civic centres, cultural and educational centres, sports facilities, youth clubs, children's playgrounds and engage in tourist promotion. |
| National Prickle Bush Management Group | Coordination of prickly acacia management at a national level. The NPBMG is also responsible for national coordination of mesquite and parkinsonia given the similarities between the species. The NPBMG action plan coordinates implementation of national strategic plans. |
| Ord Irrigation Co operative (OIC) | To manage and distribute water for irrigation purposes to member growers in the Ord River Irrigation Area. |
| Ord Land and Water (OLW) | To ensure the wise use of land and water of the Ord River Catchment. |
| Ord River Waterways Management Group | Provision of a forum for all parties with interests in the Ord River waterway to come together and add value to its overall management. |
| Pastoralists and Graziers Association of Western Australia (PGA) | To ensure the prosperity and long term viability of members, the agricultural and associated industries, by providing a voice statewide and federally. |
| Pearl Producers Association (PPA) | Preparation of Environmental Codes of Practice.<br><br>Independent NGO representing the commercial pearling industry licenced in WA dedicated to maintaining a sustainable, responsible and profitable round pearl culture industry. |

| | |
|---|---|
| Rangelands Coordinating Group **(RCG)** | Accountable for Community/Government partnership group, representative of Western Australia's Rangeland sub-regions NRM stakeholders<br>Co-ordinate and guide the development of a sub-regional framework for involvement and representation of Natural Resources Management stakeholders in WA's Rangelands<br>Develop a strategy and associated investment plans for Natural Resources Management in WA's Rangelands. The strategy will be founded on sub-regional structure and is required to meet joint State & Commonwealth Government accreditation criteria<br>Determine and recommend priorities for Community, Government and industry investment in Natural Resources Management in WA's Rangelands<br>Encourage community participation and involvement in NRM processes |
| Save Endangered East Kimberley Species (SEEKS) | Promotion of 'Hands on' community involvement in the conservation of native plants and animals in the East Kimberley.<br>Community awareness.<br>Provision of avenue to lobby government on relevant issues.<br>Conjugate organisation for funding applications |
| Tourism Western Australia | To accelerate the sustainable growth of tourism<br>Encourage the development of new sustainable tourism product, infrastructure and facilities which meet market demands<br>Provide planning and strategy advice on identified tourism issues<br>Ensure regional WA is consulted and involved in the development of Government strategic tourism planning and infrastructure development |
| Water Corporation (WC) | The provision of water and wastewater services to the city of Perth and hundreds of towns and communities in Western Australia. Additionally, provision of drainage and irrigation services to thousands of households, businesses and farms across the State. |
| Western Australia Local Government Association (WALGA) | The Association represents 144 Local Governments in the state of Western Australia, providing policy, advocacy and lobbying support as well as a range of services to its members. |
| Western Australia Fishing Industry Council (WAFIC) | The peak industry body providing representation for the commercial fishing industry, pearling and aquaculture. The Industry Council works under strict government regulation and in partnership with the Department of Fisheries and the Australian Fisheries Management Authority to ensure sustainability of commercial fisheries. |
| World Wildlife Fund Australia (WWF) | Protection and conservation of biologically outstanding land, freshwater and marine habitats. |
| Zone Control Authorities (ZCA) | Manage the funding that is raised by the Agricultural Protection Board for the management of declared plants and animals on stations<br>Advise the APB on issues in local areas |

## *7.2 NATIONAL AND STATE STRATEGIES, POLICIES AND LEGISLATION*

### *7.2.1 Australian Government list of policies and programs*

***Generic***

- National Framework for NRM Standards and Targets
- National NRM Monitoring and Evaluation Framework
- National NRM Accreditation Criteria (and guidelines)
- National Capacity Building Framework
- 7 matters of national environmental significance
    - World Heritage Properties
    - RAMSAR wetlands of international significance
    - Nationally listed threatened species and ecological communities
    - Listed migratory species
    - Commonwealth marine areas
    - Nuclear actions
- National Weeds Strategy

***Biodiversity***

- Nationally listed threatening processes
- Weeds/pests/ferals of national significance
- National biodiversity hotspots
- National Objectives and Targets for the Conservation of Australia's Biodiversity 2001-2005
- National Vegetation Framework
- National Approach to Firewood Collection and Use
- Environment Protection and Biodiversity Conservation Act (1999)

***Water***

- National Water Quality Management Strategy (in particular volume 4 and 7)
- National Water Initiative and "The Living Murray"
- Wetlands Policy of the Commonwealth Government of Australia (1997)
- COAG Water Reforms
- MDB Salinity Management Strategy
- MDB Native Fish Management Strategy
- MDB ICM Policy
- National Recreational Fishing Policy and Recreational Fishing Codes of Conduct
- • National Water Quality Management Strategy
- • COAG Water Reform Framework 1994 and National Water Initiative 2003
- • Wetlands Policy of the Commonwealth Government of Australia
- • National Strategy for Ecologically Sustainable Development 1992
- National Action Plan for Shorebird Conservation in Australia
- • National Framework for Management and Monitoring of Australia's Native Vegetation
- • National Greenhouse Strategy
- • National Objectives and Targets for Biodiversity Conservation 2001-2005
- • National Strategy for the Conservation of Australia's Biological Diversity
- • National Weeds Strategy
- • Threat Abatement Plans for Weeds of National Significance and listed key Threatening Processes
- National Recreational Fishing Policy and Recreational Fishing Codes of Conduct

- Draft National Cooperative Approach to Integrated Coastal Zone Management

***Coasts***

- National Cooperative Approach to Integrated Coastal Zone Management (under development)
- Reef Water Quality Protection Plan
- Great Barrier Reef Wetlands Program
- National System for Prevention and Management of Introduced Marine Pests
- Australia's Oceans Policy
- Fisheries Management Act 1991

***Sustainable Land Management***

- National Dryland Salinity Program
- Managing Climate and Variability Program
- Agriculture – Advancing Australia (in particular FarmBis)
- Plantations for Australia: the 2020 Vision
- Forestry National Action Statement (under development)
- Australia's National Framework for EMS in Agriculture
- EMS National Implementation Plan

***Indigenous Engagement*** *(not yet complete)*

- COAG Reconciliation agenda

***Local Government Engagement*** *(not yet complete)*

## *7.2.2 State Government list of policies and programs*

***Generic***

- State Planning Strategy (1997)
- Statement of Planning Policy No. 2 Environment and Natural Resource Policy
- State Sustainability Strategy (2003)
- Draft Western Australian Greenhouse Strategy
- Local Government Act (1995).
- Town Planning and Development Act (1928).
- Aboriginal Heritage Act (1972).
- Preliminary EPA Position Statement No. 8 Environmental Protection in NRM (2004)

***Fisheries and Coastal***

- Policy for the Implementation of Ecologically Sustainable Development for Fisheries and Aquaculture in Western Australia
- Fish Resource Management Act (1994)
- State Coastal Planning Policy (Statement of Planning Policy 2.6)
- Commonwealth's Oceans Policy Initiative
- State Coastal Strategy (in development)
- State Marine Planning Strategy (in development)
- Coasts WA: Better integration (Government response to report of the Coastal Ministerial Taskforce)
- Aboriginal Fishing Strategy (2003)
- Integrated Fisheries Management (IFM)
- Department of Fisheries 2003. Fisheries Management Paper 168. Aborogonal

***Water***

- State Water Strategy (2003) (incorporating State Water Conservation Strategy)
- Waterways WA: Policy for the management of Waterways in WA (strategy in development)
- Statement of Planning Policy No. 2.7: Public Drinking Water Source (2003)
- State Water Quality Management Strategy for Western Australia (2001)
- Wetlands Conservation Policy for Western Australia (1997)
- State Algal Management Strategy (2003)
- Rights in Water and Irrigation Act (1914)
- Country Areas Water Supply Act (1947)
- State Rural Water Plan
- Statewide Waterways Management Policy and Strategy (in development)
- State Floodplain Management Strategy (in development)
- Environmental Water Provisions Policy for Western Australia Statewide Policy No. 5 (2000)
- Statement of Planning Policy No. 2 Environment and Natural Resources Policy (2003)
- Draft Statement of Planning Policy No. 2.x Water Resources Policy
- Metropolitan Water Supply, Sewerage, and Drainage Act (1909).
- Country Areas Water Supply Act (1947

***Biodiversity***

- State Biodiversity Conservation Strategy (in development)
- Biodiversity Conservation Act (in development)

- Wildlife Conservation Act
- Conservation and Land Management Act (1984)
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar, Iran, the Ramsar Convention)
- Asia-Pacific Migratory Waterbird Conservation Strategy: 2001-2005
- Montreal Protocol on Substances that Deplete the Ozone Layer
- Convention on Biological Diversity (Biodiversity Convention)
- Convention for the Protection of the World Cultural and Natural Heritage (World Heritage Convention)
- Environmental Protection Act (1986).

***Sustainable use of resources***

- Soil and Land Conservation Act (1945)
- State Sustainability Strategy (2003)
- State Salinity Strategy (2000)
- Government's response to the Salinity Taskforce Report (2002)
- Land Administration Act 1997 (rangelands)
- State Rangelands Policy
- Forest Products Act
- State Weed Strategy (2001)
- State Planning Strategy (1997)
- Action Plan for Tree Farming in WA
- Tree Plantations Agreement Bill (2002)
- Western Australian Greenhouse Strategy (in development)
- Carbon Rights Bill (2002)

### *7.2.3 List of information, data, tools resources*

***Generic***

- Land and Water Resources Audit
- Australian Natural Resources Atlas and Data Library (including Regional Information toolkit)
- Australian Ramsar Management Principles of the EPBC Act regulations
- Weeds of National Significance
- Tax Incentives for Conservation
- Capacity Building Planning Logic

***Biodiversity***

- Biodiversity Toolkit
- National Vegetation Information System (NVIS)
- Greening Australia's Regional Vegetation Management Summaries/Native Vegetation Needs Analysis
- National Approach to Firewood Collection and Use
- National Principles and Guidelines for Rangeland Management
- Florabank Initiative
- Factors Promoting Successful Biodiversity Conservation and Case Study Examples (DEH website)
- Climate Change impacts on Biodiversity in Australia : October 2002 Workshop outcomes http://www.deh.gov.au/biodiversity/science/bdac/greenhouse/pubs/climate-change.pdf
- Developing a National Biodiversity and Climate Change Action Plan http://www.deh.gov.au/nrm/publications/biodiversity/possible-2.html

***Water***

- Australian Wetlands Database (Directory of Nationally Important Wetlands)
- River health / condition assessment (Aus Rivas)
- Wetlands Information package: "Integrating Wetlands into NRM regional planning and implementation processes.
- Wetlands Resource CD
- Water Quality Targets Online
- Waterwatch Australia Data Monitoring and Management
- Water Saving Ideas Project

***Coasts***

- State of the Marine Environment reports

***Sustainable Land Mangement***

- National Program for Sustainable Irrigation
- FarmBis Training programs
- Pathways to Industry EMS Program
- EMS Navigator

***Indigenous Engagement*** (not yet complete)

- Land Tenure Database (in production through national NHT project)

***Local Government Engagement*** (not yet complete)

- Local Government Biodiversity Toolbox

## *7.2.4 List of funded initiatives / projects*

***Generic***

***Biodiversity***
- Greening Australia Knowledge Brokers Project

***Water***
- Waterwatch
- River Health Assessment and Environmental Flows
- Tropical Rivers and River Protection
- River, Estuary, and Wetland Monitoring and Evaluation
- Murray Darling Basin Initiatives, including
- FRDC Released Fish Project

***Coasts***
- Coastal Catchment Initiative

***Sustainable Land Mangement***
- National EMS pilots project
- EMS Incentives Program
- MBI Pilot Program

***Indigenous Engagement***
- Indigenous Protected Area Programme
- National Indigenous Engagement Project (case studies)

***Local Government Engagement*** (not yet complete)

***List of Networks and Committees***
- National Landcare Program Facilitators
- Waterwatch
- Farm Forestry Facilitators
- Threatened species network
- Australian Wetlands Information Network
- Wetlands and Waterbird Taskforce
- Great Artesian Basin Network/facilitators
- MDBMC Community Advisory Committee (where relevant)
- Former Fisheries Action Program facilitators and existing Fishcare programs/networks
- Marine and Coast Community Network
- Sea Net
- Threatened Bird Network
- Weeds of National Significance Network
- Private Forestry Development Committees

## *7.3 Threatened Flora in the Kimberley*

**CONSERVATION CODES**

**R: Declared Rare Flora - Extant Taxa**

**Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection,** and have been gazetted as such.

**P1: Priority One - Poorly known Taxa**

**Taxa which are known from one or a few (generally <5) populations which are under threat**, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**P2: Priority Two - Poorly Known Taxa**

**Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat** (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**P3: Priority Three - Poorly Known Taxa**

**Taxa which are known from several populations, and the taxa are not believed to be under immediate threat** (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

**P4: Priority Four - Rare Taxa**

**Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors**. These taxa require monitoring every 5-10 yea

| Species Name | Conservation Code |
|---|---|
| Eucalyptus ceracea | R |
| Eucalyptus mooreana | R |
| Keraudrenia exastia | R |
| Pandanus spiralis var. flammeus | R |
| | |
| Acacia paula | P1 |
| Acacia gloeotricha | P1 |
| Acacia vincentii | P1 |
| Acacia manipularis | P1 |
| Acacia setulifera | P1 |
| Ailanthus triphysa | P1 |
| Aphyllodium parvifolium | P1 |
| Boronia jucunda | P1 |
| Colubrina asiatica var. asiatica | P1 |
| Corchorus capsularis | P1 |
| Cullen candidum | P1 |
| Desmodium flagellare | P1 |

| | |
|---|---|
| Didymoplexis pallens | P1 |
| Echinochloa kimberleyensis | P1 |
| Fimbristylis pilifera | P1 |
| Fuirena nudiflora | P1 |
| Glycine pindanica | P1 |
| Goodenia lunata | P1 |
| Goodenia byrnesii | P1 |
| Goodenia suffrutescens | P1 |
| Goodenia durackiana | P1 |
| Goodenia brachypoda | P1 |
| Goodenia strangfordii | P1 |
| Gossypium marchantii | P1 |
| Gossypium enthyle | P1 |
| Hydrocotyle grammatocarpa | P1 |
| Nicotiana heterantha | P1 |
| Ondinea purpurea subsp. petaloidea | P1 |
| Phyllanthus indigoferoides | P1 |
| Ptilotus crispus | P1 |
| Schizachyrium mitchelliana | P1 |
| Stylidium diceratum | P1 |
| Tadehagi robustum | P1 |
| Thysanotus banksii | P1 |
| Trachymene oleracea subsp. sedimenta | P1 |
| Trachymene villosa | P1 |
| Trianthema kimberleyi | P1 |
| Triumfetta hapala | P1 |
| Triumfetta saccata | P1 |
| Triumfetta trisecta | P1 |
| Typhonium peltandroides | P1 |
| Typhonium sp.Kununurra(A.N.Start ANS 1467) | P1 |
| Acacia deltoidea subsp. ampla | P2 |
| Alysicarpus suffruticosus | P2 |
| Blumea pungens | P2 |
| Boronia minutipinna | P2 |
| Boronia filicifolia | P2 |
| Cleome kenneallyi | P2 |
| Dendrolobium cheelii | P2 |
| Drepanocladus fluitans | P2 |
| Erpodium australiense | P2 |
| Eucalyptus ordiana | P2 |
| Eucalyptus fitzgeraldii | P2 |
| Fimbristylis laxiglumis | P2 |
| Glycine albicans | P2 |
| Gomphrena cucullata | P2 |
| Gomphrena pusilla | P2 |
| Goodenia gloeophylla | P2 |
| Goodenia inundata | P2 |
| Goodenia psammophila subsp. hiddinsiana | P2 |
| Gossypium pilosum | P2 |
| Gossypium pulchellum | P2 |
| Grevillea psilantha | P2 |
| Grevillea latifolia | P2 |
| Grevillea donaldiana | P2 |
| Jacksonia remota | P2 |

| | |
|---|---|
| Kohautia australiensis | P2 |
| Lindernia macrosiphonia | P2 |
| Minuria macrorhiza | P2 |
| Myriophyllum costatum | P2 |
| Myriophyllum callitrichoides subsp. striatum | P2 |
| Nymphoides beaglensis | P2 |
| Olax spartea | P2 |
| Paspalidium retiglume | P2 |
| Pertusaria trachyspora | P2 |
| Platysace saxatilis | P2 |
| Ptilotus marduguru | P2 |
| Ricinocarpos marginatus | P2 |
| Sauropus torridus | P2 |
| Stylidium rubriscapum | P2 |
| Stylidium fimbriatum | P2 |
| Triodia bunglensis | P2 |
| Triumfetta rubiginosa | P2 |
| Triumfetta aspera | P2 |
| Utricularia aurea | P2 |
| Acacia richardsii | P3 |
| Acacia kenneallyi | P3 |
| Alysicarpus major | P3 |
| Aphyllodium glossocarpum | P3 |
| Boronia kalumburuensis | P3 |
| Boronia pauciflora | P3 |
| Borya subulata | P3 |
| Brachychiton tridentatus | P3 |
| Brachychiton incanus | P3 |
| Brachychiton tuberculatus | P3 |
| Comesperma pallidum | P3 |
| Decaschistia byrnesii subsp. lavandulacea | P3 |
| Eragrostis crateriformis | P3 |
| Fimbristylis sieberiana | P3 |
| Fuirena incrassata | P3 |
| Gardenia sericea | P3 |
| Gardenia gardneri | P3 |
| Glycine lactovirens | P3 |
| Glycine falcata | P3 |
| Goodenia sepalosa var. glandulosa | P3 |
| Goodenia purpurascens | P3 |
| Goodenia psammophila subsp. psammophila | P3 |
| Goodenia crenata | P3 |
| Goodenia modesta | P3 |
| Gymnanthera cunninghamii | P3 |
| Hibiscus brachysiphonius | P3 |
| Keraudrenia katatona | P3 |
| Maireana prosthecochaeta | P3 |
| Phyllanthus aridus | P3 |
| Pityrodia obliqua | P3 |
| Pityrodia chorisepala | P3 |
| Rhynchosia sp.Bungaroo Creek(M.E.Trudgen 12402) | P3 |
| Solanum leopoldense | P3 |
| Solanum oedipus | P3 |
| Solanum oligandrum | P3 |

| | |
|---|---|
| Stylidium costulatum | P3 |
| Stylidium perizostera | P3 |
| Stylidium prophyllum | P3 |
| Trachymene dusenii | P3 |
| Triodia acutispicula | P3 |
| Xanthosia eichleri | P3 |
| Brachychiton xanthophyllus | P4 |
| Ficus lilliputiana forma lilliputiana | P4 |
| Ficus lilliputiana forma pilosa | P4 |
| Grevillea miniata | P4 |
| Grevillea adenotricha | P4 |
| Pittosporum moluccanum | P4 |

## *7.4 Threatened Fauna in the Kimberley*

| COMMON NAME | SCIENTIFIC NAME |
|---|---|
| Boodie (mainland) | Bettongia lesueur graii |
| Desert Bandicoot (Walilya) | Perameles eremiana |
| Australasian Bittern | Botaurus poiciloptilus |
| Night Parrot | Pezoporus occidentalis |
| Loggerhead Turtle | Caretta caretta |
| Bilby | Macrotis lagotis |
| Crested Shrike-tit (northern subsp) | Falcunculus frontatus whitei |
| Orange Leaf-nosed Bat | Rhinonicteris aurantius |
| Red Goshawk | Erythrotriorchus radiatus |
| Golden Bandicoot (Wintarru) | Isoodon auratus auratus |
| Gouldian Finch | Erythrura gouldiae |
| Buccaneer Burrowing Skink | Lerista praefrontalis |
| Black-footed Rock-wallaby (WK ssp) | Petrogale lateralis West Kimberley ssp |
| Red-tailed Phascogale | Phascogale calura |
| Southern Marsupial Mole (Itjaritjari) | Notoryctes typhlops |
| Partridge Pigeon (western ssp) | Geophaps smithii blaauwi |
| Australian Painted Snipe | Rostratula benghalensis australis |
| Giant Desert Skink | Egernia kintorei |
| Airlie Island Ctenotus | Ctenotus angusticeps |
| Mouldingia orientalis | Mouldingia orientalis |
| Olive Ridley Turtle | Lepidochelys olivacea |
| Flatback Turtle | Natator depressus |
| Northern Marsupial Mole (Kakarratul) | Notoryctes caurinus |
| Snail | *Amplirhagada astuta* |
| Snail | *Carinotrachia carsoniana* |
| Snail | *Cristilabrum bubulum* |
| Snail | *Cristilabrum buryillum* |
| Snail | *Cristilabrum grossum* |
| Snail | *Cristilabrum isolatum* |
| Snail | *Cristilabrum monodon* |
| Snail | *Cristilabrum primum* |
| Snail | *Cristilabrum rectum* |
| Snail | *Cristilabrum simplex* |
| Snail | *Cristilabrum spectaculum* |
| Snail | *Cristilabrum solitudum* |
| Snail | *Mouldingia occidentalis* |
| Snail | *Mouldingia orientalis* |
| Snail | *Ningbingia australis australis* |
| Snail | *Ningbingia australis elongata* |
| Snail | *Ningbingia bulla* |
| Snail | *Ningbinga dentiens* |
| Snail | *Ningbingia laurina* |
| Snail | *Ningbingia octava* |
| Snail | *Ningbingia res* |
| Snail | *Ordtrachia elegans* |
| Snail | *Turgenitubulus christenseni* |

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| Snail | *Turgenitubulus costus* |
| Snail | *Turgenitubulus depressus* |
| Snail | *Turgenitubulus foramenus* |
| Snail | *Turgenitubulus opiranus* |
| Snail | *Turgenitubulus pagodula* |
| Snail | *Turgenitubulus tanmurrana* |
| Snail | *Westraltrachia alterna* |
| Snail | *Westraltrachia inopinata* |
| Snail | *Westraltrachia turbinata* |
| Rough-scaled Python | Morelia carinata |
| Greenway's Grunter | Hannia greenwayi |
| Little North-western Mastiff Bat | Mormopterus loriae cobourgiana |
| Pilsbrycharopa tumida | Pilsbrycharopa tumida |
| Lerista robusta | Lerista robusta |
| Small Toadlet | Uperoleia minima |
| Cryptagama aurita | Cryptagama aurita |
| Ramphotyphlops troglodytes | Ramphotyphlops troglodytes |
| Ramphotyphlops micromma | Ramphotyphlops micromma |
| Westraltrachia recta | Westraltrachia recta |
| Kimboraga yammerana | Kimboraga yammerana |
| Amplirhagada montalivetensis | Amplirhagada montalivetensis |
| Butler's Dunnart | Sminthopsis butleri |
| Prince Regent Hardyhead | Craterocephalus lentiginosus |
| Drysdale Hardyhead | Craterocephalus helenae |
| Drysdale Grunter | Syncomistes rastellus |
| Lerista bunglebungle | Lerista bunglebungle |
| Black Bittern | Ixobrychus flavicollis australis |
| Lerista separanda | Lerista separanda |
| Ctenotus uber johnstonei | Ctenotus uber johnstonei |
| Lerista kalumburu | Lerista kalumburu |
| Yellow-lipped Cave Bat | Vespadelus douglasorum |
| Northern Leafnosed-bat | Hipposideros stenotis |
| Mitchell Gudgeon | Kimberleyeleotris hutchinsi |
| Long-nose Sooty Grunter | Hephaestus epirrhinos |
| Diporiphora convergens | Diporiphora convergens |
| Ctenotus yampiensis | Ctenotus yampiensis |
| Simoselaps minimus | Simoselaps minimus |
| Koolan Blind Snake | Ramphotyphlops yampiensis |
| Ramphotyphlops howi | Ramphotyphlops howi |
| Kimboraga micromphala | Kimboraga micromphala |
| Hadra wilsoni | Hadra wilsoni |
| Large-scale Grunter | Leiopotherapon macrolepis |
| Drysdale Gudgeon | Kimberleyeleotris notata |
| Pygmy Rainbowfish | Melanotaenia pygmaea |
| Spectacled Hare-wallaby (mainland) | Lagorchestes conspicillatus leichardti |
| Rock Ringtail Possum | Petropseudes dahli |
| Scaly-tailed Possum | Wyulda squamicaudata |
| Prymnbriareus nimberlinus | Prymnbriareus nimberlinus |
| Kimboraga exanimus | Kimboraga exanimus |
| Damochlora spina | Damochlora spina |
| Baudinella baudinensis | Baudinella baudinensis |
| Damochlora millepunctata | Damochlora millepunctata |
| Black-footed Tree-rat | Mesembriomys gouldii gouldii |
| Partridge Pigeon (eastern ssp) | Geophaps smithii smithii |

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| Purple-crowned Fairy-wren (western ssp) | Malurus coronatus coronatus |
| Bush Stonecurlew | Burhinus grallarius |
| Monjon | Petrogale burbidgei |
| Golden-backed Tree-rat | Mesembriomys macrurus |
| Water-rat (Rakali) | Hydromys chrysogaster |
| Grey Falcon | Falco hypoleucos |
| Eastern Curlew | Numenius madagascariensis |
| Princess Parrot | Polytelis alexandrae |
| Ghost Bat | Macroderma gigas |
| Lakeland Downs Mouse (Kerakenga) | Leggadina lakedownensis |
| Chestnut-backed Button-quail | Turnix castanota magnifica |
| Star Finch (western) | Neochima ruficauda subclarescens |
| Little Bittern | Ixobrychus minutus |
| Australian Bustard | Ardeotis australis |
| Pictorella Mannikin | Heteromunia pectoralis |
| Flock Bronzewing | Phaps histrionica |
| Peregrine Falcon | Falco peregrinus |
| Freshwater Crocodile | Crocodylus johnstoni |
| Salt-water Crocodile | Crocodylus porosus |
| Major Mitchell's Cockatoo | Cacatua leadbeateri |
| Burdekin Duck | Tadorna radjah rufitergum |