

# **KIMBERLEY REGION**

## **DRAFT REGIONAL MANAGEMENT PLAN**

**February 1998**

### **Planning Team**

Chris Portlock - Coordinator

Gordon Graham - Regional Ecologist, Kimberley Region

Chris Done - Regional Manager, Kimberley Region

Jeanette Gilmour - Planning and Visitor Services Branch

Department of Conservation and Land Management  
for the  
National Parks and Nature Conservation Authority  
Perth, Western Australia 1998

## **WHAT DO YOU THINK?**

We want to know what you think of the proposals in this Draft Management Plan. Have you thought about writing a submission?

### **Why write a submission?**

It is an opportunity to provide information, express your opinion, suggest alternatives and have a say on how we are proposing to manage CALM land in the Kimberley Region over the next 10 years.

If you prefer not to write your own submission you could make a joint submission with others.

### **What makes an effective submission?**

To ensure that your submission is as effective as possible:

- make it concise and clear;
- list your points according to the subject sections (and page numbers) in the Plan;
- describe briefly each subject or issue you wish to discuss
- say whether you agree or disagree with any or all of the objectives or strategies within each subject, or those of specific interest to you; clearly state your reasons (particularly if you disagree), and give sources of information where possible.
- suggest alternatives to deal with any issue with which you disagree.

**It is important to indicate those strategies and recommendations you agree with as well as those with which you disagree.**

Each submission is important, but those that give reasons for concerns, give support where appropriate and offer information and constructive suggestions are most useful.

### **What happens to your submission?**

All submissions will be summarised according to the topics discussed. The Draft Management Plan will then be reviewed in the light of the submissions according to established criteria (see below). A summary of the submissions will be published along with the Final Management Plan including an indication of how the plan was amended or not in response to the submissions. If a submission is marked 'Confidential' the author will remain anonymous in the analysis of submissions.

## What criteria will be used in assessing your submission?

1. The Draft Management Plan *may* be amended if a submission:
  - (a) provides additional resource information of direct relevance to management;
  - (b) provides additional information on affected user groups of direct relevance to management;
  - (c) indicates a change in (or clarifies) Government legislation, management commitment or management policy;
  - (d) proposes strategies that would better achieve management goals and objectives; or
  - (e) indicates omissions, inaccuracies or a lack of clarity.
2. The Draft Management Plan *may not* be amended if a submission:
  - (a) clearly supports the draft proposals;
  - (b) offers a neutral statement or no change is sought;
  - (c) addresses issues beyond the scope of the plan;
  - (d) makes points which were already in the plan, or were considered during plan preparation;
  - (e) indicates strongly opposing views to the preferred management option; or
  - (f) contributes opinions which are not feasible (generally due to conflict with existing legislation, or Government or departmental policy).

## DEADLINE

Submissions are welcome for two months after the date of release of the draft plan. For inquiries please phone (08) 9334 0406.

## WHERE TO SEND YOUR SUBMISSION

Written submissions should be sent to:

Executive Director  
Department of Conservation and Land Management  
Locked Bag 104  
Bentley Delivery Centre WA 6983

Attention: Plan Coordinator  
Draft Kimberley Region Regional Management Plan

## **ACKNOWLEDGMENTS**

Comment and advice during the preparation of this draft plan was provided by:

- CALM's Regional and District staff - in particular Mark Pittavino and Allen Grosse
- Specialist branches within CALM
- CALM's Corporate Executive
- The National Parks and Nature Conservation Authority

Many people, both individuals and agency representatives, made valuable contributions to the development of this document. Particular acknowledgment is made of the efforts of representatives of the Shires of Broome, Derby-West Kimberley, Halls Creek and Wyndham-East Kimberley; the Kimberley Development Commission, Kimberley Tourism Association, Kimberley Land Council and the Broome Botanical Society.

## **NOMENCLATURE**

Inclusion of a name in this publication does not imply its approval by the relevant nomenclature authority.

## **OBJECTIVES**

- 1) Provide a framework to guide the future management of CALM's Kimberley region.
- 2) Provide information on CALM's regional role, organisational structure and administration and integrate with other regional planning initiatives in the Kimberley.
- 3) Allow for community awareness and participation in the planning process and afterwards in management within the region.
- 4) Assess the current conservation reserve status of the region and design principles and strategies to improve the conservation reserve system.
- 5) Identify management issues affecting the Kimberley Region and specify appropriate management strategies.
- 6) Identify opportunities for sustainable recreation, tourism and commercial activities, including forestry, and opportunities for promoting the wilderness values of CALM lands and waters within the region.

## INTRODUCTION

### 1. Origin, Structure, Mission and Objectives of CALM

The Department of Conservation and Land Management (CALM) was established in 1985 as a result of the amalgamation of the National Parks Authority, the Forests Department and the Wildlife Branch of the Department of Fisheries and Wildlife. The Conservation and Land Management Act (1984) was proclaimed on 22 March 1984 and established two controlling bodies in which the lands and waters managed by CALM are vested. National parks, nature reserves and conservation parks are vested in the National Parks and Nature Conservation Authority (NPNCA). State forests and timber reserves are vested in the Lands and Forests Commission (LFC). In 1997 amendments were made to the Conservation and Land Management Act (1984) which established a third controlling body, the Marine Parks and Reserves Authority (MPRA) in whom marine nature reserves, marine parks and marine management areas are vested. Map 1 shows the lands and waters managed by CALM (as at 30 June 1996).

The membership of the controlling bodies represents a wide range of community interests associated with the lands vested in them.

CALM's operations are structured into nine administrative regions which cover the full extent of Western Australia's diverse natural environment and the Kimberley region is one of those nine (See Map 1).

National Park rangers have been present in the region since 1978 when the Geikie Gorge National Park was manned. A wildlife officer was stationed in Wyndham in 1967 and in Broome in 1990. In 1979 a forestry officer was appointed to Kununurra. In 1985, when the administrative region of the Kimberley was formally created, there was a regional base at Kununurra and a nursery operation at Broome. In 1989, with the creation of a district manager position at Broome, the East Kimberley and the West Kimberley Districts came into being.

CALM has two major management tasks:

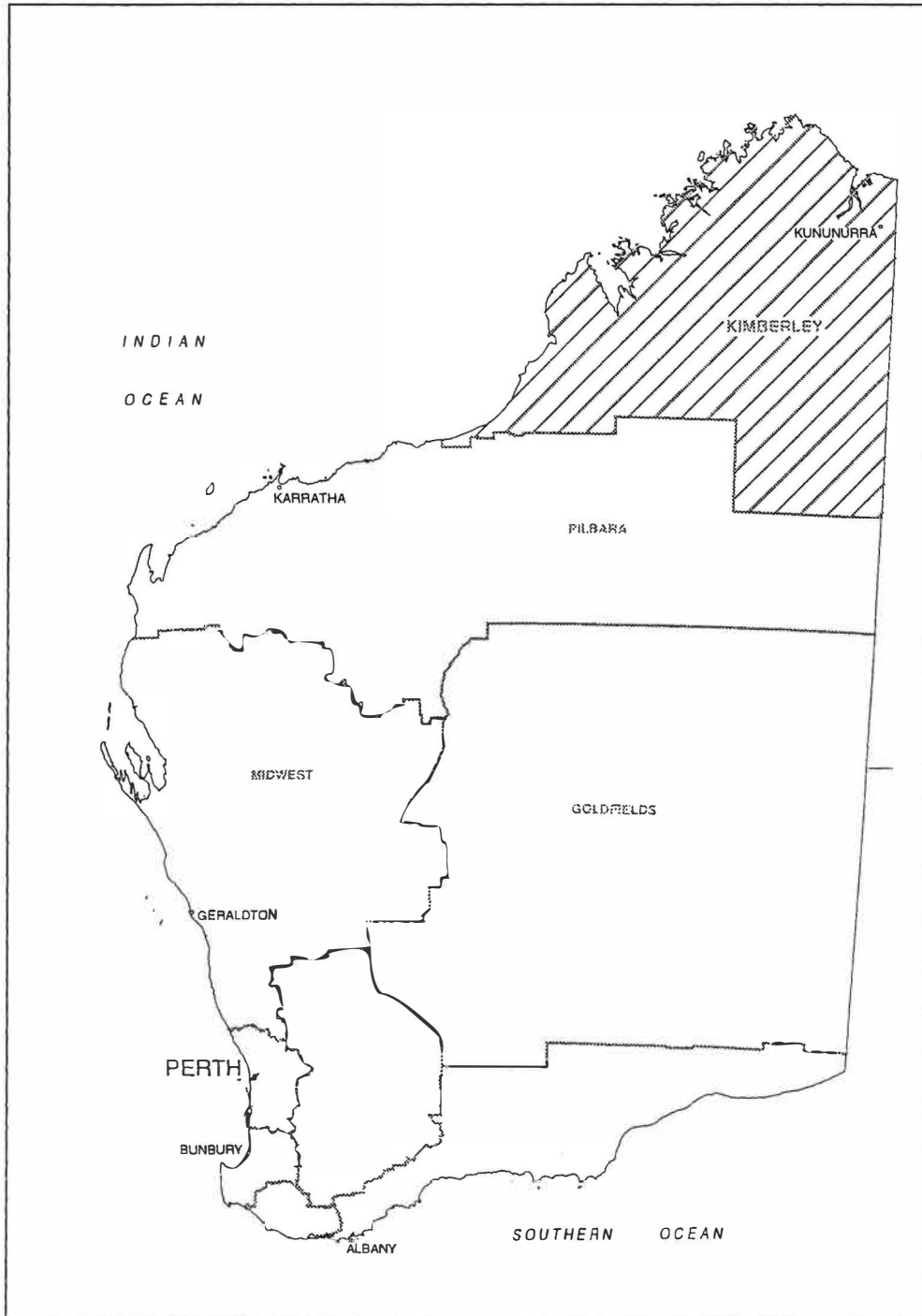
- management of lands vested in the controlling bodies; and
- management of wildlife throughout Western Australia irrespective of land tenure, vesting and management.

The statement of mission adopted by CALM clearly shows the importance placed on its function to care for public lands and resources. That mission is:

WE CONSERVE AND MANAGE WESTERN AUSTRALIA'S WILDLIFE  
AND THE LANDS ,WATERS AND RESOURCES ENTRUSTED TO THE  
DEPARTMENT FOR THE BENEFIT OF PRESENT AND FUTURE  
GENERATIONS.

# Locality

0 250 500 750km



CALM's primary objectives are:

**Conservation:** To conserve indigenous plants, animals, and ecological processes in natural habitats throughout the state.

**Value and Use of Resources:** To optimise the value and financial return to the community of wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

**Recreation and Tourism:** To identify and provide opportunities and services to the community which allows them to enjoy the wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

**Knowledge:** To seek and provide an up-to-date and sound scientific and information basis for the Department's conservation and land management activities.

**Community Support:** To promote community awareness and appreciation of the values of the wildlife, lands, waters and resources entrusted to the Department, and to develop community understanding and support for the Department's conservation and land management activities.

**Human Resources:** To recruit, develop, reward and retain knowledgeable and talented staff, and to provide a stimulating, safe, productive and supportive work environment where staff can pursue individual goals consistent with those of the Department.

**Corporate Efficiency:** To optimise the efficiency, effectiveness and responsiveness of the Department in the achievement of conservation and management objectives.

## **2. Acts and Regulations**

There are a number of Acts of Parliament and their associated regulations for which CALM is directly responsible. There are also other acts which affect CALM's activities or which confer special powers on CALM.

The two primary Acts under which CALM operates are the Conservation and Land Management Act and the Wildlife Conservation Act. The Conservation and Land Management Act covers such matters as defining land categories, establishing controlling bodies, establishing and defining the functions of the Department, management planning, finances, control and eradication of forest diseases, permits, licences, contracts, leases, offences and enforcement.



Under the Wildlife Conservation Act, CALM is responsible for the conservation and protection of indigenous flora and fauna on all lands and waters within State boundaries. CALM is responsible for managing the Wildlife Conservation Regulations 1970 which provide for the protection, management and control of nature reserves.

Vacant Crown land and unvested reserves are normally controlled by the Department of Land Administration (DOLA), however forest produce on vacant Crown land and pastoral leases is controlled by CALM under section 88 of the CALM Act. Forest produce includes trees, timber, firewood, honey, seed, rocks and soil. Minerals are excluded under the Mining Act 1978.

The Bush Fires <sup>Service</sup> Board is responsible for <sup>coordinating</sup> fire prevention measures on vacant Crown land and unvested reserves under Section 10 of the Bush Fires Act. Under Section 45 of the Bush Fires Act CALM may take responsibility for the suppression of fires threatening State forest.

Under an agreement with the Department of Land Administration (DOLA) the Agriculture Protection Board has responsibility for the control of vermin and declared plants on vacant Crown lands and un-vested reserves.

### **3. Management Planning.**

CALM has a statutory obligation to manage land and waters to which the CALM Act applies, in accordance with a management plan. These management plans may range from the broadest Statewide strategic plan to a detailed operational plan focusing on a specific location. Management plans are prepared by CALM on behalf of the controlling bodies (NPNCA, MPRA and LFC) in whom the lands and waters are vested.

After the controlling bodies approve the draft management plan it is then released for public comment for a minimum two-month period. CALM's Corporate Executive and members of the controlling bodies consider the summary of public submissions and the final management plan resulting from the submissions.

Once accepted by the controlling bodies the final plan will be referred to the Minister for the Environment for approval. On gazettal the plan then becomes the legal basis for CALM's management activities for a minimum of ten years. The CALM Act also provides for the management plan to be amended if required, and requires the proposed revisions to be released for public comment if they represent significant changes.

Management plans reflect Departmental policies, administrative instructions and principles set down in several important documents including:

The State Conservation Strategy;  
The CALM Act and the Wildlife Conservation Act;  
CALM's Strategic Plan and  
Strategies for Conservation and Recreation on CALM lands in Western  
Australia.

Planning documents include strategic plans, regional plans, area plans, interim guidelines, necessary operations and compatible operations.

### **Regional Management Plan**

This Draft Kimberley Regional Management Plan proposes management strategies addressing issues affecting all categories of land and water managed, or proposed to be managed, by CALM in the Kimberley. The plan also addresses issues applicable to the responsibilities of the Department in terms of its role in managing the flora and fauna of the state as a whole.

### **Area Management Plans**

Area management plans will be produced for a specific location such as a national park or nature reserve only where there are requirements above and beyond those that are being considered by this regional management plan.

The type of requirements which result in an area management plan being prepared include unique management problems, proposals for large scale infrastructure development, public demand or special wildlife (which require particular management approaches).

The Purnululu National Park is the only area within the Kimberley for which a management plan has been prepared.

The Planning Branch of CALM produces a five year rolling priority list of those areas for which a plan is intended to be produced. This list is approved by the Corporate Executive. Areas within the Kimberley which are on this list are the Mt Hart Pastoral Lease, Geikie Gorge National Park, Windjana Gorge National Park, Tunnel Creek National Park and Mirima National Park.

With funding assistance from Environment Australia the region is also preparing a management report for the Lower Ord Ramsar site which it is hoped will become the basis for a formal draft management plan of the area.

### **Interim Management Guidelines**

These are produced to ensure that certain operations continue to be carried out on the CALM managed estate where there is no management plan. The guidelines must contain the description of the activity and what conditions are to be placed on the activity for that location. A map of the locality and area of activity must also be included. Finally the guidelines must give an indication of who is required to approve

particular operations. These guidelines are usually a compilation of a series of necessary operations documents (Administrative Instruction 23).

In the region interim management guidelines have been produced for fire management.

### **Necessary Operations**

In the absence of an area management plan certain necessary operations may be undertaken on nature reserves and marine nature reserves in accordance with the CALM Act. Such operations are defined as 'those operations which are necessary for the preservation or protection of persons, property, land, flora and fauna, or for the preparation of a management plan' (CALM Act - Section 33(3)(b)(i)).

Necessary operations must focus on particular issues and not pre-empt the options for a future management plan. Examples of these issues are feral animal control and protection from wildfire. These documents are usually prepared by district and specialist staff. Approvals are given by staff at different seniority levels according to the type of activity. Generally speaking, operations that are of a routine nature and are well established are approved by the District Manager. Operations that protect the values of an area but are new or unlikely to be repeated are approved by the Regional Manager and finally those activities that are new and are likely to cause disturbance, such as the construction of facilities and roads, must be approved by the Executive Director.

### **Compatible Operations**

Provision is also made in the CALM Act for compatible operations to be undertaken in the case of national parks and marine parks where there is for the time being no management plan. Compatible operations are defined as necessary operations, as described above for nature reserves, and operations approved by the Minister for the Environment as being compatible with the purposes for which the park is established (CALM Act - Section 33(3)(b)(i)).

Compatible operations must be publicly notified as for management plans with opportunity given for written submissions. The proposal may then be submitted to the Minister for the Environment for approval.

**Strategy:**     **Prepare area management plans, compatible operations and necessary operations documentation for those areas and issues which have not been adequately covered in this management plan. This will be on a priority basis and as resources allow.**

## RESOURCES AND ADMINISTRATION

### 4. Overview

The Kimberley region is in the north of Western Australia. It is bounded to the south by the Pilbara region, to the east by the Northern Territory, to the North by the Timor Sea and to the west by the Indian Ocean. The region has a magnificent coastline with white sandy beaches, cliffs, headlands, inlets and many islands. There are outstanding features associated with ranges, valleys and gorges, old sea beds and ancient coral reefs containing important fish fossils, extensive mudflats and mangrove fringed shorelines.

It is a dynamic area facing change from sole Aboriginal occupation to pastoralism, pearling and gold based economy to one more diversified, including tourism, agriculture, horticulture and the extraction of minerals. As one of the most sparsely populated regions in Australia, considerable increases in tourism and an expansion in the economic base are attracting more residents as employment opportunities grow.

Administratively it is comprised of the shires of Broome, Derby-West Kimberley, Halls Creek and Wyndham-East Kimberley.

### 5. Physical and Biological Resources

The Kimberley region is internationally renowned for its spectacular scenery, and the richness of its biological, cultural and economic resources. The region has an area in excess of 420 000 square kilometres, or approximately 16 % of the area of the State of Western Australia.

The climate has been described as a dry monsoonal climate with two distinct seasons and several transition periods. Allowing for variations between coastal and inland locations the "wet" season generally falls between November and March, and the "dry" season occurs from April to October. It has been recorded that Aboriginal people in the north of Australia traditionally recognised a greater number of seasons with, for example, the people of Arnhem land identifying six. Broadly these linked weather characteristics to the availability of various types of food and also determined when cultural activities should take place. CALM, in its management, also acknowledges a greater seasonal variability than a "wet" and a "dry" time of year. The period at the end of the dry season prior to the onset of rains is a time of discomfort with high temperatures and humidity. The end of the wet season is a time when the land is still green, there is abundant water and the easterly winds begin to blow signalling the start of the dry season.

Rainfall occurs on a gradient ranging from about 1 500mm per annum in the extreme north west to 350mm per annum or less in the more southern lands. Monsoonal summer and cyclonic rains provide the most consistent rainfall.

In CALM's 'Geology and Landforms of the Kimberley' nine landforms are described and an excellent summary of the geological history of the region is given.

Map ... shows the various biogeographic regions of the Kimberley as described in the Interim Biogeographic Regionalisation for Australia (IBRA). The descriptions of these, taken from Thackway and Cresswell (Eds), give a good profile of the region.

#### North Kimberley (NK)

Dissected plateau of Kimberley Basin. Savanna woodland of woollybutt and Darwin stringy bark over high Sorghum grasses and *Plectrachne schinzii* hummock grasses on shallow sandy soils on outcropping Proterozoic siliceous sandstone strata. Savanna woodlands on *Eucalyptus tectifica* - *E. grandiflora* alliance over high *Sorghum* grasses on red and yellow earths mantling basic Proterozoic volcanics. Riparian closed forests of paperbark trees and *Pandanus* occur along drainage lines. Extensive mangal occurs in estuaries and sheltered embayments. Numerous small patches of monsoon rainforest are scattered through the district.

#### Central Kimberley (CK)

Hilly to mountainous country with parallel siliceous ranges of Proterozoic sedimentary rocks with skeletal sandy soils supporting *Plectrachne pungens* hummock grasses with scattered trees, and with earths on Proterozoic volcanics in valleys supporting ribbon grass with scattered trees. Open forests of river gum and *Pandanus* occur along drainage lines.

#### Dampierland (DL)

Quaternary sandplain overlying Jurassic and Mesozoic sandstones with pindan. Hummock grasslands on hills. Quaternary marine deposits on coastal plains, with mangal, samphire - *Sporobolus* grasslands, *Melaleuca acacioides* low forests, and spinifex - *Crotalaria* strand communities. Quaternary alluvial plains associated with the Permian and Mesozoic sediments of Fitzroy Trough support tree savannas of *Chrysopogon* - *Dicanthium* grasses with scattered *Eucalyptus microtheca* - *Lysiphyllum cunninghamii*. Riparian forests of river gum and cadjeput fringe drainages. Devonian reef limestones in the north and east support sparse tree steppe over *Triodia intermedia* and *T. wiseana* hummock grasses.

#### Tanami (TAN)

Mainly red Quaternary sandplains overlying Permian and Proterozoic strata which are exposed locally as hills and ranges. The sandplains support mixed shrub steppes of *Hakea suberea*, desert bloodwoods, *Acacias* and *Grevilleas* over *Triodia pungens* hummock grasslands. Wattle scrub over *T. pungens* hummock grass communities occur on the ranges. Alluvial and lacustrine calcareous deposits occur throughout. In the north they are associated with Sturt Creek drainage, and support *Chrysopogon* and *Iseilema* short grasslands often as savannas with river gum; in the south, the saline



alluvia of Lake Mackay support samphire low shrublands and *Melaleuca lasiandra* - *M. glomerata* shrublands.

#### Ord Victoria Plains (OVP)

Level to gently undulating plains with scattered hills on Cambrian volcanics and Proterozoic sedimentary rocks; vertosols on plains and predominantly skeletal soils on hills; grassland with scattered bloodwood and snappy gum with spinifex and annual grasses. The lithological mosaic has three main components. (1) Abrupt Proterozoic and Phanerozoic ranges and scattered hills mantled by shallow sand and loam soils supporting *Triodia* hummock grasslands with sparse low trees. (2) Cambrian volcanics and limestones form extensive plains with short grass (*Enneapogon spp.*) on dry calcareous soils and medium - height grassland communities (*Astrebla* and *Dicanthium*) on cracking clays. Riparian forests of river gums fringe drainage lines. (3) In the south-west, Phanerozoic strata expressed as often lateritised upland sandplains with sparse trees.

#### Victoria Bonaparte (VB)

Phanerozoic strata of the Bonaparte Basin in the north western part are mantled by Quaternary marine sediments supporting samphire - *Sporobolus* grasslands and mangal, red earth plains and black soil plains with an open savanna of high grasses. Plateaux and abrupt ranges of Proterozoic sandstone, known as the Victoria Plateau, occur in the south and east, and are partially mantled by skeletal sandy soils with low tree savannas and hummock grasslands

## 6. Demographic and Economic Characteristics

The Kimberley is currently one of the least populated regions in Australia. The sparse population represents only 1.5% of the total State population but is steadily growing at approximately 3.5% per annum. The region has a relatively high proportion of males and people under the age of 18 compared to the remainder of the State. Most of the population growth has occurred in the Shire of Broome followed by the Derby - West Kimberley Shire. Major towns are Broome, Derby, Fitzroy Crossing, Halls Creek, Wyndham and Kununurra.

The Kimberley Region is rich in Aboriginal cultural heritage. Approximately 45% of the total population of the Region are of Aboriginal descent with one quarter of Western Australia's total Aboriginal population residing in the Kimberley. Proportions of Aboriginal populations in Shires range from 33% in Wyndham-East Kimberley to 76% in Halls Creek.

The main sources of economic activity are mining (\$551 million), tourism (\$140 million), irrigated agriculture (\$42 million), pearling (\$137 million) and fishing (\$12 million), (pastoral \$29 million) and community services. The figures given in the brackets are the estimated values of the various sectors in 1995.

The largest employer is in community services such as health, education, police and welfare. The second largest employment area is in the wholesale and retail trade.

Government strategies are in place to expand the economic base and diversify business to bring greater economic growth and community benefits to the region.

## **7. Resource Use**

Pastoralism has been a major land use in the region for the past century and mining, irrigated agriculture, horticulture, tourism and conservation have recently increased in scope and importance. A major land use change has been Aboriginal groups wishing to establish communities and living areas away from existing towns.

Conservation interest in the region is widespread locally, nationally and internationally.

Categories of land and water within the Region include pastoral leases, reserves for the Use and Benefit of Aborigines, conservation reserves and areas of vacant Crown land.

Mining has contributed to the economic development of the Kimberley with the 1885 Halls Creek gold discoveries to the lucrative projects such as the Argyle Diamond Mining venture.

Minimising the environmental impact of mineral exploration and mining operations where these might affect lands of interest to CALM or a particular conservation value is of importance to CALM.

The tourism industry continues to expand and utilises the region's spectacular scenery, cultural features and climatic conditions.

The Kimberley Region has been identified as a priority tourism destination by the State government and in developing the Region's tourism potential liaison with a range of State and Federal agencies is important. The unique natural attractions and complexity of landscapes attract increasing numbers of tourists from both within Australia and overseas. The Kimberley caters to a wide range of visitors seeking a variety of experiences from backpacking to four wheel driving to escorted group tours and flying. The impacts to this fragile natural environment from increased visitation can be detrimental if not managed in a sustainable manner. Management concerns include damage to tracks, littering, vegetation removal and erosion.

Tourism is of major importance to CALM. By facilitating public access to particular features and contact with the natural environment in a professionally managed way the impact is minimised. Visitor knowledge and awareness is also increased through the promotion of environmental education with on site interpretation, brochures and interaction with appropriately trained staff.

The State Government has initiated studies into the feasibility of damming the Fitzroy River and to then use these waters plus water from a borefield to develop broadacre cotton growing south east of Broome. CALM will participate in the environmental assessment of those proposed developments as is the case with the work being done on Stage 2 of the Ord River irrigation area.

## **8. Local Government**

The Shire of Broome (The Pearl Coast) covers approximately 56 000 sq km. The town of Broome is the most rapidly developing centre in the Kimberley. It is regionally important as the focus of the pearling industry, as a service centre for the surrounding pastoral industry, is a major port, administrative centre and a popular tourist destination.

The Shire of Derby-West Kimberley (Gateway to the Gorges) covers approximately 103 000 sq km. The town of Derby is an important service centre for tourism, is growing in importance as a port with ore shipping facilities and also services pastoral activities. The town of Fitzroy Crossing is also within the Shire.

The Shire of Halls Creek (Home of the Bungle Bungle) is the largest of the local authorities in the region occupying an area of approximately 143 000 sq km. Halls Creek is a tourist stop over, is very important for the provision of community services for an extremely sparsely populated shire and is a centre for the servicing of the beef industry.

The Shire of Wyndham-East Kimberley (The Last Frontier) covers an area of approximately 121 200 sq kms. The towns of Kununurra and Wyndham are the main centres of population. Within this shire are located the man made lakes Argyle and Kununurra. The primary purpose for the waters of these lakes is for irrigated agriculture on the black soil plains associated with the Ord and Keep Rivers. Kununurra is the main service centre for this activity, is the main location of community services and a growing tourist destination. Wyndham is important as a port and tourist destination.

Liaison with local authorities and tourism agencies will be important in developing nature-based tourism and the promotion of conservation values throughout the Region.



## **9. CALM's Regional and District Organisation**

### **9.1 Overview**

Within the region there are two districts - the East Kimberley District (EKD) and the West Kimberley District (WKD). The EKD is responsible for the management of CALM estate and other operations in the Shires of Halls Creek and Wyndham-East Kimberley and the WKD has these responsibilities in the Shires of Broome and Derby-West Kimberley. Where there are obvious benefits to the management of an area, then the district boundaries may be changed, such as where a reserve is close to or straddles a shire boundary. The regional headquarters is located in Kununurra along with the EKD base. The WKD is based at Broome. These locations provide excellent opportunities to interact with the public and inform them of CALM managed reserves and attractions in the Kimberley. Kununurra is often the first point of call for visitors entering the state from the Northern Territory. This means that information can be provided to introduce these people to the numerous attractions of the State and CALM's various functions.

CALM's promotion of and research into the development of tropical forestry is significant. This will also bring about changes to the staff structure within the region with the tropical forestry staff being responsible to the Plantations Group Business Unit. The assistance of District and Regional staff will also be necessary to further this development. Over the period of operation of this plan it is to be expected that the organisational structure and numbers of staff may change significantly.

### **9.2 Region**

Regional staff are based at Kununurra.

In brief staff roles are;

**Regional Manager** - Overall responsibility for CALM operations in the region. Ensures policies and standards are adhered to. Advises senior staff on important issues and provides forward planning focus for the region. The Regional Manager is responsible to the Director of Regional Services.

**Ecologist** - Documents the flora and fauna of the region, undertakes special projects dealing with flora and fauna, acts as a planning officer and undertakes environmental impact assessment of projects. This position is responsible to the Regional Manager.

**Administration Officer** - Coordinates the preparation of budgets, maintains budget data input for program management and responsible for the running of the Kununurra office. This position is responsible to the Regional Manager.

**Clerical Officer** - Assists the Administration Officer and handles public enquires. This position is responsible to the Administrative Officer.

### **9.3 Plantations Group Business Unit**

Staff roles are:

Field Operations Manager - Senior level responsibility for the day to day running of the tropical forestry activities. Liaises with the public on all matters relating to the establishment of tropical forestry. Ensures that best practice principles are applied including implementation of latest research. This position is responsible to the Plantations Group Manager.

Forest Research Officer - Undertakes research on the viability of an irrigated tropical forest industry. This position is responsible to the Plantations Group Manager.

Nursery Officer - Responsible for the management of all nursery activities including those currently in conjunction with the private sector. This position is responsible to the Field Operations Manager.

Contract Staff - Assist in the running of the nursery and the establishment and maintenance of plantations. This positions are responsible to the Field Operations Manager and the Nursery Officer as required.

### **9.4 East Kimberley District**

The East Kimberley District is based at offices in Kununurra. There is a workshop and depot at the arboretum on Ivanhoe Crossing Road. This facility also has provision for short term staff accommodation.

The District shares clerical and administrative support with the Region. Further staff assistance is provided during the tourist season from April to September each year through the system of mobile rangers. There has also been an increasing use of locally recruited seasonal staff.

In brief roles are;

District Manager - Responsible for CALM operations in the District. Ensures policies and standards are adhered to. Advises senior staff on important issues. Responsible for staffing requirements and budgeting. Undertakes public liaison. This position is responsible to the Regional Manager.

Ranger-In-Charge Purnululu - Responsible for the day to day management of the Purnululu National Park. Undertakes Ranger duties such as public liaison, maintenance of park facilities and fee collection. Assists in the preparation of park budgets and responsible for staff. This position is responsible to the Regional Manager.

Ranger-In-Charge Kununurra - Similar duties as the Ranger In Charge Purnululu for Mirima National Park. Also undertakes patrols of Parry Lagoons and assists with

ranger duties at Purnululu National Park. This position is responsible to the District Manager.

Park Ranger - Under instruction from a Ranger-In-Charge undertakes management duties for National Parks. This positions are responsible to the District Manager.

Seasonal Staff - Undertakes a range of duties during the peak of tourist visitation to the district. These duties include ranger activities, maintenance and interpretation. This positions are responsible to the District Manager.

Senior Operations Officer - Responsible for the day to day implementation of works programs for staff. Assists staff as required in attaining work goals. Ensures standards are maintained and assists the District Manager in the preparation of budgets. This position is responsible to the District Manager.

Reserves Officer - Undertakes maintenance, construction and patrol duties on the CALM estate. This includes the supervision of roading programs, provision of facilities such as toilet blocks, information structures and the maintenance of those facilities. Participates in weed and pest control programs. This position is responsible to the Senior Operations Officer.

Interpretation Officer - Prepares brochures, designs information panels and facilities, gives talks to the public and ensures sign standards are maintained. This position is responsible to the District Manager.

Operations Officer - Responsible for depot maintenance. Plans facilities including budget preparation. Participates in weed and pest control programs. Assists with crocodile management. This position is responsible to the District Manager.

Trainee Field Workman - Assists with reserve maintenance and construction duties. Undertakes informal and formal training courses. This position is responsible to the Senior Operations Officer.

Wildlife Officer - Responsible for wildlife enforcement roles of the District. Required to undertake patrols of the CALM estate. Ensure that groups and individuals either undertaking commercial activities involving wildlife or issued with permits relating to wildlife are adhering to the necessary requirements of operation. Gives advice to the public on wildlife matters. This position is responsible to the District Manager.

## **Strategy**

**Review annually the current structure and performance of the East Kimberley District and report on that performance to the Regional Manager.**

The implementation of this strategy is also subject to a review of individual positions.

## **9.5 West Kimberley District**

The West Kimberley District is based in Broome with offices, depot and workshop in Herbert Street. An ecological education centre, called The Kimberley Natural Eco-centre is also being developed at this location. This is discussed elsewhere in this plan.

As with the East Kimberley District further staff assistance is provided during the main tourist season with mobile rangers and seasonal staff.

In brief staff roles are;

District Manager - Responsible for CALM operations in the District. Ensure policies and standards are adhered to. Advises senior staff on important issues. Responsible for staffing requirements and budgeting. Undertakes public liaison. This position is responsible to the Regional Manager.

Administrative Assistant - Responsible for the day to day running of the District office. Manages the accounting system. Assists the Regional Administration Officer in the preparation of budgets. This position is responsible to the District Manager.

Conservation Officer - As directed is responsible for conservation issues within the district. This includes liaison with interest groups and individuals. Advises the District Manager on conservation matters. Assists in the documentation of the District's flora and fauna. This position is responsible to the District Manager.

Wildlife Officer - Responsible for the wildlife enforcement roles of the District. Required to undertake patrols of the CALM estate. Ensure that groups and individuals either undertaking commercial activities involving wildlife or issued with permits relating to wildlife are adhering to the necessary requirements of the operation. Gives advice to the public on wildlife matters. This position is responsible to the District Manager.

Reserves Officer - Undertakes maintenance, construction and patrol duties on the CALM estate. This includes the supervision of roading programs, provision of facilities such as toilet blocks, information structures and the maintenance of those facilities. Participates in weed and pest control programs. This position is responsible to the District Manager.

Park Ranger - Under instruction from a Ranger-In-Charge undertakes management duties for National Parks. This positions are responsible to the District Manager.

Maintenance Worker - Assist, under direction, the Reserves Officer in the implementation of agreed works programs. This position is responsible to the District Manager.

Ranger-In-Charge Derby - Responsible for the day to day management of Windjana Gorge National Park, Tunnel Creek National Park and the Mt Hart Pastoral Lease.

For the latter particular emphasis is given to Bell Creek and Silent Grove. Undertakes Ranger duties such as public liaison, maintenance of park facilities and fee collection. Assists in the preparation of park budgets and responsible for staff. This position is responsible to the District Manager.

Ranger-In-Charge Fitzroy Crossing - Responsible for the day to day management of Geikie Gorge National Park and associated conservation parks, Brooking Gorge Conservation Park and the Devonian Reef Conservation Park. Undertakes duties as described for other Rangers In Charge. This position is responsible to the District Manager.

Cultural Ranger - Undertakes general ranger duties. Is the first point of contact on Aboriginal cultural matters with particular responsibility for areas close to Broome and on the Dampier Peninsula. Is responsible for the interpretation activities relating to Aboriginal culture. This position is responsible to the District Manager.

## **Strategy**

**Review annually the current structure and performance of the West Kimberley District and report on that to the Regional Manager.**

The implementation of this strategy is also subject to a review of individual positions.

## **9.6 Officer Services**

Government departments, local authorities, community organisations and private individuals are provided with a range of information and advice from CALM on matters of conservation, wildlife protection and land management.

Information and advice is provided at local, regional and Departmental level. Enquiries are referred to other departments and authorities when appropriate.

Increasingly staff are undertaking contracts for environmental consultancies and eco-tour guides for private companies. At all times it is the responsibility of staff and their immediate supervisors to ensure that there is no conflict of interest. For example, only those environmental assessment contracts where CALM will not be subsequently asked for a Departmental submission or advice should be undertaken. Options on the overall merit of a project should not be given when the project is subject to a formal environmental impact assessment. Departmental information should not be released as part of a contract without the approval of the Executive Director. Equally, when undertaking the role of expert guides these should not be undertaken where there are private companies operating or where there might be claims of an advantageous position because of being a public servant.

In addition to administration, management and operations, the following services are available at both the District offices;

(a) Licensing

Forest Produce

Damage Licences

Dangerous Fauna (such as 'problem' crocodiles)

Avicultural

Flora licences for commercial purposes, scientific or other prescribed purposes, commercial producers and nurseryman's licence

Fauna and flora licences for scientific research and

Access permits

Filming

Commercial Activities

(b) Merchandising

Sale of selected CALM publications and posters.

Souvenir products.

(c) Interpretive Services

Information and pamphlets are available on CALM activities, national parks and reserves throughout WA, local tree planting, native flora and fauna. Staff are also involved in guided tours, the running of an eco-centre, interpretive walks and slide nights.

(d) Committees

Land Conservation Districts

Co-operative Research Centre

Regional planning at a multi organisation level

Environmental assessments

Emergency Management Advisory

Tourism Association

Reserve Management Advisory

**Strategies**

1. **Continue to provide information and advisory services on conservation, wildlife management and land management matters on request.**
2. **A brochure will be produced by the region each year with information as to what the staff structure is and who occupies the various positions along with contact numbers.**
2. **Supplement the system of bringing up mobile rangers from the south of the State each year for the tourist season by training and employing**



locally recruited seasonal staff. Traditional custodian employment opportunities in particular will be investigated.

## CONSERVATION RESERVE STATUS

### 10. CALM Conservation Reserves

The Department of Conservation and Land Management (CALM) is committed to select and manage conservation reserves, and take other steps necessary, to ensure the long-term maintenance of species and genetic diversity and the persistence of those habitats, indigenous species and ecological processes that comprise Western Australian ecosystems (Policy Statement No. 31). CALM lands and waters in the Kimberley Region are managed for multiple uses with areas allocated a priority use taking into consideration attributes of the ecosystem, the location and accessibility of the area, potential for public use or the purpose for which the area is vested.

Existing CALM reserves in the Kimberley Region include national parks, conservation parks, nature reserves and marine reserves. The current total area of land in the region managed by CALM is approximately 2.3 million hectares.

#### Current CALM Conservation Reserves of the Kimberley Region (see Map 2)

<b>National Parks:</b>	<i>Areas managed for nature conservation, scientific study and public enjoyment that have important conservation, cultural or scenic values that are nationally or internationally significant in terms of landscape and biota.</i>
Geikie Gorge (Part)*	Spectacular scenery along the Fitzroy River showing features of a Devonian Reef system.
Windjana Gorge*	Devonian reef where the Lennard River has carved its way through the limestone of the Napier Range.
Tunnel Creek*	Part of the oldest cave system in WA where the creek flows through a water-worn tunnel in the limestone of the Oscar Range.
Purnululu (Part)*	The imposing Bungle Bungle Range with beautiful gorges and pools.
Mirima	Colourful eroded sandstone formations adjacent to the town of Kununurra.

Drysdale River*	Remote park encompassing a vast landform including long sections of the Drysdale and Carson Rivers.
-----------------	-----------------------------------------------------------------------------------------------------

**Conservation Parks:** *Identical purpose to national parks. They are managed as if they are national parks. These areas may not necessarily be nationally or internationally unique in terms of landscape or biota. They may be small in size or have been affected by some past land use or may be affected by some future land use.*

Geikie Gorge (Part)*	Recent addition to the Geikie Gorge national park.
----------------------	----------------------------------------------------

Devonian Reef	Features of the Oscar Range including Tunnel Creek national park.
---------------	-------------------------------------------------------------------

Brooking Gorge	Scenic Devonian reef gorge north east of Fitzroy Crossing with rugged limestone formations.
----------------	---------------------------------------------------------------------------------------------

Purnululu (Part)*	Adjacent to the Purnululu National Park and encompassing part of the Osmond Range and the Ord River features.
-------------------	---------------------------------------------------------------------------------------------------------------

**Nature Reserves :** *Areas managed for nature and scientific study, with important nature conservation values such as occurrence of particular flora, fauna, communities or habitats*

Point Coulomb*	Extending from the coast to the hinterland with its associated pindan soils and vegetation.
----------------	---------------------------------------------------------------------------------------------

Lacepede Islands*	Sparsely vegetated islands or reefs with significant seabird nesting colonies and turtles.
-------------------	--------------------------------------------------------------------------------------------

Sandy & Browse Islands and Scott Reef	Important small areas part of the Lacepede group.
---------------------------------------	---------------------------------------------------

Ord River*	Part of a Ramsar wetland adjacent to the tidal portion of the Ord River encompassing mangrove swamps and mudflats.
------------	--------------------------------------------------------------------------------------------------------------------

Parry Lagoons*	Part of a Ramsar wetland continuous with the Ord River Nature Reserve noted for the numbers and variety of waterbirds.
----------------	------------------------------------------------------------------------------------------------------------------------

Pelican Island*	One of only five offshore Islands in WA where the pelicans breed.
-----------------	-------------------------------------------------------------------

Point Spring	A permanent spring at the base of the Weaber Range which has a small patch of rainforest associated with it.
--------------	--------------------------------------------------------------------------------------------------------------

Low Rocks*	A small island in Admiralty Gulf important as a seabird breeding site.
------------	------------------------------------------------------------------------






Swan Island*	A small island often connected to the mainland at low tide.
Prince Regent*	One of the State's two biosphere reserves. A large reserve protecting many areas of scenic grandeur encompassing a vast array of flora and fauna.
Dragon Tree Soak*	A peat swamp in the Great Sandy Desert which is a surface expression of the Wallal Palaeoriver . The reserve includes surrounding dune areas.
<b>Marine Parks:</b>	<i>Marine areas managed for nature conservation, scientific study, public enjoyment and sustainable commercial and recreational fishing where appropriate</i>
Rowley Shoals*	Considered to contain the most perfect examples of pristine shelf atolls in Australian waters.
<b>Other Areas</b>	
Mount Hart*	Presently a CALM held pastoral lease encompassing the magnificent scenery of the King Leopold Ranges.
Charnley River	Presently a CALM held pastoral lease adjacent to Mount Hart. This area and Mount Hart are managed as if they were national parks.
Wolfe Creek Crater*	Wolfe Creek Meteorite Crater Reserve is the second largest impact structure in the world measuring 850 metres in diameter.
Kununurra Arboretum	Situated at Kununurra and planted with mainly native Kimberley trees with some other tropical species.
12 Mile Block	An area of land adjacent to the town of Broome where tropical forestry research is taking place.
Sandalwood Plots	Land is being leased at the Frank Wise Institute at Kununurra for research on irrigating sandalwood and associated valuable timbers.

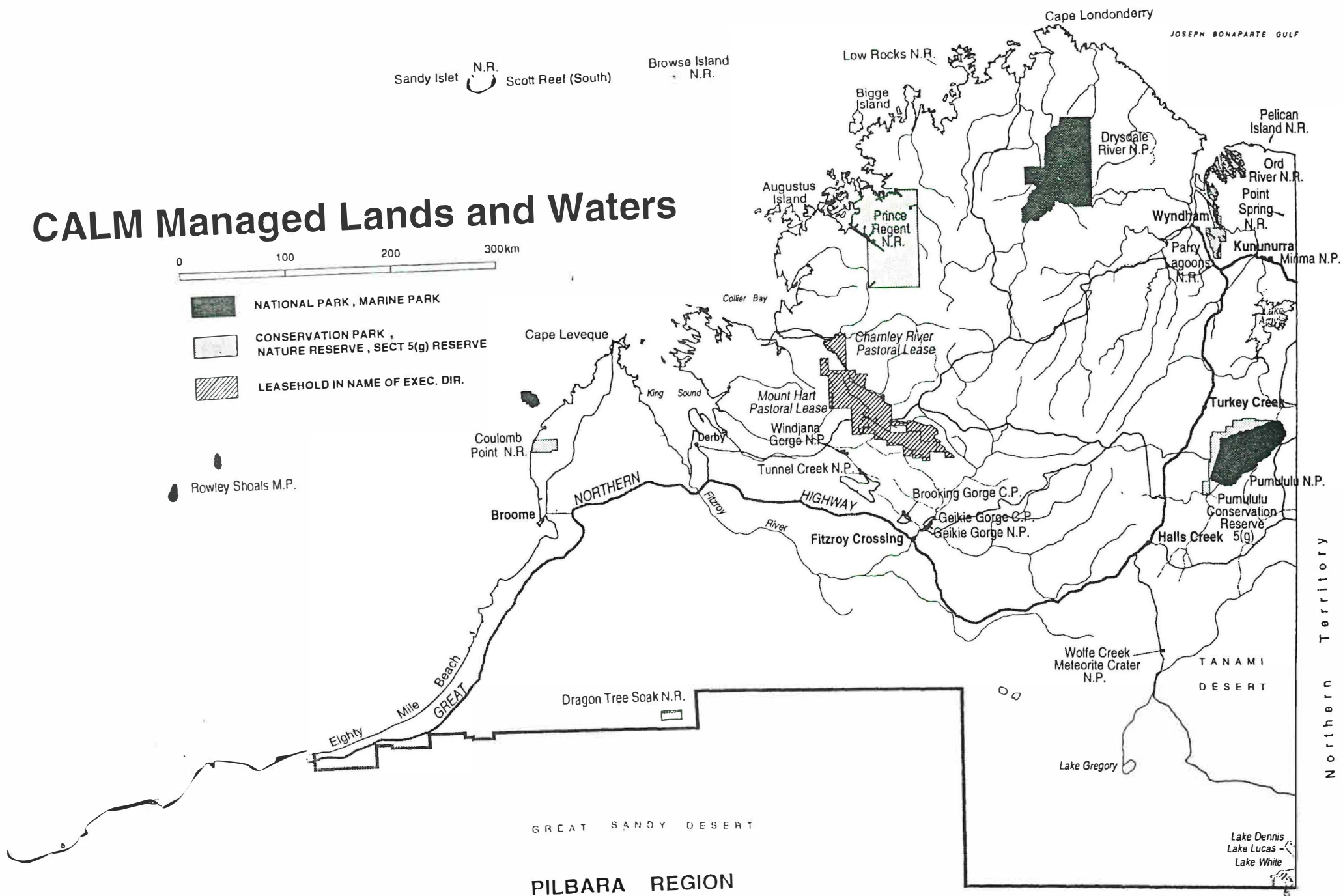
\* These areas are either wholly or partly on the Register of the National Estate as prepared by the Australian Heritage Commission.

# CALM Managed Lands and Waters



-  NATIONAL PARK, MARINE PARK
-  CONSERVATION PARK, NATURE RESERVE, SECT 5(g) RESERVE
-  LEASEHOLD IN NAME OF EXEC. DIR.

Rowley Shoals M.P.



PILBARA REGION

Northern Territory

## **11. Proposed Vesting, Tenure, Purpose and Boundary Changes.**

The majority of land in the Kimberley Region is Crown land with a large proportion of this leased for pastoral purposes. Other land includes CALM estate, vacant Crown land (VCL), unvested reserves, reserves for use and benefit of Aboriginal people and reserves with various other purposes. An opportunity exists to proclaim a representative series of nature conservation reserves in the Kimberley Region which would be of enormous merit and achieve much in the challenge to conserve the world's biodiversity. In order for this to occur vesting, tenure, purpose and boundary changes will need to occur.

Recommendations for tenure changes have been made in previous documents including the Environmental Protection Authority's Conservation Through Reserves Committee (CTRC) System 7 report and CALM's 'Nature Conservation Reserves of the Kimberley (1991)'. Table 1 summarises the recommendations contained in these documents. The table also contains the recommendations of the report 'A Representative Marine Reserve System for Western Australia' (1994) and staff of the Kimberley region.

These publications give descriptions of the areas including their flora and fauna. It was considered unnecessary to repeat those details in this document.

It is recognised that the majority of the recommendations have not taken place even though many have been in existence for up to 20 years. There has over the years been an enormous amount of discussion in an attempt to create the reserves but resolution has usually been frustrated because of competing land use demands. These have ranged from concerns from the mining industry, pastoral industry and most recently Native Title.

It is expected that a conservation reserve system for the Kimberley will continue to develop as more information becomes available and as the above issues are resolved. A useful tool in assessing the overall suitability of areas is the Interim Biogeographic Regionalisation For Australia. This will assist in indicating which land categories were poorly represented in the reserve system.

Table 1  
KIMBERLEY REGION TENURE PROPOSALS

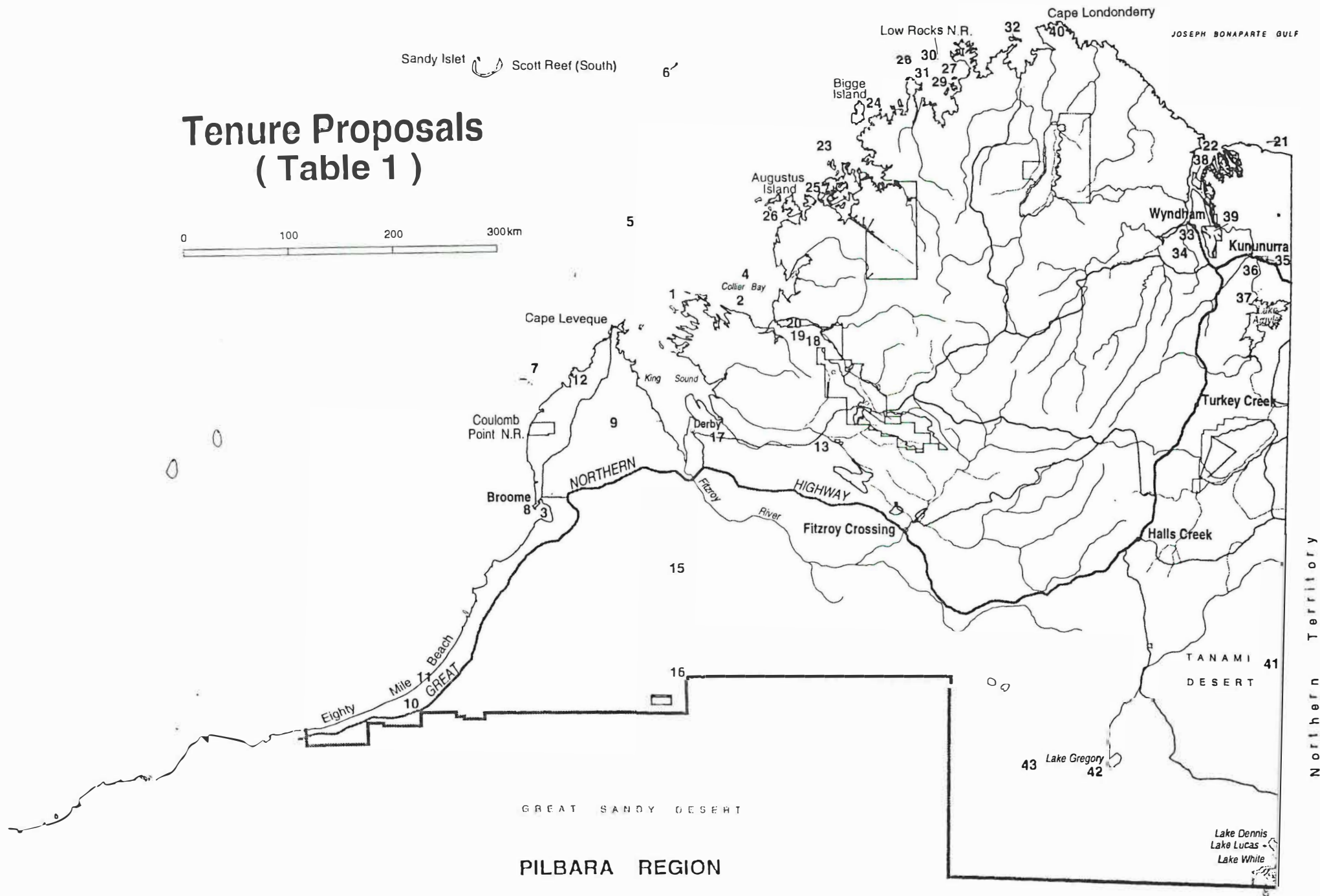
AREA NAME	CURRENT STATUS				PROPOSED STATUS			
	VCL	Pastoral Lease	Reserve	Other	National Park	Conservation Park	Nature Reserve	Marine Park
<b>WEST KIMBERLEY</b>								
<b>ISLANDS AND MARINE</b>								
1(H) Buccaneer Archipelago	X		X	X	X			X
2(H) Kingfisher Islands	X				X			
3(M) Roebuck Bay	X	X		X				X
4(M) Montgomery Islands	X		X	X				X
5(M) Adele Island				X			X	X
6(M) Browse Island			X				X	X
7(L) Lacepede Islands			X				X	
<b>MAINLAND</b>								
8(H) Broome Vine Thickets			X			X		
9(H) Dampierland		X	X			X		
10(H) Mandora	X	X						X
11(M) Eighty Mile Beach	X	X		X				X
12(M) Dampier Peninsula	X	X					X	
13 (H) Oscar and Napier Ranges			X		X			
14 (H) Mimbi Caves		X				Section 16		
15(M) Edear Ranges	X				X			
16(M) McLarty Hills	X		X		X			
17(L) Derby Samphire Flats								X
<b>Wandjina Coast Parks</b>								
18(H) King Leopold Ranges	X	X				X		
19(M) Humbert Creek				X		X		
20(H) Walcott Inlet	X					X		X

**Table 1 (cont'd)**  
**KIMBERLEY REGION TENURE PROPOSALS**

AREA NAME	CURRENT STATUS				PROPOSED STATUS			
	VCL	Pastoral Lease	Reserve	Other	National Park	Conservation Park	Nature Reserve	Marine Park
<b>EAST KIMBERLEY</b>								
<b>ISLANDS AND MARINE</b>								
21(M) Pelican Island			Class C				Class A	
22(M) Cambridge Gulf				X				X
<b>Wandjina Coast Parks</b>								
23(H) Bonaparte Archipelago	X				X			
24(H) Bigge Group	X				X			
25(H) Prince Regent Group	X		X		X			
26(H) Augustus Group			X		X			
27(H) Admiralty Gulf Islands	X				X			
28(H) Cassini Island	X				X			
29(H) Osborn Island	X				X			
30(M) Low Rocks			X		X			
31(H) Institute, Montesquieu and Kingsmill Islands	X				X			
32(H) Sir Graham Moore Islands	X				X			
<b>MAINLAND</b>								
33(H) King River			X			Special Purpose		
34(M) Cockburn Range		X			X			
35(H) Mirima			X		Increase Size			
36(H) Packsaddle Swamps	X						X	
37(H) Lake Argyle Islands and Carr Boyd Ranges	X			X	X			
38(M) Adolphus Island	X				X			
39(M) Parry Lagoons			X		X			
40(H) Cape Londonderry	X				X			X
41(M) Gardiner Range	X				X			
42(M) Lake Gregory		X				Special Purpose		
43(M) Southesk Tablelands	X		X		X			
44(L) Purnululu (CP)			X		X			
45(M) Osmond Valley		X				X		
<b>Wandjina Coast Parks</b>								
46(H) Prince Regent, Mitchell River and Prince Frederick Harbour	X		X		X			X
47(H) Lawley River	X			X	X			X
48(M) Camp Creek	X			X			X	
49(M) Mitchell Plateau	X			X			X	



# Tenure Proposals ( Table 1 )



In the table the numbers in front of the names of the locations relate directly to Map 2 and the H, M, and L give the priority for action of each of the proposals (High, Medium and Low). The reserves section indicates categories of land that are currently vested with some agency. For example they might be existing nature reserves or reserves for the use and benefit of Aborigines. As mentioned previously it is intended that conservation parks will eventually become national parks and for all reserves it is also intended that they should be Class A.

The proposed King River Reserve is a special purpose reserve for the management of crocodiles. This includes use of the area for commercial purposes.

## **AREAS REQUIRING FURTHER INVESTIGATIONS**

### **West Kimberley**

Chedda Cliffs, Islands in Talbot Bay, Phillips Range, Saint George Range, George Water, Doubtful Bay, Cape Borda-Pender Bay, Sandy Point-Beagle Bay, Lacepede Islands surrounds, Lagrange Bay and Yampi Peninsula.

### **East Kimberley**

Burt Range, Mount Zimmerman, Cape Bougainville Peninsula, Osmond Range Durack Ranges, Ningbing Range, North Kimberley Coast, East of Cape Londonderry, Pentecost and Durack River Gorges, Vansittart Bay, Long Reef, West Cambridge Gulf, Rust Range and Lake Kununurra

It is of relevance to look at the parameters set for the recommendations contained in the publication 'Nature Conservation Reserves In The Kimberley'. At the time the information was being collected on these areas there was a clear intention to assess unencumbered land as much as possible. This meant that areas looked at were mainly vacant Crown land or existing reserves. Areas with defined mineral potential or pastoral lands were not included. The result of this is that there are areas being brought to the attention of CALM which are as important, if not more so, than those already listed. The identification of land worthy of being reserved for conservation is dynamic in the Kimberley.

A further issue is the view held that all the recommendations should be seen as being the best possible outcome. It needs to be understood that the category of conservation reserve a piece of land is placed in to may not always conform to the recommendation contained in this plan. In order to achieve a result of protecting an area then boundaries and category will be negotiable depending upon the level of compromise required. However there do need to be strategies in place which ensure that the final outcomes have met the intent of what has been proposed.

## Strategies

1. Establish a senior level inter-departmental committee, chaired by the Director of Nature Conservation, and whose role will be to implement the tenure proposals as listed in Table 1 . Priorities given for each recommendation will be taken into consideration during that process.
2. Assess and recommend appropriate tenure proposals for those areas listed as requiring further investigation.
3. Reassess the boundary recommendations of the publication 'Nature Conservation Reserves In The Kimberley' and advise the Director of Nature Conservation of any changes that have taken place or are envisaged for approval.
4. Treat all boundary changes which come about through negotiation with stakeholders which are different to those contained in Table 1 as proposed only until they are approved by the Director of Nature Conservation.
5. Continue to identify the values of other areas which might be worthy of reservation.

## 12. International Agreements

### 12.1 Biosphere Reserves

Biosphere reserves are nominated by governments and are designated as such, if acceptable, by the Director-General of UNESCO.

*Biosphere reserves are 'protected areas of representative terrestrial and coastal environments which have been internationally recognised within the framework of UNESCO's Programme on Man and the Biosphere (MAB) for their values in conservation and in providing the scientific knowledge, skills and human values to support sustainable development' (Biosphere reserve nomination form 1994).*

*Within the biosphere reserve concept, three fundamental needs are addressed. Firstly the need to conserve biodiversity, ecological processes and ecosystems. Secondly, the need for an international monitoring network has been recognised. Thirdly the need to link environmental protection and land development with research and education to achieve sustainable development. The objective is for biosphere reserves to function as a World Network of protected areas which demonstrate the value of activities which link conservation and development.*



Biosphere reserves should have special value as a baseline for measuring long-term changes in the biosphere as a whole.

Currently there are 324 biosphere reserves in 82 countries with a total area of 211 500 million hectares. It is a general principle that biosphere reserves should be as large as possible. Across the world biosphere reserves encompass a wide range of land types, management regimes and land uses. They range in size from 70 million hectares in the North-east Greenland National Park to 20 hectares for the Miramare Marine Park in Italy.

What has been considered as a highly important issue with respect to biosphere reserves is the designation of a zoning pattern of core areas and buffer and transition zones. A role of this zoning is to assist managers in determining the appropriate use of the reserve and the location of those uses within the reserve.

The Prince Regent Nature Reserve is one of two biosphere reserves in Western Australia. The other biosphere reserve is the Fitzgerald River National Park located east of Albany on the south coast.

The Prince Regent Nature Reserve is a very remote reserve and presently has the classification of prohibited access. This means that people who wish to visit the reserve may only do so for legitimate scientific study under a permit issued by CALM. Because of the remoteness and the small numbers of people visiting the reserve the requirement to zone the area and produce a management plan is not considered to be a priority at this stage. This could alter with a change of purpose of the reserve. An option in the application of a zoning system to the area is to consider Prince Regent Nature Reserve as the core area with the surrounding lands and waters performing the functions of buffer and transition zones.

Discussions are under way on the feasibility of conducting a biological survey of the reserve which would replicate and add to that which was undertaken in 1974. Some consideration is also being given to assessing the fire regime which currently affects the area along with possible fire management practices which might be employed in the area. The achievement of both of these objectives is funding dependant.

It is recommended that this Nature Reserve have substantial land areas added to it with an allied change in tenure to National Park. The establishment of a Marine Park adjacent to the newly created National Park is also planned.

## Strategies

- 1. Continue to take the Prince Regent Nature Reserve's status as a biosphere reserve into full consideration when addressing usage of the area, funding acquisition, changes to status of the area and day to day management.**

2. **Place as a priority for the preparation of a specific area management plan any newly created national park. Zoning will be considered in that plan.**
3. **Continue to encourage biological studies of the biosphere reserve including efforts to acquire a suitable level of funding.**

## **12.2 Ramsar Convention for Internationally Important Wetlands**

In 1971 a convention was held in the Iranian city of Ramsar which resulted in governments nominating wetlands worthy of being listed as internationally important wetlands. Australia was the first contracting party to the Convention.

The official contact point for the Ramsar Convention within Australia is the Wetlands, Waterways and Waterbird Unit of Environment Australia. Environment Australia only exercises direct control on Ramsar matters affecting Commonwealth land. In Western Australia the responsible agency is CALM, which joins other States and Territories in regular informal and formal discussions on the Ramsar Convention. Apart from the nomination of important wetlands the Convention also obliges the contracting parties to formulate wetland policies, create wetland nature reserves, promote the wise use of wetlands, monitor listed wetlands to ensure they retain their special ecological characteristics, train managers in wetland management and consult each other on these and other issues.

Ramsar wetlands are often nominated because of their identified values with respect to waterbirds and in particular migratory species of these. Wetlands can, however, be nominated for other reasons including being a representative or unique wetland playing a substantial biological or ecological role in the natural functioning of a major river basin or coastal system, it performs a major supportive function for rare or endangered plants, animals and habitat and if it is important with respect to fish species and habitat.

There are four wetlands areas within the Kimberley region recognised internationally under the Ramsar Convention. These are Lakes Kununurra and Argyle, Eighty Mile Beach and Mandora, the Lower Ord, Roebuck Bay (see Map 2). These areas were listed in June 1990. There are nine Ramsar listed wetlands within Western Australia and 49 in Australia. The Lower Ord site is almost completely covered by the Ord and Parry Lagoons Nature Reserves.

In 1996 a report was compiled described as stage 1 in management planning for Ramsar sites in the Kimberley Region. This was prepared under contract and part funded through the National Wetlands Program of Environment Australia. It included participation of experienced CALM staff. It was the requirement of this report to advise and consult with relevant landholders and Aboriginal groups, undertake a thorough analysis of existing and potential threats to the ecological character of the sites, assess the cultural significance of each of the wetlands, assemble background information which might be used in the preparation of site management plans and identify critically important investigations or other actions required for the sites.

The need for managers to acknowledge the special interests of Aboriginal people in the areas was a specific requirement.

The report gave recommendations in some detail but which have been summarised as follows:

1. Encourage the development of research programmes aimed at understanding the ecological processes at each site. This is particularly so for Lake Argyle where they may be rapidly changing water regimes.
2. Develop monitoring programmes for each site to test for changes in the ecological character of the sites over time.
3. Create suitable conservation reserves for each of the Ramsar sites. (These proposed reserves are covered elsewhere within this plan.)
4. Establish consultative committees to discuss Ramsar issues and the management of each of the sites. In particular possible changes in the ecological character of Lake Kununurra since nomination needs to be investigated and reported on. Also the establishment of Lake Argyle and Lake Kununurra as separate Ramsar wetlands needs to be investigated along with Eighty Mile Beach and Mandora.
5. Define a clear management boundary at each of the sites. Work on this has occurred for Lakes Kununurra and Argyle.

Taken as a whole it is important to stress that the implementation of recommendations accepted is very much dependant on funding and other regional and district priorities.

The report went on to discuss the need to list Lake Gregory under the Ramsar Convention but acknowledged the need for substantial negotiations with local Aboriginal groups prior to progress being made on this report.

At the time of preparing this management plan a management report was being prepared for the Lower Ord site which comprises the Ord River Nature Reserve, Parry Lagoons Nature Reserve and the proposed Cambridge Gulf Marine Park. Funding assistance for this project comes from Environment Australia with the Final report due by the end of June 1998.

## **Strategy**

**Subject to the constraints outlined above CALM will implement the major recommendations of the Stage 1 Report for management planning of the Kimberley Ramsar wetlands.**

### 12.3 Other Internationally Recognised Values

Australia is a signatory to several international treaties that are concerned with the protection of migratory birds. These include the China Australia Migratory Birds Agreement (CAMBA) and the Japan Australia Migratory Birds Agreement (JAMBA). The State is working to list areas on the Shorebird Reserves Network with the Parry Lagoons Nature Reserve being the first listed. In the Kimberley consideration is being given to adding Roebuck Bay and Eighty Mile Beach.

The Kimberley Region is also internationally recognised for its 'wilderness' or remote experience areas and its wild and scenic rivers. The north-west Kimberley which includes catchments of rivers discharging to the coast from the Walcott Inlet to the West Arm of Cambridge Gulf, constitutes one of the great, remote isolated and virtually unscathed 'wilderness' areas of the country and of the world (Williams *et al*, 1996).

The greatest 'wilderness' or remote experience values are found in catchments that are isolated, rugged and rocky. Continuous uncontrolled grazing by cattle and feral animals is the major cause of damage to, and decline of, the vegetation and subsequently the soil supporting it (Williams *et al*, 1996).

Major tourist sites of the Kimberley region often focus on the 'wilderness' and wild scenic river values and include sights such as Mitchell River Falls, the King George River Falls, Purnululu and gorges along the Isdell, Charnley and Chamberlain Rivers.

In 1989 the NPNCA prepared a policy on wilderness. In that policy the definition of a 'wilderness area' was given as;

'A wilderness areas is a tract of land substantially unmodified by modern technological society, sufficiently large and remote to make practical the long term protection of its natural systems.'

Clearly, the Kimberley region has within it areas which fit this definition. A 'wilderness area' can also include within it areas of indigenous people living a traditional or non-industrial lifestyle involved in traditional land management practices.

There are two large conservation reserves, Prince Regent Nature Reserve and the Drysdale River National Park, where wilderness area management principles could be applied.

The objectives of 'wilderness' management are;

to protect the areas from disturbance by modern technological society;

to maintain their ecological processes;

to allow communities of indigenous plants and animals to continue to flourish and evolve in the wild;

to maintain opportunities for solitude and self-reliant recreation where compatible; and;

to educate the public in the concept of 'wilderness'.

### **Strategy**

**Investigate the feasibility of declaring appropriate areas of land as 'wilderness' and rivers as wild and scenic. In the first instance this will involve the existing conservation estate but consideration should also be given to areas proposed to be added to the conservation estate.**

## **13. CALM's Responsibilities Outside the CALM Estate**

CALM is responsible for the conservation and protection of indigenous flora and fauna on all lands and waters within State boundaries under the Wildlife Conservation Act 1950.

As mentioned previously vacant Crown land and unvested reserves are normally controlled by the Department of Land Administration (DOLA) but forest produce on vacant Crown land and pastoral leases is controlled by CALM under section 88 of the CALM Act.

CALM has responsibility for administering the Wildlife Conservation Regulations 1970 which provide for the protection, management and control of nature reserves. Under section 130 of the CALM Act those provisions also apply to those reserves created under the Land Act for the Conservation of Flora and Fauna but which are not vested in the NPNCA.

CALM can also enter into agreements with the owner, lessee or licensee of any land for the management of the land as national park, conservation park or nature reserve, or for some other purpose. Management agreements can also be made with the lessee of a pastoral lease with the approval of the Minister of Lands. Through management agreements under Section 16 of the CALM Act, the conservation values of areas can be safeguarded as these areas would be managed as if they were part of the CALM estate.

In order for CALM to achieve its conservation responsibilities, the Department participates in programs aimed at promoting conservation values and involving the public wherever possible. In a number of cases CALM is involved directly in decision making regarding land-use within areas proposed to be conservation reserves or in adjacent areas and is actively liaising with public interest groups such as land



conservation district committees in promoting the protection of conservation values of the Region.

An example of this broader responsibility is the joint control of feral animals in the Mitchell Plateau area. Here, apart from mustering of cattle by station owners from the vacant Crown land, CALM, in conjunction with the Agriculture Western Australia, and under the auspices of the North Kimberley Land Conservation District Committee, undertakes control measures through aerial shooting. A serious issue is that stock continue to make inroads into vacant Crown land, proposed conservation areas and other non-pastoral land categories and impact upon those areas, in some case dramatically. As a result of the rugged nature of many areas the options of mustering or taking animals for pet meat to reduce and eventually eliminate the animals is too expensive.

CALM will also promote the protection of specific areas of high conservation value which are not on the managed estate either through public promotion or through involvement in specific schemes aimed at the protection of certain areas. An example of this is the protection of the small and the widely dispersed rainforest patches which are found throughout the Kimberley. It would be highly unlikely that a reserve system could encompass all the various types of rainforest with enough areas covered to ensure their conservation and protection. CALM has prepared an education pamphlet about the factors that impact on rainforests and has also participated in fencing several areas.

CALM is well aware of areas, some of which are fairly substantial, within the Kimberley Region that will require further investigation to determine their conservation values and management requirements. Options for these areas include either adding them to CALM's conservation estate sometime in the future, managing them under some type of formal or informal management agreement or encouraging sympathetic management.

## **CONSERVATION**

The Wildlife Conservation Act gives the Department responsibilities on all land categories. Three Departmental policy statements provide management directions: No. 9 Conservation of Threatened Flora in the Wild, No. 27 CALM's Role in Management of Native Vegetation in Rural Areas and No. 33 Conservation of Endangered and Specially Protected Fauna in the Wild. Policy Statements 9 and 33 refer to species of particular concern declared under Section 14 (fauna) and Section 23 (flora) of the Wildlife Conservation Act 1950 to be either rare, threatened with extinction, or in need of special protection.

## 14. Flora and Vegetation

The Kimberley Region has 2 126 species of vascular plants. 101 species of these are non-local species (introduced or not native to the area). The 2126 species are made up of 167 families. The largest family of plants in the Kimberley is the Poaceae (grasses) followed by the Papilionaceae (pea flowers), Cyperaceae (sedges), Myrtaceae (eucalypts and paperbarks) and Mimosaceae (wattles). The degree of endemism in the Kimberley Region is difficult to ascertain as many species are poorly known taxonomically and are poorly collected. Many of the region's plants have closer affinities with plants of the Northern Territory and Queensland and areas of South-East Asia, than with the rest of Western Australia. Some of the 2126 species are also found in the adjacent Pilbara Region, but many are not found elsewhere in Western Australia.

Botanical collections of the Kimberley are believed to have been first carried out by botanist Allan Cunningham in 1819-1821. Further botanical collections were made by JWO Tepper in 1889-91, F M House in 1901, WV Fitzgerald in 1905-06, H Basedow in 1916 and by CA Gardner from 1921. Improved road and air access over the last two decades has enabled an increase in botanical collecting in the Kimberley. The first checklist of Kimberley vascular plants was published by the former WA Herbarium, now part of CALM, in 1989. CALM published the "Flora of the Kimberley Region" in 1992 and 'Broome and Beyond' in 1996. These studies represent the current state of taxonomic knowledge of the Region's plant species.

The Kimberley Region corresponds with the Northern Botanical Province as defined by Beard (1979). Within this province are four phytogeographic districts; the Gardner, Fitzgerald, Dampier and Hall Districts (see Map 4). The extent of these districts and the predominant vegetation is described in the "Flora of the Kimberley Region".

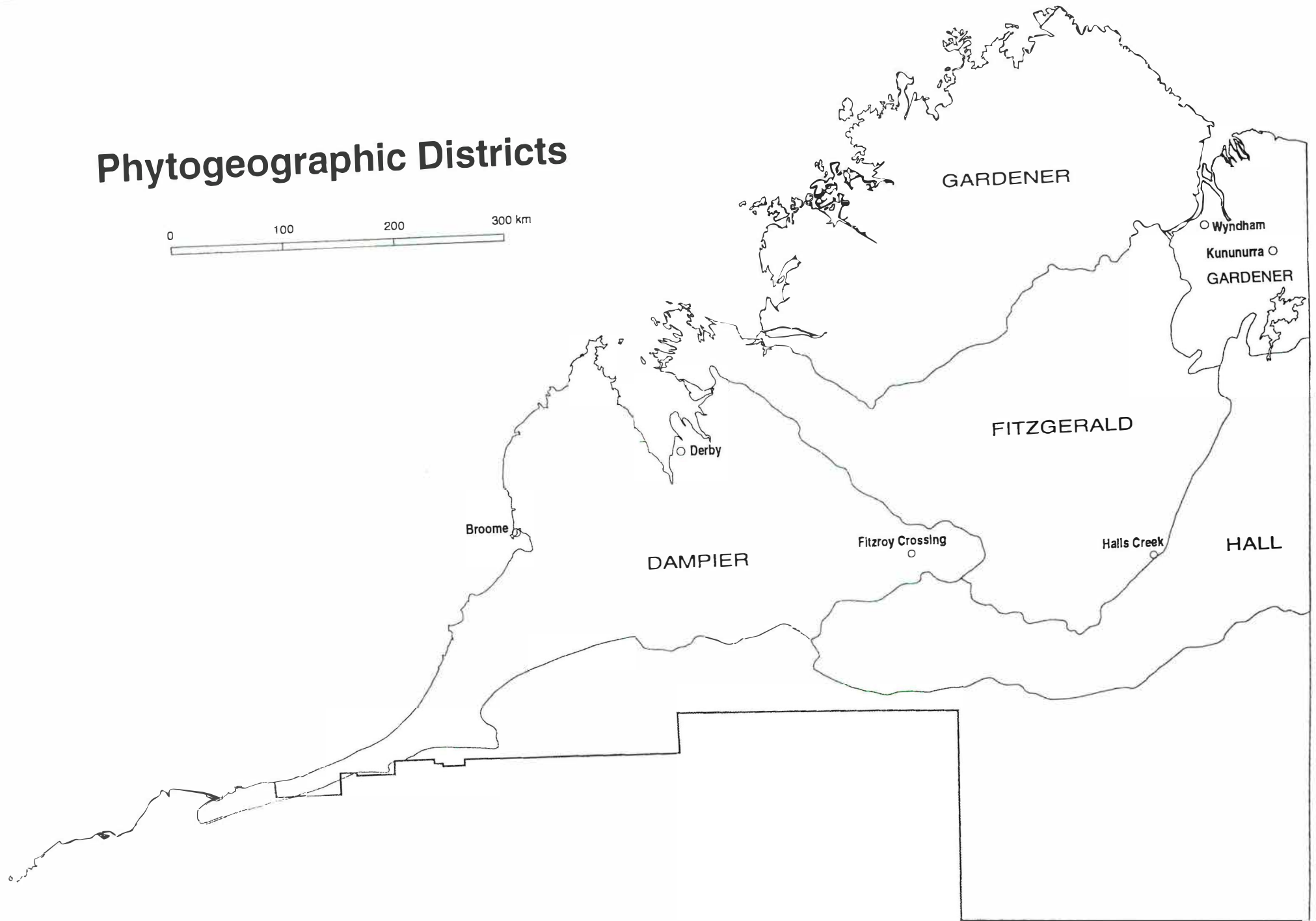
### *The Gardner Botanical District*

The vegetation is predominantly savanna woodland. On Sandstone areas *Eucalyptus* species dominate the tree layer and *Sorghum* and *Plectrachne* species comprise the grass layer. On basalt areas, however, the grass layer is dominated by species of *Sehima*, *Chrysopogon*, *Themeda*, *Heteropogon*, *Sorghum* and *Plectrachne*. Woodland occurs on areas of laterite with higher rainfall and is dominated by *Eucalyptus* species but also includes species of *Cycas*, *Livistona*, *Terminalia* and *Gardenia*. Riverine woodland includes species of *Terminalia*, *Ficus*, *Melaleuca*, *Acacia*, *Eucalyptus* and *Pandanus*. Small patches of vine thicket occur with a variety of tree and vine species. There are also, particularly in the east, small areas of hummock grassland associated with shale and dominated by *Plectrachne pungens* with occasional species of *Eucalyptus* and *Melaleuca*. Mangrove communities occur in sheltered inlets.

### *The Fitzgerald Botanical District*

The vegetation is predominantly savanna woodland or tree savanna in which the trees are generally lower and more scattered than in the Gardner District.

# Phytogeographic Districts





Eucalyptus species dominate the tree layer, but, to the south, there are often scattered trees of *Adansonia gregorii*, *Gyrocarpus americanus*, *Lysiphyllum cunninghamii* and *Petalostigma pubescens*. The grass layer is dominated by *Plectrachne* species. As in other Districts areas of shale support tree steppe and grass steppe.

#### *The Dampier Botanical District*

The vegetation is predominantly pindan or pindan woodland, both vegetation types being dominated by *Acacia* species. Pindan woodland has an emergent tree layer characterised by *Eucalyptus* and *Grevillea* species, *Gyrocarpus americanus*, *Erythrophleum chlorostachys*, *Lysiphyllum cunninghamii*, *Adansonia gregorii*, *Buchanania obovata* and *Terminalia canescens*. Low tree savanna is also found in which the grass layer is dominated by *Chrysopogon* species and the tree layer by *Adansonia gregorii*, *Lysiphyllum cunninghamii* and species of *Eucalyptus*, *Grevillea*, *Hakea* and *Acacia*. Fringing major rivers is riverine woodland of *Eucalyptus camaldulensis* with *Terminalia platyphylla*, *Nauclea orientalis*, *Adansonia gregorii*, *Lysiphyllum cunninghamii*, *Planchonia careya* and *Melaleuca*, *Pandanus* and *Ficus* species. On the black cracking clay plains is grass savanna dominated by *Astrebla*, *Dicanthium* and *Chrysopogon* species. The Oscar and Napier Ranges support a steppe of hummock grasses dominated by *Triodia* species with scattered herbs and very occasional shrubs and small trees of *Adansonia gregorii*, *Cochlospermum fraseri*, *Ficus* and *Terminalia* species. Mangrove communities are found in sheltered inlets and hypersaline samphire flats especially at Roebuck and La Grange Bays.

#### *The Hall Botanical District*

The predominant vegetation is of shrub steppe or tree steppe, with the grass layer dominated by *Triodia* species. The tree steppe has occasional to sparse trees of *Eucalyptus* species. The shrub steppe has occasional shrubs of species of *Acacia*, *Grevillea* and *Hakea*. There are areas of tree savanna in the Osmond Range and the Ord plains; here the tree layer is dominated by *Eucalyptus* species and the grass layer by *Aristida* and *Chrysopogon* species and also sometimes species of *Sehima*, *Themeda* and *Sorghum*. Cracking clay plains support a treeless grass savanna dominated by *Astrebla* species.

The Kimberley has a number of distinct and interesting flora communities. It is estimated that more than 1500 rainforest patches occur in the Kimberley. These are usually quite small and are thought to have begun to form around 6000 years ago. They have a distinct structure and floristic composition and attract and support fauna which is not found in the vast surrounding savanna. These patches are usually predominantly supported by some form of an aquifer, rather than rainfall, and are deciduous to some degree in the dry season. They occupy a range of niches; behind foredunes of beaches (eg. Broome), adjacent to rivers (eg. Ord), on scree slopes (eg. Mitchell Plateau), in gorges (eg. Emma Gorge) and in damp land situations. They range from being distinct and isolated to being indistinct from the surrounding savanna. By far the greatest number of these patches are to be found near the remote north west coast of the Kimberley in the higher rainfall areas. Tree species unique to

these areas include *Aglaia elaeagnoidea*, white bean (*Ailanthus triphysa*), *Ganophyllum falcatum*, *Garuga floribunda*, *Colubrina asiatica* and *Alstonia spectabilis*.

Mangrove communities are a feature of the Kimberley coast and larger estuaries. Seventeen species of mangrove have been recorded. These communities are more species rich than those further south in the State and support diverse land and marine faunas of which many are dependant on this habitat. The mangroves of the Kimberley have been documented in Semeniuk *et al* and the birds in Johnstone.

The flora of the Kimberley present a great opportunity and need for more detailed and longer term studies of, in particular, the structure and distribution of flora communities. There is also a need to obtain knowledge on the processes affecting the flora of the Kimberley whether that be man induced or as a result of long term natural and global change. There are indications that the inappropriate use of fire in the Kimberley has already affected the floristic structure of large areas. Associated with these changes are changes to the fauna of the region and through this inexorably linked relationship an example of an area of required study is how the demise of certain native fauna may have changed flora dispersal mechanisms.

### **Declared Flora**

Under the Wildlife Conservation Act, special protection is afforded to Declared Rare Flora by the requirement for a permit from the Minister for the Environment before such flora can be taken. In the Wildlife Conservation Act (subsection 6[1]) the following definition is given:

*To take in relation to any flora includes to gather , pluck , cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.*

Thus, taking declared rare flora would include not only direct injury or destruction by human hand or machine but such activities as allowing stock to graze on the flora, introducing pathogens that attack it, altering water tables such that flora is deprived of adequate soil moisture or is inundated, allowing air pollutants to harm foliage etc.

In the case of threatened plants which need fire for regeneration, burning at an appropriate time may not adversely affect the survival of the population. However, burning would injure existing plants and constitutes "taking" under the Act. Therefore, Ministerial approval is required prior to conducting a prescribed burn which involves any species of declared rare flora. A fine of up to \$10 000 may be imposed for a breach of the Act.

Two Departmental policy statements provide management directions, these being; policy No. 9 Conservation of Threatened Flora in the Wild and No 27 CALM's Role in Management of Native Vegetation in Rural Areas. Further, policy statements 9 and 33 refer to species of particular concern declared under Section 23 of the Wildlife Conservation Act 1950 to be either rare, threatened with extinction or in need of special protection.

In November 1997 there were 4 species of gazetted 'Declared Rare Flora' in the Kimberley Region. The species and distribution are noted below:

### **Declared Rare Flora of the Kimberley Region**

<b>Species</b>	<b>Distribution</b>
<i>Eucalyptus ceracea</i> <i>Eucalyptus mooreana</i> <i>Pandanus spiralis</i> var. <i>flammeus</i> <i>Pittosporum moluccanum</i>	NW of Wyndham, King George River King Leopold Range SE of Broome Dampier Peninsula, N of Broome, Berthier Is., Maret Is., Northern Territory, SE Asia

In addition to the species above, a further 99 species found in the region are listed as priority flora, 37 species of these are known from very few populations and are under threat, 35 are known from very few populations but are considered not to be under any immediate threat, 24 species known from several populations at least some of which are not believed to be under immediate threat and 3 species which, whilst rare, have been adequately surveyed and are not threatened by any identifiable factors.

There are some projects, apart from the ongoing gradual documentation of the flora of the Kimberley, which CALM either undertakes fully or participates in with other agencies. Often these projects attempt to answer management questions. Examples of this work are the rainforest research project mentioned earlier (Section 12) and the development of programs under the auspices of the Cooperative Research Centre (CRC) for the Sustainable Development of Tropical Savannas. These CRC projects include looking at the current and past distribution of cypress pine *Callitris intratropica*, factors affecting its distribution, changes to communities of which Cypress Pine was, or is, a component and studies of factors that are affecting the long term survival of riparian vegetation.

### **Strategies**

**In addition to implementing Departmental policies and guidelines for flora conservation, the Kimberley Region will:**

- 1. Prepare priority lists of those areas in the Region both within and outside the CALM estate, which require floristic documentation.**
- 2. Prepare protection, monitoring and research programs for the Region's threatened flora on a priority basis.**
- 3. Promote the protection of flora from both within and outside the CALM estate by liaising with groups and individuals with land affiliations or land management responsibilities in the Region.**

## 15. Fauna

There are around 79 species of mammal to be found in the Kimberley of which 7 of are introduced. Unlike other areas of Australia there have been no recorded mammal extinctions from the Kimberley though there are concerns about the status and distribution of a number of species. The approximate number of bird species to be found in the Region is 295 with a number of these being long term or short term visitors depending upon the season. Within the groups reptiles and amphibians there are approximately 178 and 39 species respectively. 12 frog species are confined to the Kimberley and there is one species of introduced frog. The Kimberley has the greatest diversity of frog species in Western Australia and the Region is considered by some authors as a distinct herpetofaunal unit in Australia (Tyler, Smith and Johnstone).

The Kimberley fauna includes a number of species not represented in, or occasional visitors to, areas further south in the state including two species of crocodile, birds such as the black-necked stork and brolga, a number of species of native rodents and the Ringtail Possum. It is considered that the pastoral industry has led to a reduction in the number of native fauna species in some areas and has been referred to in reports (Kitchener 1978, McKenzie 1981). Throughout Australia competition from feral animals and stock has, and continues to, dramatically impact on native species. The legacy and continuing results of these processes is also evident in the Kimberley, though in many respects little understood.

Regular surveys of freshwater crocodiles, *Crocodylus johnstoni*, and estuarine crocodiles, *Crocodylus porosus*, in the Cambridge Gulf, Forrest River, Durack River, Pentecost River, King River, Ord River and Lakes Kununurra and Argyle are carried out as a requirement of having a crocodile industry to gauge any changes in population numbers as a result of harvesting. Once funding has been secured the Department intends to conduct a saltwater crocodile survey of the whole region.

Information on the Kimberley fauna is limited and surveys are required to assess species, population levels, and conservation status and habitat requirements. Biological surveys have been undertaken by CALM which include Drysdale River National Park, Prince Regent Nature Reserve, Edgar Ranges, Islands off the North-West Kimberley, Great Sandy Desert, Kimberley Rainforests, Mirima National Park and the Cockburn Ranges. Many of these studies received both financial and staff assistance from external sources such as from the Commonwealth Government. The WA Museum and CALM has undertaken extensive surveys of the Mitchell Plateau. These surveys include the listing and discussion of the flora of the areas also.

Whilst often overlooked, research is beginning to show that the Kimberley has a rich assemblage of endemic land snail fauna. An important aspect of this is that these diminutive animals may prove to be important and easily identified indicators of greater habitat change affecting a broad range of organisms.



As with flora there is research interest in the fauna of the Kimberley by other States, National and International agencies. Apart from participating where possible in those projects CALM also issues permits for that research to take place.

### **Declared Fauna**

Conservation of Endangered and Specially Protected Fauna in the Wild (Policy No. 33) provides some management direction. Policy Statements 9 and 33 refer to species of particular concern declared under Section 14 of the Wildlife Conservation Act 1950 to be either rare, threatened with extinction, or in need of special protection. Fauna in need of important consideration are currently listed according to three categories:

Threatened- Presumed to be extinct or in imminent danger of extinction, dependant on or restricted to habitats that are vulnerable or subject to factors that may cause decline

Reserve- Recently removed from the threatened list, uncommon, declining in range, abundance or insufficient information available to make an assessment of their status.

Specially protected- Animals which might be taken illegally because of high commercial value and that taking might pose a threat to the species; uncommon but not endangered.

The fauna which fall into these categories known to, or potentially occurring in the Kimberley Region include 15 mammals, 38 birds, 12 reptiles and 10 fish. These are listed at Tables 2, 3 and 4.

TABLE 2

**Threatened Fauna of the Kimberley Region  
(known to occur or potentially occurring)**

THREATENED FAUNA	
Scientific Name	Common Name
<b>Mammals</b>	
<i>Dasyercus cristicauda</i>	Mulgara
<i>Isoodon auratus</i>	Golden Bandicoot
<i>Macrotis lagotis</i>	Bilby
<i>Lagorchestes conspicillatus</i>	Spectacled Hare-wallaby
<i>Petrogale lateralis</i>	Black-footed Rock-wallaby
<i>Mesembriomys gouldii gouldii</i>	Black-footed Tree-rat
<i>Megaptera novaeangliae</i>	Humpback Whale
<b>Birds</b>	
<i>Dupetor flavicollis</i>	Black Bittern
<i>Stictonetta naevosa</i>	Freckled Duck
<i>Aviceda suberistata</i>	Pacific Baza
<i>Erythrotriochis radiatus</i>	Red Goshawk
<i>Falco hypoleucos</i>	Grey Falcon
<i>Megapodius reinwardt</i>	Orange footed Scrubfowl
<i>Geophaps smithii</i>	Partridge Pigeon
<i>Polytelis alexandrae</i>	Princess Parrot
<i>Ninox rufa</i>	Rufous Owl
<i>Tyto longimembris</i>	Eastern Grass Owl
<i>Coracina tenuirostris</i>	Cicadabird
<i>Poecilodryas superciliosa</i>	White-browed Robin
<i>Falcunculus frontatus</i>	Crested Shrike-tit
<i>Malurus coronatus coronatus</i>	Purple-crowned Fairy-wren
<i>Lonchura flaviprymna</i>	Yellow-rumped Mannikin
<i>Erythrura gouldiae</i>	Gouldian Finch
<b>Reptiles</b>	
<i>Dermochelys coriacea</i>	Leathery Turtle
<i>Morelia carinata</i>	Rough-scaled Python

TABLE 3

**Reserve Fauna of the Kimberley**  
(known to occur or potentially occurring)

RESERVE FAUNA	
Scientific Name	Common Name
<b>Mammals</b>	
<i>Phaseogale tapoatafa</i>	Brush-tailed Phascogale
<i>Sminthopsis longicaudata</i>	Carpentariau Dunnart
<i>Pseudocheirus dahli</i>	Rock Ringtail
<i>Wyulda squamicaudata</i>	Scaly-tailed Possum
<i>Petrogale burbidgei</i>	Monjon
<i>Hydromys chrysogaster</i>	Water Rat
<i>Mesembriomys macrurus</i>	Golden backed Tree-rat
<b>Birds</b>	
<i>Ardea sumatrana</i>	Great-billed Heron
<i>Lephoictinia isura</i>	Square-tailed Kite
<i>Hamirostra melanosternon</i>	Black-breasted kite
<i>Accipiter novachollandiae</i>	Grey Goshawk
<i>Irediparra gallinacea</i>	Comb-crested Jacana
<i>Burhinus magnirostris</i>	Bush Thick-knee
<i>Rostratula benghalensis</i>	Painted Snipe
<i>Numenius madagascariensis</i>	Eastern Curlew
<i>Limnodromas semipalmatus</i>	Asian Dowitcher
<i>Calidris subminuta</i>	Long-toed Stint
<i>Sterna albifrons</i>	Little Tern
<i>Ptilinopus regina</i>	Red-crowned Fruit-dove
<i>Chalcophaps indica</i>	Emerald Dove
<i>Haleyon chloris</i>	Mangrove Kingfisher
<i>Pitta iris</i>	Rainbow Pitta
<i>Microeca flavigaster</i>	Lemon-breasted Flycatcher
<i>Rhipidura rufifrons</i>	Rufous Fantail
<i>Cisticola juncidis</i>	Zitting Cisticola
<i>Amytornis housei</i>	Black Grass-wren
<b>Reptiles</b>	
<i>Diporiphora convergens</i>	
<i>Lerista apoda</i>	
<i>Lerista separanda</i>	
<i>Lerista prae-frontalis</i>	Buccaneer Burrowing Skink
<i>Rhamphotyphlops howt</i>	
<i>Rhamphotyphlops micromma</i>	
<i>Rhamphotyphlops vampiensis</i>	Koolan Blind Snake
<b>Frogs</b>	
<i>Uperoleia minima</i>	
<i>Uperoleia variegata</i>	
<b>Fish</b>	
<i>Craterocephalus helenae</i>	Drysdale Hardyhead
<i>Craterocephalus lentiginosus</i>	Prince Regent Hardyhead
<i>Melanotaenia pygmaea</i>	Pygmy Rainbowfish
<i>Hannia greenwayi</i>	Greenway's Grouter
<i>Letopotherapon macroiepis</i>	Longnose Sooty Grunter
<i>Syncomistes rastellus</i>	Drysdale Grunter
<i>Hypseleotris aurea</i>	Golden Gudgeon
<i>Kimberleleotris notata</i>	Drysdale Gudgeon
<i>Kimberleleotris hutchinsi</i>	Mitchell Gudgeon



TABLE 4

**Specially Protected Fauna of the Kimberley  
(known to occur or potentially occurring)**

<b>SPECIALLY PROTECTED FAUNA</b>	
<b>Scientific Name</b>	<b>Common Name</b>
Mammals <i>Dugong dugon</i>	Dugong
Birds <i>Tadorna radiah</i> <i>Falco peregrinus</i> <i>Cacatua leadbeateri</i>	Radjah Shelduck Peregrine Falcon Major Mitchell's Cockatoo
Reptiles <i>Crocodylus porosus</i> <i>Crocodylus johnstoni</i> <i>Aspidites ramsayi</i>	Saltwater Crocodile Freshwater Crocodile Ramsay's Python

A number of projects are in place to find out more about these threatened species in order to develop management strategies to protect their habitats and ensure ongoing survival. These projects include a program to record and investigate reported sightings of the night parrot, *Geopsittacus occidentalis*; the preparation of a recovery plan in collaboration with a number of other Australian agencies, for the Gouldian finch and bilby; *Erythrura gouldiae* and *Macrotis lagotis*; the protection and management of a small soak near Kununurra to look at habitat options for finches and the Gouldian finch *Erythrura gouldiae*, in particular; research into the habitat requirements, biology and ecology of the golden bandicoot *Isodon auratus* with financial assistance from Environment Australia; and the habitat range of the black-footed rock-wallaby, *Petrogale lateralis*.

There are many fauna groups that require basic taxonomic and distribution studies. Taxonomic work is required amongst the mammals particularly when considering threatening processes which might be occurring in that group with the possibility of extinctions. Other groups, such as insects, require basic studies as there are numerous new species still to be identified in the region.

CALM has formed a specialist unit to focus on the fate of the State's endangered flora and fauna. This group is called the Western Australian Threatened Species and Communities Unit. Policy Statement No. 50 Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna has been developed with the operational objective 'To ensure that conservation resources are allocated on a priority basis to the most threatened taxa of plants and animals'.

More work is being undertaken by CALM, often in collaboration with other State and Federal agencies, on the preparation of endangered species recovery plans. Most

activity in the Kimberley is occurring with respect to fauna currently as previously mentioned the bilby *Macrotis lagotis*, the Gouldian finch *Erythrura gouldiae* as well as the dugong *Dugong dugon* are being studied through collaborative efforts. The same could occur for endangered flora and endangered communities. Associated with this is a requirement for a regionally based operations group who can facilitate information exchange between researcher, planners and operations staff and who can participate in the setting of priorities and the acquisition of funds. This group should include non-CALM personnel such as volunteers and people with expertise in particular fields. An important role of the group would be to coordinate works across the region to ensure a consistent approach.

## **Strategies**

**In addition to implementing Departmental policies and guidelines for fauna conservation the Kimberley Region will:**

- 1. Prepare priority lists of those areas which require faunal documentation for existing and proposed CALM estate as well as region-wide.**
- 2. Prepare protection, monitoring and research programs for the region's threatened fauna on a priority basis.**
- 3. Promote the protection of the region's fauna.**
- 4. Establish a regional endangered species operations group.**

## **16. Historic Sites**

Discussion of historic sites is defined here as dealing with those built structures and other aspects reflecting the influence of European settlement.

On much of the estate managed or proposed to be managed by CALM are historic sites which require specific attention. In many cases what might be considered of historic importance has not been correctly documented. There is a requirement for a better understanding of the methods of management of these sites.

Historic sites can range from homesteads such as at Mt Hart, the telegraph station ruins at Parry Lagoons Nature Reserve and trees (usually boabs) blazed by early explorers as within the Prince Regent Nature Reserve. There are a range of places where the influence of European exploration, the pastoral industry and mineral exploration is in evidence. These include the alignment of old tracks and stock routes which whilst no longer visible on the ground can be seen on maps and were once used; fencelines; dams (turkey mounds); outstations; yards and even old abandoned vehicles.

In the past arbitrary decisions have been made concerning features without assessments of their cultural significance being made. This has usually taken place because of an understandable desire to either remove apparently unsightly 'rubbish', to return an area to its natural state or in upgrading a location.

In 1979 Australia adopted the Burra Charter which is a charter for 'the conservation of places of cultural significance'. The Burra Charter has a series of guidelines which include defining significance, establishing significance, conservation policy and procedures for undertaking studies and reports. Clearly this Charter applies to Aboriginal sites also.

### **Strategies**

1. **Collate existing information on historic sites located in or proposed to be included in the CALM managed estate of the Kimberley Region.**
2. **Maintain an up-to-date register of sites in the Regional and District offices.**
3. **Ensure that, until the above strategies are implemented, no works are undertaken affecting features on the CALM estate without an assessment of cultural significance being made.**
4. **Liaise closely with the National Trust and the Heritage Commission in the preparation and maintenance of registers and in the evaluation of potential additions.**
5. **In accordance with the Burra Charter develop management guidelines for historic sites in liaison with the WA Museum, National Trust, Heritage Commission, tertiary institutions and historical societies.**
6. **Where appropriate, incorporate material on historic sites of an area in interpretive displays and community education programmes.**

## **RECREATION AND TOURISM**

### **17. Overview**

Interest in the natural wonders of the Kimberley by both national and international visitors grows yearly. CALM sees itself as having a major role to play in the development of the recreation and tourism industry. Sustainable recreation and tourism is a primary objective of CALM.

Increasing tourist interest in the area has lead to an expansion in commercial tour operators providing tours to attractions on CALM managed lands. All commercial concession tourist operations on CALM managed land are required to be licensed under the CALM Act (See Section 39).

Traditionally some categories of lands managed by CALM, particularly national parks, are extensively used for both recreation and tourism. There is a developing trend towards recreational and tourist use of other lands entrusted to CALM due to increasing interest in the natural environment, and improved access, particularly private use of four wheel drive vehicles. The WA Tourism Commission estimated that there were 260,00 visitors to the Kimberley Region in 1996. CALM visitation figures for selected sites are displaying a rising trend. Visitor numbers to Purnululu National Park during 1995/96 reached 13 000. For the same period Geikie Gorge National Park attracted 27 000 visitors. There is also an expansion occurring in the charter boat industry for fishing and nature based expeditions of both short and long duration.

CALM sees the Kimberley Region as having a vital role to play in introducing people to the State's natural values and the numerous functions of the Department. It is proposed to expand the Regional Headquarters at Kununurra become more visible and accessible to the public through the development of office facilities at the Kununurra Arboretum. A greater role in the provision of information and interpretive services can then be adopted.

Future services and facilities required on CALM managed lands are directly linked to the level and type of visitation.

## **18. Recreation**

Recreation is defined as those leisure time activities or experiences participated in through choice which bring enjoyment or satisfaction to the participants. It is recognised that lands and waters entrusted to the Department have the capacity to satisfy an important portion of the public demand for outdoor recreation and in so doing contribute significantly to social, psychological, physical and economic well-being of people of this State. Society's demand for recreation and tourism opportunities in natural areas is reflected in CALM's enabling legislation and is a principle objective of the Department. Policy Statement No. 18 - Recreation, Tourism and Visitor Services establishes the following general principles:

### *Preservation of Land Values*

The values of the land as a whole should be maintained, the natural ecosystems (including landscapes, particular sites, biota) should be able to sustain the form of recreation, or ancillary activity which is occurring or proposed.

Consistent with preservation of land values, facilities associated with recreation should be carefully controlled. For example facilities for organised sport should generally be minimal on most categories of land. This is also tied to Section 33 of the CALM Act which limits the Department's ability to carry out other than 'necessary operations' on nature reserves, national parks and conservation parks unless there is an approved management plan in place.

The intensity of recreational activity should be controlled if necessary to ensure that it does not destroy the value and nature of the activity. Where access to CALM managed lands is sought for activities such as water skiing and stocking with introduced fish for recreational fishing, CALM would generally pursue a strategy of encouraging proponents to look for alternatives outside CALM managed lands.

#### *Consistency of Recreation with Purpose of Vesting*

Recreational activity should be compatible with the vesting purpose of the land or the established land use priority. This includes existing categories of land such as State forest, national park and nature reserve, but also includes allowance for new categories which may arise.

#### *Equity*

The widest range of activities consistent with the purpose of vesting should be allowed, but uses which impair other forms of use to an unreasonable extent or place the safety of other users in jeopardy, should be controlled or eliminated. The application of the concept of zoning of the estate is often used to assist in this regard.

#### *Management*

The Department should be capable of providing any necessary degree of supervision of the activity, particularly where land values may be impaired. If this cannot be done the activity should be restricted, relocated or eliminated.

## **19. Public Access**

Lands and waters entrusted to the Department are generally open to public use. There are some areas restricted to the public for reasons of safety, disease control, water quality, protection of species, maintenance, etc. Throughout the Kimberley there are a number of very remote areas where access is only possible by boat or air. For example there is no road access to the Prince Regent Nature Reserve. The Drysdale River National Park has no roads within it and areas such as Lennard Gorge are only accessible by four wheel drive vehicles in the dry season. The Prince Regent Nature Reserve is declared to be a prohibited access area and as such permits to enter are only granted for scientific reasons. With the implementation of proposed enlargements to this reserve and its declaration as a National Park public access will be facilitated and managed for.

Air transport has been identified as one of the most feasible methods of accessing remote locations in the Kimberley. Air services from Perth and Darwin to Kununurra



and Broome operate on a daily basis. Kimberley air charter companies conduct aerial tours over the region and CALM's Ibis Aerial Highway links a number of remote attractions with airstrips located at main visitor points eg. Bell Creek Gorge, Windjana Gorge and El Questro Station. The construction and further upgrading of airstrips in the region will provide opportunities to further link up these areas possibly through the provision of low key safari style accommodation. Aircraft based tourism is an increasingly important component of the visitor experience in the region.

One drawback is that the visual intrusion and noise from aircraft operating on or near parts of the conservation estate can detract from the visitor experience. Areas of no fly zones or specified times of operation over parts of the conservation estate are measures which will be implemented in order to alleviate this problem.

Parks may be closed at any time, especially in the wet season which extends over the period from November to April, when road conditions deteriorate. Information on road conditions in the Kimberley can be obtained from the appropriate Shire or Main Roads WA. For road conditions in national parks or reserves the nearest CALM office should be contacted.

Main Roads WA plan a major upgrade of The Gibb River Road over the period 1996 to 2005. The Derby-Gibb River-Wyndham Road is an important route for tourism, pastoral and community access purposes. Part of this road, the Kalumburu section, provides access to remote Aboriginal communities on the northern coast and areas such as the Mitchell Plateau. The road is currently closed four to five months of the year through seasonal flooding. Proposed gravel sheeting, construction and sealing of jump-ups and improvements to waterway crossings will reduce periods of road closure and will provide a better standard of service for all road users. The upgrading of this road has major implications for the existing and proposed CALM estate as it is likely that this road will provide a two wheel drive access to what are fairly remote areas of the Kimberley. There is also the likelihood that the broader conservation values of the remote north Kimberley will be impacted upon. Improved road access will inevitably result in an increase in the numbers of visitors to areas which do not have management infrastructure and possibly lead to degradation of those areas. The impact of un-managed roadside camping is being noticed through the King Leopold ranges. To date there has been no analysis of the implications, both positive and negative, of the road upgrade with an associated plan of management to assist all land managers in maximising the benefits and minimising the impacts of that upgrade.

It is essential that road access is consistent with the wilderness character of many parks and reserves and a single, four-wheel-drive access road is seen as one strategy to help maintain that character.

A number of areas do not have gazetted access from public roads, for example Purnululu National Park, Drysdale River National Park and Brooking Gorge Conservation Park. It is intended to seek a dedicated alignment to each of the areas from public roads and secure the same for other areas as they are reserved. These alignments may be used to provide for public access or to ensure access for management purposes.



A cautious approach will be adopted in planning for and providing access to the region's reserves. Access needs to be balanced with care of the features and protection of the visitor experience. Appropriate access will be facilitated and in so doing a wide range of options will be taken into consideration. There are already a variety of access avenues operating including bitumen roads, fly and drive, single width four wheel drive tracks, fly overs and guided tours.

There are several areas where access protocols need to be developed such as in the Prince Regent area or islands and shorelines where seabird and turtle activities occur or in other sensitive areas where reef walking and shell collecting tend to occur. Access by divers at the Rowley Shoals Marine Park is being addressed in the preparation of a management plan for that area and through the issuing of permits for commercial activities.

### **Access Policies**

- Access to all areas of land and waters entrusted to the Department will be open to public use, except where this contravenes the general principles discussed above. In practice this allows access on foot to most areas and access by vehicle along designated tracks and roads.
- Access on foot will be facilitated by construction of walking paths and tracks in areas where features of interest, protection of natural resources and public safety justify their construction. Interpretation material will be included as appropriate. Construction standards will be determined from time to time in accordance with CALM Policy Statement No. 40 - Road Management. Construction will accord with policy on visitor safety and will, where possible provide appropriate access for disabled people.
- Vehicle access will be generally determined within the constraints of Section 33 of the CALM Act. In most areas a system of roads and/or tracks exists before a management plan is prepared. Generally access along such roads/tracks will be permitted until a management plan is prepared, but in circumstances where the values of the land are under threat (eg. for erosion control) it may be necessary to close or restrict vehicle access.
- Road design standard will be determined in accordance with CALM Policy Statement No. 40.
- Use of unregistered vehicles will not be permitted except in compliance with the Off Road Vehicles Act. Where a permit is provided under that Act by the Minister for Local Government, departmental approval is required for use on lands managed by this Department. Such approval will be issued by the Regional Manager. Guidelines for approval will be issued separately.

- Access by aircraft is subject to regulation by the Commonwealth Department of Transport. The Department may impose additional conditions for access. At other than established airstrips, access by aircraft, including helicopters, will be by permit from Regional Managers.
- Airstrips will be constructed only in accordance with an approved management plan.
- Power boats will not be permitted in areas where their use is not already established. Permission will not be withdrawn except through the area management plan process or as a requirement of 'necessary operations'.

Management plans may seek to vary existing use where such use is not in accord with the principles discussed above.

### Strategies

1. **Facilitate appropriate public access to the estate managed by it and investigate all options to do so.**
2. **Seek to create a dedicated access alignment to each area of the Kimberley conservation estate from public roads.**
3. **Investigate and implement where necessary controls on aircraft operation, including no fly zones and times of operation, over specified areas of the conservation estate.**
4. **Undertake a review of all existing roads and tracks and make recommendations on their requirements and standards.**
5. **Develop access protocols for sensitive areas such as those important for seabird and turtle activities.**

## 20. Safety

CALM has a 'duty of care' to users of CALM managed land under the Occupiers Liability Act. The Department encourages safe use of areas under its management.

It is important that visitors to the region are made aware of the possible dangers they might face in such a remote area. The grandeur of the Kimberley can hide some of its risks. Examples are the lack of water supplies and very high temperatures for much of the visitor season presenting the hazards of dehydration and heat stress to those unprepared. The combination of high growth rates of vegetation in the wet season coupled with a long dry season often create a high fire risk.

Visitors should be encouraged to take all possible steps to ensure their own safety. Because of the vastness of the region in the event of a problem occurring there can be long delays before help is on hand.

The coordination of search and rescue operations is the responsibility of the WA Police Department, however, where incidents occur on lands managed by CALM it is often the Department who will organise an initial response. The skills and resources of the Department may also be required to assist Police in dealing with emergencies outside areas managed by CALM.

### **Strategies**

- 1. Undertake a risk assessment of the CALM estate and facilities in addition to that which occurs on a day to day basis.**
- 2. Develop emergency management procedures for the region.**
- 3. Train staff in Incident Control Systems (ICS).**

### **21. Visitor Fees**

It is necessary that CALM implement a policy broadly described as user pays. Funds are generated through a system of commercial concessions and visitor fees. These monies are used to assist CALM in meeting its management obligations.

The rationale behind commercial concessions and the charges levied are explained in the sections following the broad heading of 'Commercial Activities'.

The recouping of fees from visitors to the CALM managed estate can offset the costs of management and raise funds for the provision and maintenance of facilities and services for users. Whenever possible, and appropriate, fees will be collected from users when a service or opportunity is provided as long as the benefit to the Department (which may include protection of surrounding resource values) exceeds the cost of collection. A variety of alternative recoupment methods will be used including visitor entry fees, vehicle entry fees, camping fees and voluntary donations. The level of fees is set from time to time by the Minister for the Environment.

A number of park passes is available from CALM and apply to some national parks in Western Australia. Currently an entrance fee to most National Parks in the Kimberley Region is not charged but this situation will change in the near future. Entrance fees are currently charged at Purnululu and Mirima National Parks. An Annual Local Park Pass is also available for these two parks. Camping fees are charged in some parks including those at Windjana Gorge National Park, Purnululu National Park and Silent Grove and Bell Creek within the Mt Hart Pastoral Lease. The introduction of a Kimberley Parks Pass where a single payment can be made for entrance to all parks is being considered.

## Strategy

**Adopt a consistent fee system across the region including various entrance and camping fees. A Kimberley Park Pass will be introduced.**

## 22. Visitor Accommodation

There is increasing demand by the public for opportunities to stay overnight in the lands and waters entrusted to the Department. Overnight stays are catered for through camping or built accommodation. CALM Policy Statement 18, Recreation, Tourism and Visitor Services covers built accommodation and camping policies.

Campsites are established at Bellburn Creek and Kurrajong within the Purnululu National Park and at Windjana Gorge, Silent Grove and Bell Creek. Bush camping is permitted in larger reserves subject to certain conditions and where impacts are minimal and constraints of distance apply. In all cases where bush camping is to be undertaken notification of the duration and location of the activity is sought. The EKD negotiates with the owners of Carson River Station concerning bush camping activities on that pastoral lease for when people visit the Drysdale River National Park. The issue of people camping adjacent to the Gibb River Road in the vicinity of the King Leopold Ranges needs to be resolved

Some issues of importance to managers with respect to camping are:

- provision of suitable camping areas (both in terms of environmental impact, site stability and in meeting visitor needs)
- minimising conflicts with day users
- managing and maintaining campsites
- lighting of campfires (collection of firewood and risk of bush fires need careful consideration).

Overnight accommodation is available at CALM's Mt Hart homestead, which operates under a contract for services agreement and is located within the King Leopold Ranges, north west of Derby.

Occasionally the concept of providing more permanent chalet style accommodation has been raised. CALM will consider this type of development either on or adjacent to the conservation estate provided there is no conflict with the purpose of the area involved and it conforms with all aspects of the compatible operations planning and if necessary a formal environmental impact assessment.

## Strategy

**Review annually accommodation demands including an assessment of the standard of existing facilities.**

## **23. Day Use Facilities**

Many recreational pursuits on lands managed by CALM are carried out during the course of one day. These include picnicking, barbequing, bushwalking, photography, painting, fishing and nature study.

Major issues with respect to day use recreation are:

- location and design of facilities such as toilets, footpaths, barbeques and parking areas
- maintenance of recreation areas and footpaths
- visitor safety
- visitor information and interpretation

Whilst some provision will be made for rubbish collection this will be limited to camping areas but in all cases there will be an emphasis on encouraging visitors to take their rubbish with them.

Facilities will be provided to meet the requirements of visitors but without compromising the values and purpose of the estate.

## **24. Bushwalking**

Bushwalking is a popular activity on Departmental lands and enables visitors to explore and appreciate the natural environment at close quarters. Opportunities for bushwalkers are extensive and diverse and range from the short self guiding nature paths to long distance excursions.

The impact of bushwalking on the physical environment, while generally low, can vary depending on soil conditions, landform, vegetation type and intensity of use. Other impacts include the introduction and/or spread of weeds and plant disease or the escape of fires. Usually these problems can be effectively minimised through the sensitive location and design of paths and selection of campsites.

The potential safety problems associated with longer walks through remote areas are of concern. These include a walker becoming lost or injured or the risks associated with wildfire. These problems can be largely overcome through the provision of a self registration system and the provision of visitor information designed to ensure walkers are informed and equipped to handle the conditions they will encounter. Indications are that there will be an increasing demand for multi day walks over varying distances and an increasing involvement of commercial operations in the provision of this activity. It is in this extended walk activity that immediate action is required.

### **Strategy**

- 1. Clarify the situation with respect to long distance and multi day walking excursions by;**

- **establishing preferred long distance walking trails in some large reserves including designated camping sites;**
- **formulating an emergency management procedure;**
- **providing information on the conditions for use and encouraging notification from members of the public; and,**
- **introducing a fee system for commercial involvement in this activity for lands managed by CALM.**

## **25. Recreational Fishing**

Recreational fishing is permitted on some lands managed by CALM under conditions established by the Fish Resources Management Act 1994, unless restricted or prohibited by a management plan. Recreational fishing is not permitted in nature reserves. In marine parks and national parks it is permitted apart from declared sanctuary zones. These zones are identified during the planning process for an area or through necessary or compatible operations planning.

When addressing fishing matters the Department must liaise with the Fisheries Department.

An issue which has been raised previously is that of fishing at the Geikie Gorge National Park. It is considered that recreational fishing should not be banned at this site. The reasons for this are that the local community place strong emphasis on access to the waters of the gorge and there are a series of conditions on the activity which controls it adequately. Such conditions include method of take and fishing times as well as standard fishing regulations. Consideration will be given to the introduction of a fee to undertake this activity.

In other areas because of either the small area of water left at the end of the dry season, such as at Windjana Gorge, or the presence of unique fish communities, such as at the Rowley Shoals, fishing pressures will be removed. Such constraints will apply to all forms of fishing including spearfishing.

### **Strategies**

- 1. Prohibit fishing at Windjana Gorge National Park.**
- 2. Prepare a management plan for the Rowley Shoals Marine Park that include zoning to protect conservation and recreation values.**



## 26. Domestic Animals

Dogs and cats are prohibited from national parks and nature reserves excepting for seeing eye dogs for blind persons and specially trained animals for management such as feral animal control, search and rescue, or security purposes. At other locations in the state zones have been specified on some reserves where dogs may be exercised. No such zones will be gazetted on the conservation estate of the Kimberley.

Also in other parts of the state staff who live within national parks have been given permission to keep pets. No such approval will be given for Kimberley parks and reserves.

In the case of Aboriginal living areas within reserves approval for dogs may be given subject to a suitably reasoned application being made. The main condition will be that the dogs are to remain within the bounds of the living area at all times and if this does not prove to be the case all dogs will need to be removed.

Domestic dogs found wandering within a reserve will be destroyed.

Cats are seen as the most destructive domestic animal to be found in the Kimberley. There are very real concerns about the impact the cat population is having on the fauna of the region. With the establishment of remote communities these animals continue to be introduced which is a disturbing trend. Apart from not approving cats to be kept in any reserve including Aboriginal living areas the Department will investigate methods of controlling and possibly eradicating the population of cats if present.

Whilst no applications have to date been received it is possible that there will be requests to conduct treks with horses (or camels) within CALM managed land. If this is undertaken as part of a commercial operations such as an adventure tour group then it will be necessary for the proponent to submit the details necessary to conform with compatible operations planning. Such an activity will also attract a fee.

In the event of individuals or groups wanting to undertake treks which are not part of a commercial operation it is the Department's preference that routes which do not involve conservation reserves should be chosen. In the event of this being unavoidable approvals may be given on a once only basis.

### Strategy

**In addition to implementing Departmental policies and guidelines prepare a Regional Recreation and Tourism Plan. This plan will provide greater detail and guidance on what the Department's approach is and will be in the region and why. It will be prepared with the participation of all interested parties.**

## **ABORIGINAL ISSUES**

### **27. Cooperative Management**

Cooperative management arrangements have been entered into by Aboriginal traditional owners and CALM.

The management plan for Purnululu National Park is the first plan for the conservation estate of Western Australia to provide a formal management structure for the participation of the Aboriginal traditional owners. This plan recognises the valuable contribution to be made by the Aboriginal traditional owners. It acknowledges their traditional responsibility for the care of their cultural values and the link this has to the land.

As part of the planning process an Aboriginal-CALM Park Council is established to address matters of concern to Aboriginal people. The Park Council is the primary agent for Aboriginal participation in Park management following the adoption of a plan. Apart from assisting in the preparation of management functions of a Park Council are to assist CALM, within the provisions of the CALM Act, in the implementation of approved management plans, to develop policy in relation to Aboriginal interests in the Park and to provide advice to the Minister for the Environment in all matters relating to Aboriginal involvement in the Park.

In association with Aboriginal groups CALM is developing the function of cultural rangers who have a pivotal role to play in linking CALM's responsibilities with the traditional responsibilities of Aboriginal people. To date these positions have been created for the proposed Dampierland Conservation Park and Geikie Gorge National Park.

Discussions are continuing with the traditional owners of the Mimbi caves area to develop a cooperative management arrangement under section 16 of the CALM Act. Under that section CALM can enter into an agreement with land owners to manage a piece of land as if it were a national park, nature reserve etcetera. This process does not involve formal reservation of the land.

#### **Strategy**

**Maintain and build upon commitment to the pursuit of cooperative management arrangements with Aboriginal people.**

## **28. Customary Activities**

Legislation recognises Aboriginal rights to hunt and fish for food. Under section 23 of the State's Wildlife Conservation Act 1950 Aboriginal people are exempted from some of the provisions related to the taking of certain flora and fauna. Aboriginal people may take flora and fauna for food from land, including Crown land, but not from either a nature reserve or a wildlife sanctuary. The consent of the occupier of the land is required. In the case of national parks and conservation parks the consent of CALM's Executive Director is necessary for Aboriginal people to hunt, fish or gather food for their own sustenance. Conditions associated with approval include that the species taken is not likely to become unduly depleted, food taken is not sold and the activity is consistent with other land management objectives.

## **29. Aboriginal Living Areas**

With approval from the NPNCA and the Minister for the Environment the Executive Director is able to grant a lease of an area of CALM managed estate as long as it is consistent with a management plan for the area or conforms with necessary or compatible operations planning. Through this provision the establishment of Aboriginal living areas can be considered. Through a longer process, and if appropriate, areas could be formally excised from a reserve.

In Purnululu National Park, for which a final management plan is in place, the Minister for the Environment agreed in principle to the establishment of residential lease areas with the size to be similar to the size of excisions which have been negotiated on pastoral leases. The plan also sets out the basis for the environmental management of living leases which can be applied to other areas.

Living areas require boundary determinations and planning for housing, water, power, waste disposal and communication. It is necessary that the development of living leases are associated with an environmental assessment process.

### **Strategy**

**In considering the approval of living leases require the preparation of an environmental assessment and community development plan.**

## **30. Aboriginal Cultural Heritage Management**

Aboriginal traditional owners, under Aboriginal customary law, have responsibility and obligations in relation to the protection, preservation and management of areas and objects of Aboriginal significance. This responsibility is acknowledged for CALM managed land. One way to facilitate the carrying out of those responsibilities and obligations is to establish cultural heritage committees. CALM will respond to

requests for the creation of these committees by senior Aboriginal people who have some affiliation to a particular area or who are considered traditional owners of that area. These same people would become committee members along with CALM staff.

A cultural heritage committee recognises, protects and promotes Aboriginal cultural values of an area and ensures the protection, preservation and management of Aboriginal sites in an area. Cultural heritage committees advise Park Councils, the trustees of the WA Museum and the Minister for Aboriginal Affairs as to any adverse impact.

Under the provisions of the Aboriginal Heritage Act 1972-80, all Aboriginal sites and cultural objects throughout WA are protected. The trustees of the WA Museum advise and assist the Minister for Aboriginal Affairs and are responsible for the administration of the Act.

### Strategy

**Establish Aboriginal cultural heritage committees for CALM managed land as necessary and in close consultation with Aboriginal people in the Kimberley Region.**

## NATURAL RESOURCES MANAGEMENT

### 31. Fire Management

Fire management is a significant and controversial aspect of conservation and land management in WA. It is considered to be the major aspect of land management in the Kimberley region in terms of the impact of the inappropriate use of fire and establishing satisfactory fire management practices.

The overall objective of fire management within CALM is:

- *To protect community and environmental values on lands managed by the Department from damage or destruction from wildfire.*
- *To use fire as a management tool to achieve land management objectives, in accordance with designated land use priorities.*

Fire is a natural phenomenon in the Kimberley. Fire was used by Aboriginal people before European settlement as a land management tool for hunting as well as to facilitate movement throughout the area. Whilst much of this burning would have taken place in the dry season there is clear evidence that fire was used throughout the

year. This constant activity led to a patchwork of areas which had been burnt at various times across much of the country. Potentially damaging fires which occurred, and were deliberately lit, late in the dry season did not become catastrophic because they ran into previously burnt areas. Another source of fire in the late dry season was the occurrence of numerous lightning storms which were not associated with rain.

It is generally agreed that since the arrival of Europeans there has been a shift in the frequency of fires toward the late dry season resulting in large hot fires which are of great concern because of their damaging impact on the flora and fauna of the region. Part of this change has been the adoption of fire management techniques associated with stock grazing practices. The protection of biodiversity is a major consideration and there are concerns that this is being impacted upon significantly.

CALM as a major land manager, has specific responsibilities under the Bush Fires Act 1954. In particular there exists a legal and moral obligation to comply with those provisions relating to fire prevention and control of wildfires on or near CALM managed lands, and protection of life and property. Policy Statement No. 19, Fire Management, sets out Departmental objectives and policies.

CALM works closely with the Bush Fires Board in the region which has a wide ranging liaison and wildfire prevention program in place. Much land under Aboriginal control is also included in their prescribed burning program.

## **Departmental Strategies**

### ***Fire Suppression***

1. Meet legal obligations under the Bush Fires Act and the CALM Act by responding to fires occurring on or near CALM managed land to a degree that is appropriate to the values at risk.
2. Assess response to a fire in the light of potential damage to the following values, in order of priority:
  - (a) human life.
  - (b) community assets, property or special values (including environmental values).
  - (c) cost of suppression in relation to values threatened.
3. Where values dictate the Department will encourage communication and liaison which will give timely warning of the presence of a fire threatening a community or environmental values.

### ***Use of Fire***

4. Use planned fire only where this is in accordance with an approved management plan, necessary operations or where such plans do not exist, to protect and maintain the designated priority land use.

5. Prepare written prescriptions in advance, for approval by senior designated officers, before any planned fires are undertaken.
6. For areas where primary landuse is wildlife conservation, use fire in such a way as to promote the greatest possible diversity and variety of habitats within prevailing physical or financial constraints.
7. Use prescribed fire or other methods to reduce fuels on appropriate areas of CALM lands, where it can be demonstrated that is the most effective means of wildfire control, and where undesirable ecological effects do not result.

#### ***Liaison***

8. Ensure effective liaison with neighbours, Fire and Rescue Service of WA, Shires, Bush Fires Board and other fire control organisations.
9. Promote mutual aid inter-agency agreements for fire control on lands of mixed tenure with common fire problems.

#### ***Public Awareness***

10. Provide for public education in relation to the role and use of fire in ecosystem management, and hazard and risk reduction.

#### ***Research***

11. Where necessary, undertake research into fire prevention and control, fire ecology and fire behaviour on CALM lands to improve the scientific basis for, and effectiveness of, fire management programs.

#### **Strategies**

**In addition to implementing Departmental policies and guidelines the Kimberley Region will:**

1. **In association with the Fire and Rescue Service of WA, Pastoralists, other land holders and Aboriginal communities maintain a program of prescribed burning to provide and maintain low fuel buffers and provide for biological diversity and to favour habitat for specific flora and fauna where this does not compromise other species.**
2. **Assist with research into fire ecology and behaviour in Kimberley ecosystems.**
3. **Assist with monitoring the effectiveness and impacts of fire management strategies.**



## 32. Weeds, Feral Animals and Native Pest Fauna

### 32.1 Weeds

There is legal responsibility for land-holders to eradicate plants declared under Section 37 of the Agriculture and Related Resources Protection (ARRP) Act. Other plants may have weed status for reasons of visitor safety or comfort, aesthetics or conservation in a local situation and may require control or eradication according to interim management guidelines or an area management plan. CALM Policy Statement No. 14 defines a weed as "any plant which is disadvantageous from the viewpoint of effective management for the land use concerned". It may be a native or exotic species. **CALM's primary operational objective is to achieve the systematic and safe control or eradication of weeds in accordance with established priorities, and consistent with Departmental conservation objectives.**

The following plant species are declared plants under the Agriculture and Related Resources Protection Act 1976 and are to be found in the Kimberley.

Bellyache Bush	<i>Jatropha gossypifolia</i>
Calotropis	<i>Calotropis procera</i>
Mesquite	<i>Prosopis</i> spp.
Noogoora Burr	<i>Xanthium occidentale</i>
Parkinsonia	<i>Parkinsonia aculeata</i>
Prickly Pear	<i>Opuntia</i> spp.
Sida	<i>Sida acuta</i>
Sida	<i>Sida cordifolia</i>
Thornapple	<i>Datura</i> spp.

A further 24 species are considered to be environmental weeds with a number of them weeds only in certain situations or locations.

The region does not currently have many weed species, however, a further 40 or more noxious weed species occur in the Northern Territory and Queensland and are listed by the Agricultural Department of WA with information on their locations and their nearest location to the Kimberley. Many of these are serious weed species and the potential for their introduction is of concern to WA. Devils claw *Martynia annua*, for example, is a significant problem in the Victoria River District of the Northern Territory, adjacent to the East Kimberley.

Another area of concern is the possibility of the introduction of plant species for commercial gain which subsequently become environmental weeds or agricultural weeds. Many weeds are introduced as ornamental or garden plants and could just as easily be introduced first as agricultural plants. An example of an agricultural plant now considered a weed is *Leucaena leucocephala* which is a valuable stock feed crop that has been introduced throughout the Kimberley. This plant out competes native

vegetation rapidly thereby altering significantly the habitats in which it grows. Another group of concern is the ponded pasture group of fodder crops. All introduced species may be subject to some form of control depending on the nature of the potential impact on conservation values.

Little is known regarding exotic marine organisms. Initially a database of existing and possible species, methods of introduction and level of threat needs to be compiled.

### **32.2 Feral Animals**

Control of feral animals is an important strategy by which conservation objectives on CALM managed lands can be achieved. Feral animals have potential for serious impact on natural systems through direct effects such as predation, habitat destruction, competition for food and territory, potential for the introduction of disease and through environmental degradation by selective grazing. A primary operational objective of CALM's would be to achieve the systematic and safe control or eradication of feral animals in the Kimberley region according to an agreed priority dependant on the impact of the animals, the efficiency and effectiveness of control measures, participation of other stake holders and the capacity for long term monitoring of the population.

The Department also has responsibilities for control of declared animals on CALM managed lands under Sections 39-41 of the Agriculture and Related Resources Protection Act 1976 , viz "A Government Department shall control declared plants and declared animals on or in relation to public land under its control", but notwithstanding the Agriculture Protection Board Act, 1950 Sections 22(1), (2) and (3) preserves the "rights, powers, authorities of duties of any Government department".

Feral animals are those introduced species that have become established as wild or naturalised populations and under that definition the following species are feral in the Kimberley:

Rabbit\*, red fox\*, house mouse, cat, donkey\*, goat\*, pig, camel\*, cattle, buffalo, horse and feral dog.

(\* Declared animals under Agriculture and Related Resources Protection Act 1976. Note: Cattle are not legally considered feral in Australia and control measures must be undertaken with due consideration to assumed ownership.)

The following table indicates the distribution and management priority of each of these animals.

SPECIES	DISTRIBUTION	MANAGEMENT PRIORITY
Rabbit <i>Oryctolagus cuniculus</i>	Extends into southern desert area only after favourable rainfall and is an unlikely threat in the Kimberley.	Low
Red Fox <i>Vulpes vulpes</i>	Extends into southern desert area and Dampier Peninsula only after suitable seasons.	Low
House Mouse <i>Mus musculus</i>	Normally found within or near locations of human habitation. Recorded in low numbers elsewhere	Low
Cat <i>Felis catus</i>	Throughout the Kimberley	Very High
Donkey <i>Equus asinus</i>	Widely distributed	High
Goat <i>Capra hircus</i>	No established wild populations	Low
Pig <i>Sus scrofa</i>	Whilst not documented perceived that this animal is becoming more widely distributed.	Medium
Camel <i>Camelus dromedarius</i>	Southern desert areas	Medium
Cattle <i>Bos taurus</i>	Widely distributed	High
Buffalo <i>Bubalus bubalis</i>	Occasional historical records	Very Low
Horse <i>Equus caballus</i>	Overall distribution uncertain	Very Low
Dog <i>Canis familiaris</i>	Records mainly near locations of human habitation. This does not include the dingo.	Low

As has been mentioned previously the cat is considered to be the priority in terms of its impact on native fauna.

The impact of donkeys and cattle on the vegetation is greatest along river frontages, alluvial flats and ephemeral swamps. Current studies are showing that in conjunction with inappropriate fire practices they are having an impact on certain types of rainforest patches. This appears similar to the situation applying to the broader Kimberley savanna.

If a species is declared under the Agriculture and Related Resources Protection Act, the landholder, including CALM, has a legal responsibility for control on that land. CALM also has a considerable interest in control, or eradication in some circumstances of non-declared feral animals.

Some concerns have been expressed over the apparent increase in the numbers of pig on the Mt Hart pastoral lease. At some locations, such as Bell Creek, pig activity is very evident.

Of major concern to CALM is the potential for further damaging introductions of animal species. An example is the spread of the cane toad (*Bufo marinus*) across the top end of Australia. With the current spread rate it is unlikely that this toad will reach the Kimberley within the next ten years, however, this could change dramatically with an inadvertent introduction into the Ord River irrigation area for example. At some stage the likely impact of this species on the fauna of the Kimberley will need to be assessed unless its rate of spread can be halted altogether.

### 32.3 Native Pest Fauna

Another area in which CALM is involved is where native animals become pests, most noticeably affecting agricultural production. In this case CALM will issue what are called 'damage licences' to the owner of the property affected so that the owner may undertake control measures if those measures are deemed appropriate. The issuing of a licence usually stipulates the number of animals which may be taken as well as other conditions including the means of control. As an example damage licences have been issued in the past for the control of corellas and agile wallabies feeding on crops grown on the Ord River irrigation area.

Native animals that have been placed in the 'Native Pest Animal' category of the Agriculture and Related Resources Protection Act which are or might be found in the Kimberley are:

#### Mammals

Agile Wallaby

*Macropus agilis*

Euro (Common Wallaroo)

*Macropus robustus*

Long-haired Rat

*Rattus villosissimus*

Red Kangaroo

*Macropus rufus*

#### Birds

Emu

*Dromaius novaehollandiae*

Galah

*Cacatua roseicapilla*

Little Corella

*Cacatua sanguinea*

Wedge-tailed Eagle

*Aquila audax*

CALM is involved in the management of the Long-haired Rat *Rattus villosissimus* in the Ord River irrigation area. Agriculture Western Australia is intending to produce a management plan, in collaboration with CALM, for this species.

#### Strategies

**In addition to implementing Departmental policies and guidelines the Kimberley Region will:**

1. **Prepare a control program for weeds, feral animals and other pest species on a priority basis which incorporates existing and potential impact, locations and availability of resources.**
2. **Maintain an inventory of weeds on CALM managed lands that includes weeds which are of general conservation concern and weeds which if introduced, will be a major problem in the region.**
3. **Liaise with the Agriculture Protection Board, the Agriculture Department of WA and adjacent landholders with regard to control program initiation and ongoing assessment of success.**
4. **Use best knowledge practices when undertaking control programs including written assessments of benefits of control and potential negative impacts.**
5. **Undertake surveys and monitor populations and assess the effectiveness and efficiency of control programs through written reports.**
6. **Train staff appropriately and use control measures in accordance with all health and safety requirements.**
7. **Liaise with the relevant agencies of the Northern Territory with regard to the spread and possible introduction of weed and pest species.**
8. **Document the present status, likely introduction and level of threat of exotic marine organisms with the Rowley Shoals Marine Park being the focus of attention in the first instance.**

### **33. Rehabilitation**

Rehabilitation is the establishment of a stable, self-regulating ecosystem following disturbance consistent with the purpose for which the land is managed.

The requirement for rehabilitation on lands managed by CALM derives from either an inherited situation in which disturbance occurred in the absence of any commitment to rehabilitate, or as part of a management program for activities imposed on lands managed by CALM.

Departmental policy is contained in Policy Statement No. 10 Rehabilitation of Disturbed Land. CALM managed land should be managed as far as possible to avoid disturbance. Rehabilitation should be the last option in a series of management decisions designed to protect the environmental values of CALM land. Rehabilitation should aim to restore original values, including indigenous communities where appropriate, and help to enhance all potential uses provided the priority uses are not adversely affected.

## Strategies

**In addition to implementing departmental policies and guidelines the Kimberley Region will :**

- 1. Develop a working plan for rehabilitation within the Region, allocate priorities, write prescriptions and commence works as resources become available.**
- 2. Negotiate with corporate sponsors to contribute to rehabilitation programs on lands managed by CALM.**

## **34. Mining and Exploration**

Mining, within the terms of the Mining Act 1978, includes exploration, fossicking, prospecting and mining operations. Section 24 of the Mining Act defines Ministerial responsibilities for approving mining on various land classes.

Special Agreement Acts are generally enacted for major resource projects (such as bauxite, iron ore, coal) with the Department of Resources Development as the principal managing authority assisted by the Department of Minerals and Energy. The Environmental Protection Act 1986 takes precedence over most other Acts. The Department of Minerals and Energy refers 'significant' projects to the EPA according to agreed guidelines. CALM and individuals can also refer proposals for assessment.

### *Mining in National Parks and Nature Reserves*

Government policy on mining in CALM managed lands has the following implications for the CALM managed estate in the Kimberley:

- 1. 'A' Class Nature Reserves and National Parks**  
Mineral exploration in A Class nature reserves and national parks is subject to the concurrence of the Minister for the Environment. Significant ground disturbance may be referred to the EPA by the NPNCA if required. Mining will require the consent of both Houses of Parliament and EPA assessment.
- 2. 'B' and 'C' Class Reserves, 'A' Class Conservation Parks and Section 5(g) Reserves**  
Exploration and mining will be allowed subject to the recommendations of the Minister for the Environment and approval of the Minister for Mines and assessment by the EPA for production mining.



3. Marine Parks and Marine Nature Reserves

Government policy (at July 1994) on petroleum exploration and development in marine conservation reserves notes that drilling and production will not be allowed in marine nature reserves or sanctuary and recreation zones of marine parks. Drilling and production will be possible in those portions of general use zones where it has been established that such activities will not impact on sensitive marine environments. Drilling and production will not be permitted in special purpose zones where such activities are incompatible with the conservation purpose of the zone. Low impact seismic surveys may be permitted to extend into marine park areas that are not available for drilling where it has been assessed that such an activity will not impact on sensitive marine habitats. Any proposal for seismic surveys, exploration and production are referable under the Environmental Protection Act process.

The Department of Minerals and Energy (DOME) has produced a brochure titled 'Guidelines for the Application of Environmental Conditions for Onshore Mineral Exploration and Development on Conservation Reserves and Other Environmentally Sensitive Land in Western Australia'. This document sets out the basic procedures and conditions to be applied to applications for an exploration lease.

In addition to the above policies on mining DOME and CALM are working towards a policy for the management of exploration and mining activities within or adjacent to Wetlands of International Importance.

The collection of rocks, soil and fossils not covered under the Mining Act, for example as souvenirs, from the conservation estate is illegal. Fossicking is covered under that Act.

### Strategies

**In addition to implementing Departmental policies and guidelines the Kimberley Region will:**

- 1. Liaise with mining companies on an individual basis and the Department of Minerals and Energy on matters of impact assessment and environmental management on lands and waters managed or proposed to be managed by CALM.**
- 2. Monitor existing mining and exploration activities that impact directly or indirectly on CALM managed lands and waters and take any necessary action to regulate them.**
- 3. Evaluate the likely impact of any proposed mineral resource development activities on lands and waters managed and proposed for management by CALM and make recommendations within the context of government policy.**

4. **Seek compensation and/or additions to CALM managed lands and waters for losses incurred due to mining activity.**

### **35. Gravel and Basic Raw Materials**

Basic raw materials, including gravel, limestone, marl sand and rock aggregate are needed for road construction and recreation site developments within reserves. It is preferred that these materials are obtained from outside parks and reserves, or from areas that are already disturbed or which are of lower conservation value. However, transporting gravel and other industrial materials from areas outside reserves increases the construction costs.

Gravel and other industrial materials may only be extracted from parks and reserves in accordance with the State Gravel Supply Strategy (in preparation) and NPNCA Policy Statement No A5 on Basic Raw Materials. Extraction is regulated under the Local Government, CALM and Mining Acts.

Access to water supplies is also an issue which occasionally needs to be addressed. In the case of Point Spring Nature Reserve as a condition of having the reserve declared the station owner from whose property the reserve was being excised was allowed to maintain access to the water of the spring. This involved piping the water to a dam adjacent to the boundary of the reserve in order to water cattle. It is envisaged that with the development of the Ord Stage 2 irrigation area there will no longer be a need to allow that access. In the unlikely event that this turns out not to be the case CALM will negotiate with the station owner to find alternative sources of water.

In one case cattle access to water has led to damage to one of the region's four declared rare flora. In that instance and with the assistance of the owner of the station and the Broome Botanical Society the cattle were successfully fenced out of where the rare flora is to be found. This project needs to be completed by assisting the station owner to find a long term alternative water supply.

A number of times water has been pumped from billabongs adjacent to the Gibb River Road to be used in road construction and maintenance activities. This has taken place without consultation or consideration of the environmental consequences of that action. In at least one case the pumping led to the drying out of a waterhole during the dry season. There needs to be better liaison with respect to the use of the region's water supplies.

## COMMERCIAL ACTIVITIES

### 36. Leases and licences

All private tour operators conducting commercial tourist activities on conservation areas are required to obtain a licence in accordance with the CALM Amendment Regulations 1993. All tourism activities are required to be consistent with approved management plans, or in the absence of a management plan, to be either compatible or necessary operations as specified in the CALM Act. Tour operations are undertaken under either a general 'Class T' licence for general activities or a 'Class E' licence which are granted to a restricted number of operators usually entailing some form of exclusive use of an area or activity. Class E licences are subject to a rigorous selection procedure.

A formal CALM licence is required where facilities, such as a souvenir outlet, are provided, where a sole franchise is granted or where the activity is based predominantly on lands and waters managed by the Department.

Concessions operating within the Kimberley Region include tourist coach operations, 4WD 'safari' type operations, adventure activity operations and retail operations.

Planes and helicopters are an important component of tourism access in the Kimberley. A tourist route named the Ibis Aerial Highway, linking the Kimberley's major attractions, offers a wide range of options for visitors. Tour operators market the aerial highway with packages offering the choice of destination, accommodation and ground tours.

Fees are charged for aerial access to the CALM estate. The process involves CALM advertising for expressions of interest for a particular venture nominating how many concessions are available. Interested parties then put forward their proposed operation including what fees they are willing to pay. The final cost structure is arrived at with agreement from CALM.

An informal licence is issued when the activity is a guided tour, instructional course or leisure activity of a non-commercial nature and a fee for this licence may not necessarily apply.

Verbal approval for one-off activities, such as organised visits of short duration, can be granted by the regional and district managers. Fees will be associated with all commercial tourist activities conducted on CALM managed lands or waters in the Kimberley.

Conditions apply to all licences to minimise any impact of an activity or to aid in management of the value being appreciated by the public. When there are numbers of people involved in an activity managers have to address environmental impacts of

group camping, the need for adequate toilet facilities, bus turn arounds and parking, safety, competence of group leaders, the potential damage to sensitive areas and aspects such as the appropriateness of retail concessions in particular natural environments. Through a system of licensing, numbers can be controlled and monitored.

Leases entail areas of the CALM estate being used exclusively for a particular commercial activity. There are at present no such leases in the Kimberley region however examples may include areas leased for the development of tourist facilities such as for cabins or chalets, leases for associations and clubs or some specialty adventure recreational pursuit. Any lease, licence or commercial concession arrangement would have to be consistent with CALM's policy on commercial concessions, leases for associations and clubs, and overnight stays.

The management of the Mt Hart Station homestead is through a contract for services agreement. Part of the payment to the people looking after the homestead allows for income from commercial tourism activities. Their duties also include maintenance and heritage conservation.

Of broader concern is the growing number of applications for tourist leases of some kind affecting land for which CALM has proposed conservation reservation. This usually involves applications to Department of Land Administration by the proponents of a number of activities including fishing and boating bases. In a number of instances the applications have involved small and remote islands of the north west Kimberley. The region has adopted the approach that if the application is likely to affect an area proposed for reservation then the application is not supported until such time as the vesting of the area is sorted out. This then would allow for tourist venture applications to be subject to professional management through CALM's policies giving surety and protection to the operation as well as protecting the environment.

A further concern is the provisioning of tourist leases and activities on pastoral lands without an assessment of the conservation values which may be affected. As has been mentioned previously the assessment of the conservation values of the region have to date been primarily restricted to lands other than pastoral. By allowing a change in the purpose of pastoral lands without seeking to identify public interests may result in exclusive access and use of areas with enormous conservation and scenic value to all Australians.

## **Strategies**

- 1. Ensure all formally approved commercial concession operations operate under a lease or licence agreement with appropriate conditions that are reviewed regularly.**
- 2. Ensure that commercial concession operations maintain appropriate standards with respect to information, quality of service provided and minimal environmental impact operations.**

3. **Require all commercial concession operators on CALM lands and waters obtain the appropriate level of permission and pay the necessary fees for their activities.**
4. **Evaluate proposals for retail concessions and commercial tourism leases according to Departmental policy and permit their establishment where appropriate.**
5. **Identify the sustainable level of tourist concession operator use and monitor the impact of these activities and regulate them through conditions required.**
6. **Ensure that tourist concession holders within the region operate at the highest standard of educational or interpretive value to visitors.**

### **37. Firewood Collection**

It is thought of as being part of the visitor experience to be able to sit around a campfire, though it may be used for cooking, is also seen as a wilderness and social experience.

Campfires are not allowed within certain categories of land such as nature reserves but designated camping areas in some national parks cater for these fires with the provision of specific fire sites. Whilst firewood can be brought into these parks by members of the public this is not encouraged because of the possible introduction of weeds. Firewood is usually provided for by CALM and in the case of Purnululu National Park the access fee covers the provision of this wood.

Currently the firewood supplied to the region is provided by a tree lopping service in Darwin.

It is necessary that CALM investigate the most cost effective provision of firewood to those areas where campfires are allowed. This includes the involvement of private commercial enterprises.

#### **Strategy**

1. **Continue to investigate the most cost effective method of the provision of firewood and only supply firewood if all costs can be met.**

### 38. Forestry

CALM sees enormous potential in developing a tropical timber industry in the Kimberley. The primary form of that industry is through the establishment of irrigated plantations in the Ord River Irrigation Area. Research has been underway for several years now on growing Indian sandalwood (*Santalum album*) under irrigation. There is a very strong demand for the timber and oil from this plant in Asia.

Indian sandalwood, like all sandalwood species, is semi-parasitic on other plants. Research has also been looking at the best host plants to be planted along with the sandalwood. The approach adopted is to try to select plants which are valuable as the host so that a 'double crop' is achieved. On the clay soils where this research has so far taken place examples of these valuable hosts so far identified include African mahogany (*Khaya senegalensis*) and East African ebony (*Dalbergia melanoxylon*).

CALM is also enthusiastic about timber crops on sandier soils with species such as teak (*Tectona grandis*) and is seeking to ensure that this type of land is available for that purpose as the Ord River irrigation scheme expands.

CALM also sees a significant role for timber crops in helping to ameliorate the groundwater problems currently occurring within the irrigation area and envisaged to occur with the further development of this area.

There are plans to increase the number of staff working on a tropical timber industry based at Kununurra through the Plantations Business Unit. There will be cost and staff sharing with private enterprises.

CALM has recently signed an agreement with a private consortium to develop the first major Indian sandalwood plantation in the Ord River Irrigation Area.

A small amount of research is also occurring at Broome.

No more arboreta will be established in the Kimberley however as has been mentioned the role of the arboreta at Kununurra will be expanded to showcase rare or endangered flora and species of timber which are suitable for use in tropical forestry.

At one time the CALM run nursery at Broome supplied plants free of charge to be used in tree planting schemes. This nursery no longer operates and it is considered that the growth of privately run nurseries cater appropriately for that demand. A small nursery is in operation at Kununurra to supply plants for the research work being undertaken on sandalwood. It is intended that arrangements will be made with a private consortium to undertake this role.



## **Strategy**

- 1. Continue to place great importance on the important initiative of investigating and promoting a tropical timber industry in the Kimberley Region.**

## **39. Filming**

Filming includes still photography in this discussion.

Where filming is undertaken on CALM estate which is of a commercial nature or purpose permits are required. This then applies to any filming which is for uses apart from private.

The lands and waters which CALM manages have great appeal for use in various types of promotional and advertising work. The general format which applies as far as the charging of fees is concerned is that if the product produced is strictly for commercial gain and does not necessarily promote the values of the area involved a fee will be charged. This fee will be arrived at in consultation with the proponent. The application fee will apply also to commercial filming of an area from aircraft.

If the filming is seen as being beneficial to the area, for example it is of an educational nature, then the need to charge a fee will be reassessed.

## **40. Wildlife Industry**

The main industry with which the Department has dealings in the Kimberley region is the crocodile industry. This industry is regulated and managed according to the 'Management Program for the Saltwater Crocodile *Crocodylus porosus* and the Freshwater Crocodile *Crocodylus johnstoni* in Western Australia'. This program was produced by CALM to meet the requirements of Commonwealth legislation and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The program provides for the controlled harvesting of crocodiles for farming purposes and for the regulation of farming operations and trade in crocodile products.

The Department occasionally receives requests to consider the utilisation of various fauna species such as lizards but to date no proposals have been pursued. In all cases of the commercial use of native fauna each will be considered on its own merit. The Department will always adopt a cautious approach with the setting of rigorous conditions which would include the proponent showing that the operation is commercially viable.

Under the Wildlife Conservation Act all native flora is protected and native flora on Crown land is deemed to be the property of the Crown. The Department administers control of the taking and sale of flora in accordance with three types of licence:

- Commercial Purposes Licences, which allow the taking of protected flora from Crown land;
- Commercial Producers Licences, which allow the sale of protected flora taken on private land; and
- Scientific or Prescribed Purposes Licences, issued to those people intending to take native plants from Crown land for non-commercial purposes.

These licences allow the picking of all but declared rare flora (for which a special Ministerial permit is required). Commercial picking is allowed in State forest, but not in nature reserves, national parks or conservation parks where all wildlife is protected. Pastoral leases are considered Crown lands for these licences. Flora (seed or other propagation material) collected from Crown land for mine rehabilitation requires a Commercial Purposes Licence under the Wildlife Conservation Act.

## **Strategy**

- 1. Continue to administer the wildlife industry according to defined regulations and management programmes. In the event of a management programme found to be lacking one will be drawn up in consultation with the industry.**

## **41. Aquaculture and Commercial Fishing**

### **41.1 Aquaculture**

Aquaculture is the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Aquaculture provides the potential for an environmentally sustainable industry, providing employment and making a significant contribution to the State's economy. Many of the species of finfish, shellfish and algae that occur naturally in the Kimberley have potential for commercial cultivation. The Kimberley Development Commission and the Fisheries Department have identified the potential for a major extension of the regional aquaculture industry. These opportunities are detailed within the Kimberley Aquaculture Development Plan.

At present the Pearl Oyster (*Pinctada maxima*) industry is the most significant commercial aquaculture operation in the region. The Pearling Act controls the Pearl Oyster industry.

All other pearl farms and aquaculture operations are managed under the Fish Resources Management Act. The Department of Transport is responsible for

approving any installation or structure. Where an aquaculture operation occurs within a marine park, a CALM lease or licence may be required.

Aquaculture proposals are often referred to CALM because of their potential to impact on existing or proposed estate. This impact may not necessarily be associated with the aquatic component but with infrastructure development such as landing points and land based facilities.

#### **41.2 Commercial Fishing**

Within marine parks commercial fishing is regulated and managed by the Fisheries Department in consultation with CALM. In the setting of zones within these parks, and again through a consultative process, it is possible to designate sanctuary zones where fishing of any nature is not allowed. It may also occur that commercial fishing may be at odds with a recreation zoning. In those cases the commercial fishing will be phased out over a period of time.

Commercial fishing is not allowed in marine nature reserves.

A further aspect of commercial fishing activities is in the taking of animals incidental to the target species of fish. These by-catches can include turtles, crocodiles, dolphin and dugong. Discussion of the by-catch of fishing operations is often an emotive issue and unfortunately records are inadequate to document the level of this activity. Early in the 1990's an effort was made to establish a reporting system for the operation of the fishery within Lake Argyle. This fell into disuse. There is a need to remedy this situation. Monitoring and research on the impact of commercial netting will need to be addressed for the region.

#### **Strategies**

- 1. Assess applications for aquaculture operations through the Interdepartmental Committee for Aquaculture and other relevant organisations.**
- 2. Support the review and application assessment criteria as determined by the Interdepartmental Committee for Aquaculture in the consideration of new aquaculture proposals.**
- 3. Assess in consultation with the Fisheries Department, the extent of commercial fishing activity affecting existing marine estate within the region and areas proposed for reservation.**
- 4. Develop in consultation with the Fisheries Department a more efficient reporting system with respect to by-catches as part of commercial fishing operations.**

## **PUBLIC PARTICIPATION AND LIAISON**

### **42. Community Involvement and Volunteers**

#### **42.1 Community Involvement**

The CALM Act (sections 14, 33A and 57-59) applies with regard to public participation in the preparation of management plans and proposals for compatible operations. These management plans may range from the broadest Statewide strategic plan to a detailed operational plan. A range of less formal public involvement in other Departmental planning matters is also desirable. The Department wishes to co-operate with local communities and establish projects of mutual interest where appropriate.

Examples of community involvement include:

- Staff involvement on local tourist committees, with agricultural shows, tourism and trade expos and festivals.
- Advice about landscaping and tree planting and assistance to bodies such as Greening Australia
- Co-operate with schools, eg. work experience and Arbor Day.

Various advisory committees, 'Friends of the Park' and volunteer groups;

- Involvement with land conservation district committees and catchment management advisory bodies
- Liaison with bushfire brigades
- Public workshop, seminars and talks to interested groups
- Landscape Expeditions

Public participation programs require considerable staff resources to plan, implement, review and follow-up. The region will at all times attempt to meet its obligations in this regard because of the great importance of the involvement of the community in CALM's operations and knowledge about those operations.

#### **42.2 Volunteers**

CALM facilitates support from volunteers working as groups or as individuals. Volunteer activities are of value to CALM not only because the department's work capabilities and skills base are expanded at minimal cost, but also because such activities build communication links and understanding between the department and the community. A volunteer may be defined as someone who undertakes work of their own free will, without payment for the benefit of the community and themselves.

CALM has a formal policy and administrative framework for volunteer activities (Policy No. 32, Volunteers) which includes initiatives to provide more volunteer opportunities, and to provide training to both volunteers and CALM staff in their management. Matters including industrial relations aspects of volunteer activities, workers compensation insurance and public liability are managed by a Perth based Community Involvement Co-ordinator.

Changes to the CALM Act now provide for honorary Conservation and Land Management officers, positions of considerable responsibility and privilege for volunteers of exceptional commitment.

Roles for volunteers in the Kimberley Region include: assistance with reserve management eg. clean-ups usually in the form of busy bees, assistance with flora and fauna surveys or research, and with the rehabilitation of injured or orphaned fauna. The region actively seek the involvement of volunteers in the work of CALM even though some restrictions are placed on this programme due to remoteness of workplace, lack of accommodation, vehicles and equipment and few supervisory staff.

### **Strategies**

- 1. Continue to involve interested local individuals and organisations in conservation and land management projects.**
- 2. Facilitate community involvement through advisory committees and other means to provide ongoing local input into management within the Kimberley Region.**
- 3. Continue involvement in volunteer programmes and improve computer database management for communications with regard to volunteer accessibility and recording and rewarding work done.**

### **43. Marketing and Public Education**

There is an excellent opportunity to promote awareness of conservation, land management and natural systems and processes. CALM personnel in the Kimberley Region have substantial involvement with community education and interpretation work, mainly through provision of information to visitors, informal contact and presentations to community and school groups. A range of publications on recreation facilities and activities, and technical information, is available throughout the region.

The region is in an exceptional position to market the Department and its activities in the State as well as the region.

The best examples of CALM's involvement in marketing is the proposed development of themes for the two district bases at Kununurra and Broome.

Development is underway at Broome of a facility called the Kimberley Natural Eco-centre. The overall theme for this centre will be the rare and interesting fauna of the Kimberley along with displays on the processes threatening the future of these animals. At present, with the long established low water garden and a reptile display, facilities for the keeping of Gouldian finches and nocturnal animals such as the bilby are being constructed. There are also proposals to construct a wetland display and an amphitheatre. CALM staff will be on hand to conduct tours of the facility as well as some tour operator use of the area. This centre will link cooperatively with educational institutions, museums and tourism agencies.

At the Kununurra facility it is intended to develop a theme based on flora. Here displays will be constructed showing valuable timbers for use in a tropical timber industry, rare and interesting flora and possibly a rainforest patch. The role of the centre will mirror the Broome facility.

### **Strategies**

1. **Continue to improve educative material as required.**
2. **Liaise closely with other agencies, organisations and individuals who have similar interests in the interpretation of land managed by CALM, such as all levels of educational institutions, museums and tourism agencies.**
3. **Develop a marketing strategy for the region.**
4. **Seek funds, including through sponsorship, for the continued development of the district base themes.**

## **RESEARCH AND MONITORING**

### **44. Regional Program**

With funding from the Federal Government through Environment Australia the region has undertaken a number of studies. These include small scale biological studies of Mirima National Park and the Cockburn Ranges.

In 1994 funds were received to try to determine the location and possible distribution of the golden bandicoot *Isoodon auratus* in the Kimberley region.



Monitoring work has been gradually progressing looking at the impact of cattle and fire on a number of rainforest patches.

A programme is being developed to document the type and distribution of wetlands in the Kimberley region starting with the West Kimberley District.

The following lists the areas requiring research input in an approximate order of priority;

- Biological Survey work. There is a need to address the requirements of areas requiring investigation as recommended in the changes to tenure section of this plan. Also areas are being brought to the attention of the Department separate to this list which are worth investigation also. There are also specific requirements with respect to rare flora, fauna and communities. Associated with this is the need for work on the Ramsar wetlands of the Kimberley.
- Fire Management. Apart from documenting fire impacts there is a need to develop strategies for managers of an immediately practical nature. These include determining rates of spread of a wildfire and fire behaviour under different situations. Some work has been done on impacts with the rainforest study and it is hoped that under the auspices of the Cooperative Research Centre for the Sustainable Use of Tropical Savannas further studies might be possible. These include looking at Cypress pine communities, riverine vegetation and expanding the rainforest study.
- Tropical Forestry. A continued strong commitment to this field is considered important.
- Feral Animals. Basic research is required on the predation pressures of the cat as well as research on the impacts of stock primarily cattle and donkeys. There is also increasing concern about an apparent rise in pig numbers in the Kimberley.
- Dugong. Whilst mentioning the dugong in particular the needs for research could be expanded to animals such as turtles and to a lesser extent dolphins and whales. The dugong is mentioned because of possible hunting pressures on this animal and the need to determine potential habitat threatening processes.
- Weeds. Little is known of the distribution and impact of weed species in the Kimberley. Attempts at control of weeds is a major management consideration particularly for managers of conservation estate.
- Crocodiles. As mentioned previously there is a need to undertake a regional survey of crocodile populations.
- Roebuck Bay. The region sees its assistance with the studies being undertaken in Roebuck Bay by CALM Science and Information Division as important and that commitment will be maintained.

There are also requirements to undertake social research in the region. For example research on tourism impact and the establishment of criteria to monitor that impact is necessary.

### **Strategies**

- 1. Build stronger links with research bodies and the Science and Information Division of CALM in order to facilitate work on regionally driven requirements.**
- 2 Pursue external funding sources to assist in achieving research objectives.**

## **45. CALM Research**

The Science and Information Division also undertakes research within the region either with assistance from regional and district personnel or as part of larger statewide projects. As at 1997 the Division's research programme was undergoing a review but projects operating in the Kimberley include;

- Ecology and conservation of WA pythons.
- Distribution, status and taxonomy of West Kimberley rock wallabies.
- Status of pebble mound mice.
- *Callitris* study - Kimberley.
- Conservation of riparian refugia of the tropical savanna.
- Rainforest management and monitoring.
- Conservation of marine turtles.
- Dugong conservation.
- Development of guidelines for monitoring of Australia's Wetlands of International Importance.
- Roebuck Bay benthic fauna.
- Monitoring river health initiative.

- Regional assessment of the conservation status of vegetation units throughout WA.
- Buccaneer Archipelago survey.
- Establishment and maintenance silviculture of irrigated Indian sandalwood in the Ord River Irrigation Area.

### **Strategy**

1. **Ensure that close links are developed with the Science and Information Division to use Departmental resources with the greatest amount of efficiently.**

## **46. External Research**

There are a wide range of organisations and individuals conducting research in the Kimberley and on Kimberley flora and fauna. It is difficult to keep up to date with what is occurring but a better understanding of what is taking place will contribute to a data base on the region and possibly lead to cost savings or joint undertakings.

Research on wildlife by non-CALM personnel operates under a permit system. It is currently a condition of that permit system that the results of the work are forwarded to CALM.

It is obvious that undertaking research in the Kimberley region is expensive because of its remote and rugged nature. The region will try at all times to enlist the help of external agencies if this is shown to be the most cost efficient way of expending a small research budget.

### **Strategies**

1. **Review the research permit system to ensure that reporting procedures are adequate.**
2. **Prepare a bibliography of research undertaken in the Kimberley of relevance to CALM.**
3. **Investigate the participation of external agencies in achieving research goals.**

## IMPLEMENTATION

### 47. Reserve Dedication

The majority of tenure proposal changes in this plan are outstanding from previous reports including the Environmental Protection Authority's System 7 Report (the Kimberley) (1980) and the Department of Conservation and Land Management's Nature Conservation Reserves in the Kimberley (1991). Marine reserve proposals are based on recommendations in the report of the Marine Reserves Selection Working Group titled 'A Representative Marine Reserve System for Western Australia' (1994). The proposals tabled in this plan are an updated version of these earlier proposals and have been prepared in consultation with a number of government agencies including the Department of Land Administration, Department of Minerals and Energy, National Native Title Tribunal and the Ministry for Planning. The boundaries of proposed reserves indicated in this plan may require adjustment during the consultative or legislative process described above. Additionally, boundary modification may be required in future area management plans during the life of this plan.

Table 1 states CALM's preferred option for the creation of a conservation estate within the Kimberley. It is important to recognise that in achieving these options compromise may be required during the consultative process. It may be necessary to pursue a different land category in the first instance whilst competing interests are being assessed.

All proposals to change land tenure or to reserve vacant Crown land are referred to the NPNCA or the Lands and Forest Commission and are subject to a review process by the Department of Land Administration. This involves further consultation with affected government and local government authorities. Changes involving A Class reserves or State forest require agreement from both Houses of Parliament.

### 48. Integrated Regional Planning

It is desirable that this plan, as far as possible, be part of an integrated planning process for the Region. Other government agencies and private enterprise may also produce various types of management plans impacting on the region. Examples of types of plans which may effect CALM in the Kimberley include:

#### *Commonwealth Government*

Telstra/Optus - microwave links, optic fibre and telephone cable developments

#### *State Government*

Environmental Protection Authority - environmental protection policies and assessment reports.

Main Roads WA - proposals for major roadworks.

Western Power - proposals for new electricity cables.

Alinta Gas - proposals for new gas pipelines.

Tourism Commission - regional and local tourist development plans.

Water Corporation - proposals for new developments, storages, pipelines.

Department of Resources Development - regional resource studies.

Department of Minerals and Energy - regional mineral prospectivity plans.

Department of Land Administration - townsites and development plans.

Ministry for Planning - region plans.

#### *Local Authorities*

Shire plans for new townsites or developments.

#### *Private Enterprises*

Mining companies - Environmental Impact Assessment documentation for new developments.

Tourism industry - accommodation and concession proposals.

## **49. Evaluation and Review**

This plan once finalised and approved will direct the Kimberley Region to a course of action for the life of the plan. Section 61 of the CALM Act allows for the plan to be amended as required. If significant changes to the plan are proposed the revised plan will be released for public comment.

Implementation of the plan will be subject to the availability of funds and staff. Every effort will be made to attract resources. The NPNCA may initiate a review of the management plan at some point following its gazettal. Review may identify the extent to which management objectives have been achieved and strategies implemented, the reasons for lack of intended achievement or implementation and a summary of information which may affect future management directions.

### **Strategies**

- 1. Seek to establish a senior level working group involving all affected government agencies whose sole task will be the implementation of the proposed reserve recommendations.**
- 2. Continue to participate in all levels of regional planning as necessary.**
- 3. Prepare an implementation program to allocate specific tasks to specific officers and review strategy implementation progress annually.**
- 4. Report to the NPNCA on implementation progress annually through the implementation program.**
- 5. Prepare business plans as required to assist in the implementation of this plan.**
- 6. Aspire to reach cost neutral in the Kimberley Region by the year 2005.**

## REFERENCES

- Bannister, J S (1969). *A list of the species of mammals collected by W H Butler for the Archbold Collections of the American Museum of Natural History and the Western Australia Museum, 1963-1966*. Western Australian Museum Annual Report, pp 61-76.
- Beard, J S (1979). *The vegetation of the Kimberley area. Explanatory notes to map sheet 1 of Vegetation Survey of Western Australia: Kimberley*. (Univ. West Aust. Press: Nedlands.)
- Burbidge, A A (1975b). Conclusions and recommendations. In: Miles, J M and Burbidge, A A (Eds). *A biological survey of the Prince Regent River Reserve, north-west Kimberley, Western Australia, in August 1974*. Wildl. Res. Bull. West Aust. No. 3. (Dept. Fish. Wildl.: Perth.)
- Burbidge, A A (1977a). The history of the Drysdale River National Park. In: Kabay, E D & Burbidge A A (Eds). *A biological survey of the Drysdale River National Park, north Kimberley, Western Australia, in August 1975*. Wildl. Res. Bull. West. Aust. No. 6. (Dept. Fish. Wildl.: Perth.)
- Burbidge, A A (1977b). Conclusions and recommendations. In: Kabay, E D & Burbidge A A (Eds). *A biological survey of the Drysdale River National Park, north Kimberley, Western Australia, in August 1975*. Wildl. Res. Bull. West. Aust. No. 6. (Dept. Fish. Wildl.: Perth.)
- Burbidge, A A and McKenzie, N L (Eds) (1978). *The islands of the north-west Kimberley, Western Australia*. Wildl. Res. Bull. West. Aust. No. 7. (Dept. Fish. Wildl.: Perth.)
- Burbidge, A A and McKenzie, N L (Eds) (1983). *Wildlife of the Great Sandy Desert, Western Australia*. Wildl. Res. Bull. West. Aust. No. 12. (Dept. Fish. Wildl.: Perth.)
- Burbidge, A A, McKenzie, N L and Kenneally, K F (1991). *Nature Conservation Reserves in the Kimberley Western Australia*. Department of Conservation and Land Management, Western Australia.
- Bustard, H R (1969). *The current status of crocodiles in Western Australia with recommendations for conservation and managed exploitation*. Report IV. Department of Fisheries and Fauna, Western Australia.
- Butler, W H (1971). Report on a survey of the vertebrate fauna of the Point Coulomb Flora and Fauna Reserve, Dampier Land, WA. Unpublished report. Dept. Fish. Wildl. Western Australia.



- CALM (1995). *Management Program for the Saltwater Crocodile Crocodylus porosus and the Freshwater Crocodile Crocodylus johnstoni in Western Australia*. Western Australian Department of Conservation and Land Management.
- CALM (1995). Purnululu National Park Management Plan. Department of Conservation and Land Management for the National Parks and Nature Conservation Authority.
- Conservation Through Reserves Committee (1977). *Conservation reserves in Western Australia. System seven*. (Department of Conservation and Environment, Perth.)
- Coopers and Lybrand for Western Australian Tourism Commission, (1995) *Western Australian Tourism Infrastructure Strategy Technical Report, Perth, WA*.
- Department of Conservation and Land Management (1994). *A Representative Marine Reserve System for Western Australia*. Report of the Marine Parks and Reserves Selection Working Group. CALM 1994.
- Department of Conservation and Land Management (199...) *IBIS - Discover the Wild Kimberley*.
- Department of Conservation and Land Management (1994). *IBIS Aerial Tourist Highway*. In Landscape Vol. 9, No. 3, 1994.
- Department of Conservation and Land Management (1991) *Our Kimberley Carnivores*. In Landscape Vol 6, No. 4, 1991.
- Department of Conservation and Land Management (1994). *The Kimberley Exposed*. In Landscape Vol. 9, No. 2 (1993/94).
- Department of Regional Development and the North west, Department of Planning and Urban Development. *Kimberley Region Plan Study Report, A Strategy for Growth and Conservation (1990)*.
- Environmental Protection Authority (1980). *Conservation reserves for Western Australia. System 7*. (Department of Conservation and Environment, Perth.)
- Graham, G R (1994). A Biological Survey of Mirima National Park. Unpublished report. Conservation and Land Management.
- Graham, G R (1994). A Biological Survey of the Cockburn Ranges. Unpublished report. Conservation and Land Management.

- Humphries, S E, Groves, R H, Mitchell, D S (1991). *Plant Invasions of Australian Ecosystems. A Status Review and Management Directions*. Report to Australian National Parks and Wildlife Service, Endangered Species Program. Project No. 58.
- Johnstone, R E (1990). *Mangroves and mangrove birds of Western Australia*. Western Australian Museum, Perth. Records of the Western Australian Museum. Supplement 32. 120 p.
- Kabay, E D and Burbidge, A A (Eds) (1977). *A biological survey of the Drysdale River National Park, north Kimberley, Western Australia, in August 1975*. Wildl. Res. Bull. West. Aust. No. 6. (Dept. Fish. Wildl.: Perth.)
- Kenneally, K F (1991). *An Introduction to the Flora of the Kimberley*. (Association of Societies for Growing Australian Plants: 16th Biennial Conference 1991).
- Kenneally, K F, Edinger, D C and Willing, T (1996) *Broome and Beyond, Plants and People of the Dampier Peninsula, Kimberley, Western Australia*. Department of Conservation and Land Management.
- Kenneally, K F, McKenzie, N L (1991). *Competing for Paradise*. In Landscape Vol. 6, No. 4 (1991). Department of Conservation and Land Management.
- Kimberley Region Planning Study (1987). *Information bulletin No. 2*. (State Planning Commission: Perth.)
- McKenzie, N L (Ed.) (1981a). *Wildlife of the Edgar Ranges Area, South-west Kimberley, Western Australia*. Wildl. Res. Bull. West. Aust. No. 10. (Dept. Fish. Wildl.: Perth.)
- Miles, J M and Burbidge, A A (Eds) (1975). *A biological survey of the Prince Regent River Reserve, north-west Kimberley, Western Australia, in August 1974*. Wildl. Res. Bull. West. Aust. No. 3. (Dept. Fish. Wildl.: Perth.)
- Petheram, R J, Kok, B (1991). *Plants of the Kimberley Region of Western Australia*. Western Australia Department of Agriculture.
- Sawle, M (1988). *A Survey of Rare and Uncommon Mammals in the Kimberley*. Murdoch University.
- Semeniuk, V, Kenneally, K F, Wilson, P G (1978). *Mangroves of Western Australia*. Western Australian Naturalists' Club, Perth. Handbook (Western Australian Naturalists' Club) 12. vii, 92 p.
- Semeniuk, V, Wurm, PAS (1987). *The Mangroves of the Dampier Archipelago, Western Australia*. Royal Society of WA, Perth.

- Speck, N H, Wright, R L and Rutherford, G K (1964). *General Report on Lands of the West Kimberley Area, WA*. CSIRO Aust. Land Res. Ser. No. 9.
- Thackway, R, Cresswell, I D (editors) (1995). *An Interim Biogeographic Regionalisation for Australia*. A Framework for Setting Priorities in the National Reserve System Co-operative Program, Australian Nature Conservation Agency, Canberra.
- Thomson, C, Done, C, Grosse, A (1990). *The Fragile Frontier*. In Landscape Vol. 6, No. 1 (1990). Department of Conservation and Land Management.
- Tyler, M J, Smith, L A, Johnstone, R E (1994). *Frogs of Western Australia*. Rev. ed. Western Australian Museum.
- Western Australian Museum (1981). *Biological survey of Mitchell Plateau and Admiralty Gulf, Western Australia*. (West. Aust. Mus.: Perth.)
- Wheeler, J R (editor), Rye, B L, Koch, B L, Wilson, AJG (1992) *Flora of the Kimberley Region*, Western Australian Herbarium.
- Williams et al (1996). *The Identification, Conservation and Management of Wild Rivers in the Kimberley Region of Western Australia*. Stream Management 1996 Conference.
- Young, C (1981). Dragon Tree Soak - an oasis in the Great Sandy Desert. *Swans* 11, 17-20.