

# **Holmes Jungle Nature Park**



## **Plan of Management**

**December 1997**

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**Parks and Wildlife Commission of the Northern Territory  
P O Box 496  
PALMERSTON NT 0831**

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Kay Bailey	Strategic Planning and Development Unit, Darwin
Bill Binns	Chief Regional Ranger (Parks North)
Brian Delaney	Chief District Ranger (Darwin Parks)
Vanda Lockley	Interpretation (Parks North)
Roland Muench	Strategic Planning and Development Unit, Darwin
Bill Panton	Wildlife Management

and officers from Wildlife Management and Wildlife Research, PWCNT.



## **Foreword**

The Holmes Jungle Nature Park is a conservation and recreation resource for the people of Darwin and the Top End. Located immediately to the east of Karama, the Park was established to conserve the patch of monsoon rainforest which exists on Palm Creek.

Due to its proximity to suburban residents, the Park has become a popular location for recreational activities undertaken in a bush setting. Walking along its many trails underneath the eucalypt woodland or Carpentaria palm forest gives the visitor an appreciation of the flora, fauna and landforms which naturally occurred in the Darwin area. Mountain bike riding, walking dogs and horse riding are also activities enjoyed in the appropriate parts of the Park.

Holmes Jungle, Palm Creek and the Hilltop Lookout are increasingly used for education and interpretation of the natural environment of the Darwin region. Many school and other groups visit the Park to investigate its diverse habitats. The Park is ideally located close to Darwin for this type of activity.

The “Jungle” has long been a part of the Darwin recreational setting. It was an often visited picnic spot from the 1870's when it was a long twelve mile horse ride from the then small outpost on the shores of Darwin Harbour.

This Draft Plan of Management recognises Holmes Jungle Nature Park as an integral component of the park estate of the Top End and aims to ensure that future visitors can enjoy the Park's natural setting without its natural and cultural values being compromised.



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# 1 INTRODUCTION

## 1.1 Background

Holmes Jungle Nature Park contains one of the few remaining areas of monsoon rainforest in the greater Darwin area. The 250 hectare Nature Park (Reserve 1496) borders Vanderlin Drive and the suburb of Karama to the west, Crocodylus Park to the south and Micket Creek Shooting Range to the east. Shoal Bay Waste Depot lies immediately to the north-west of the Park, with the access road to the Depot running within the Park's north-western boundary (see Figures 1 and 2).

In March 1971, Sections 28, 29 and Portion 1408, Hundred of Bagot were proclaimed Reserve 1300 under section 103 of the *Crown Lands Ordinance 1931-1970* for "forestry and re-forestation purposes". Five years later, in February 1976, Reserve 1300 was reproclaimed as Reserve 1496 to allow for "rationalisation of the boundaries" with an area excluded in the north-west corner. With the creation of the Conservation Commission of the Northern Territory in March 1980 Reserve 1496, known as Holmes Jungle, became the Commission's responsibility.

It took a further three years until May 1983 for the area to be gazetted a Park under section 12 of the *Territory Parks and Wildlife Conservation Act*. Later that month it was officially named the Holmes Jungle Nature Park. A later gazettal in October 1983 clarified the boundaries of the Nature Park which comprises Lots 1849, 1850 and 1851, Town of Sanderson. Reservation from Occupation No 390 under the *Mining Act* covers the Darwin Township Area and extends over the entire Park.

The Park area was part of the original 1869 Goyder survey of Darwin (then known as Palmerston) with this district being undertaken by Surveyor A J Mitchell. Sections 28 and 29 covered the present Holmes Jungle Nature Park. On his map, Mitchell named "Palm Creek" in Section 28 .

The use of "the Jungle" as a popular picnic area commenced soon after Mitchell's survey, with the daughter of the first civilian Administrator (Harriet Daly) recalling of the early 1870's:

*Our favourite camping ground for a picnic was "the jungle", twelve miles from Palmerston, a lovely shady spot, through which ran a delicious placid stream of water.... .*

Section 28 was owned by the Moro family of the United Kingdom for 60 years from 1871 until 1931 until it became part of the estate of Felix Holmes. Section 29 was first granted in 1871 to Thomas Atkinson of Willunga, South Australia and then in 1885 transferred to Maurice William Holtze who was the Government Gardener and instrumental in developing the Darwin Botanic Gardens. Holtze had planned to grow sugar but it proved a failure in the Top End. In 1917 he transferred the title of Section 29 to wealthy local businessman Felix Ernest Holmes (Darwin butcher, baker, power generator and ice maker). Holmes used the area for depasturing his stock prior to slaughter. Upon Holmes' death in 1929, Section 29

was transferred to those representing his estate with Ivor Hall acting as manager.

During the war Holmes Jungle was a popular recreation area with members of the armed forces and the road through the northern end of the Jungle was developed to enable crossing during the wet season. The US Air Force 380 Bomb Group occupied a camp to the west of the current roundabout on the corner of Vanderlin Drive and McMillans Road. The south-west corner of Holmes Jungle Nature Park was the site of an equipment dump for this group as well as the 125th RAAF when they took over the camp in 1944-45. As recently as 1987 components of a B-24 Liberator could still be seen in this area but have since been removed.

Both Sections 28 and 29 were acquired by the Commonwealth in March 1946 as part of the Darwin Lands Acquisition after the war. Ivor Hall remained living on the clearing in the Jungle and was still there in the 1960's. Mango trees in the rainforest near the central clearing and posts from a cattle holding yard are all that remain from the agricultural and pastoral use of the area.

The first suggestion that Holmes Jungle should be reserved was made in 1961 and by December of that year the Administrator had approved Section 28 being reserved for forestry purposes. That part of Section 29 containing the Jungle was added to the proposed reserve (and referred to as Portion 1408, Hundred of Bagot), but formal proclamation as a reserve under the *Crown Lands Act* had to await completion of a survey and did not take place until 1971.

In the meantime the wildlife of Portion 1408 had been given some measure of formal protection by its declaration in July 1966 as a Protected Area under the Wildlife Conservation and Control Ordinance 1962-1966 (NT Government Gazette No 34).

The present access and developments within the Park are shown in Figure 2.

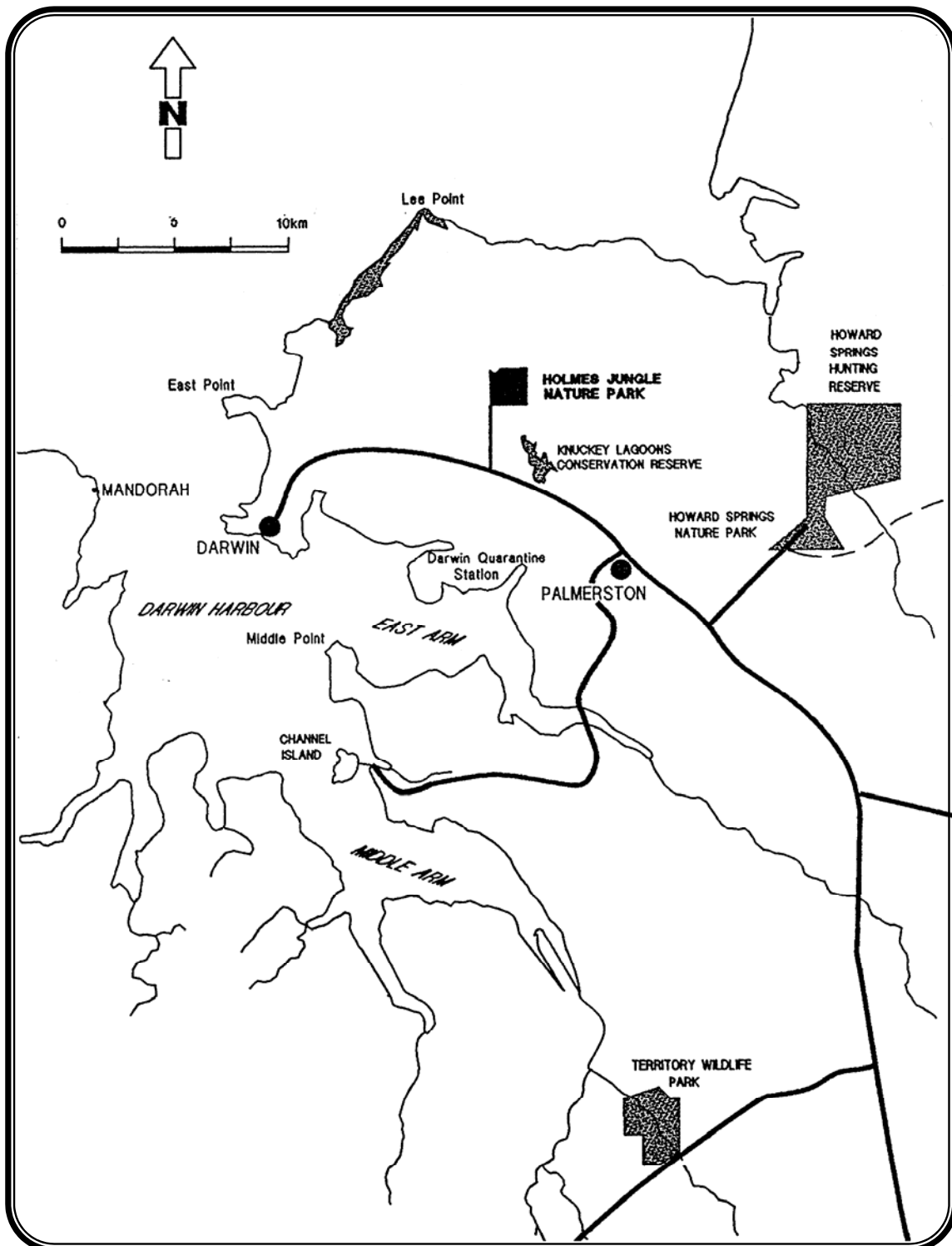
## 1.2 Values of the Park

Palm Creek runs through Holmes Jungle Nature Park from south to north and is surrounded by monsoon rainforest. The open-forest, woodlands and grasslands of the remainder of the Park provide for low-key, nature based recreational opportunities.

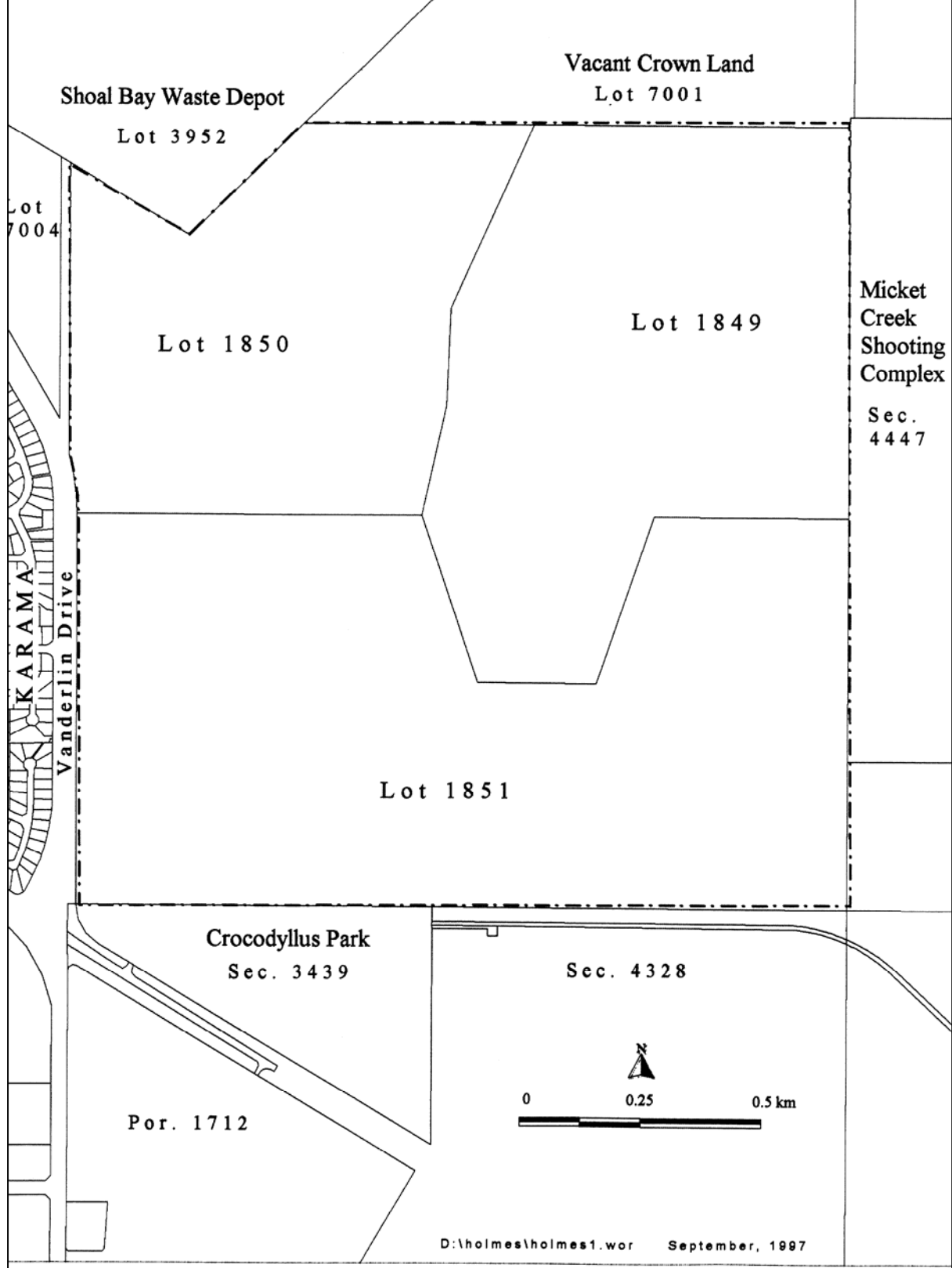
The **conservation values** of the Nature Park are related to the wet monsoon rainforest it contains, one of the few remaining patches of rainforest in the Darwin area. It provides a refuge and breeding area for numerous bird species, some of which are considered vulnerable and are subject to international treaties. A number of rare and endemic plant species also occur in the Park. The Park is included on the Register of the National Estate in the 'Natural' category as part of the Holmes Jungle and Swamp and Micket Creek Complex listing.

The Park has considerable **education and interpretation value** arising from the diversity of habitats it contains and its proximity to Darwin.

Figure 1 - Holmes Jungle Nature Park - Locality Map



# Figure 2: Holmes Jungle Nature Park - Tenure



Due to its location adjacent to suburban Darwin, the Park has significant **recreation and tourism value**. Holmes Jungle and Palm Creek have been used for recreational activities such as picnicking, walking and nature observation since the early 1870's. It was used for 'R & R' by armed forces personnel during World War II and from the mid-1980's has become a nature-based recreation location for residents in the nearby suburbs. With appropriate management, the Park has the potential to continue to provide a wide range of recreational opportunities

The **historic values** of the Nature Park stem from the association of the area with the first residents of Darwin, with Maurice Holtze and with Felix Holmes. Its use by the armed forces during WWII also adds to its value.

The **Aboriginal cultural values** of the Park are derived from the traditional use of the area.

### **1.3 Concept of the Park and its Purposes**

Holmes Jungle Nature Park was set aside in recognition of the value of the rainforest community and the recreational use of the area by Darwin residents. Despite the increasing pressures from the nearby suburban area, the Park remains an attractive setting for a variety of recreational pursuits.

It is intended that the park will continue to be managed for recreation and education of the public while, through careful management of public access and use, the conservation values of the Park will be maintained, and where possible enhanced.

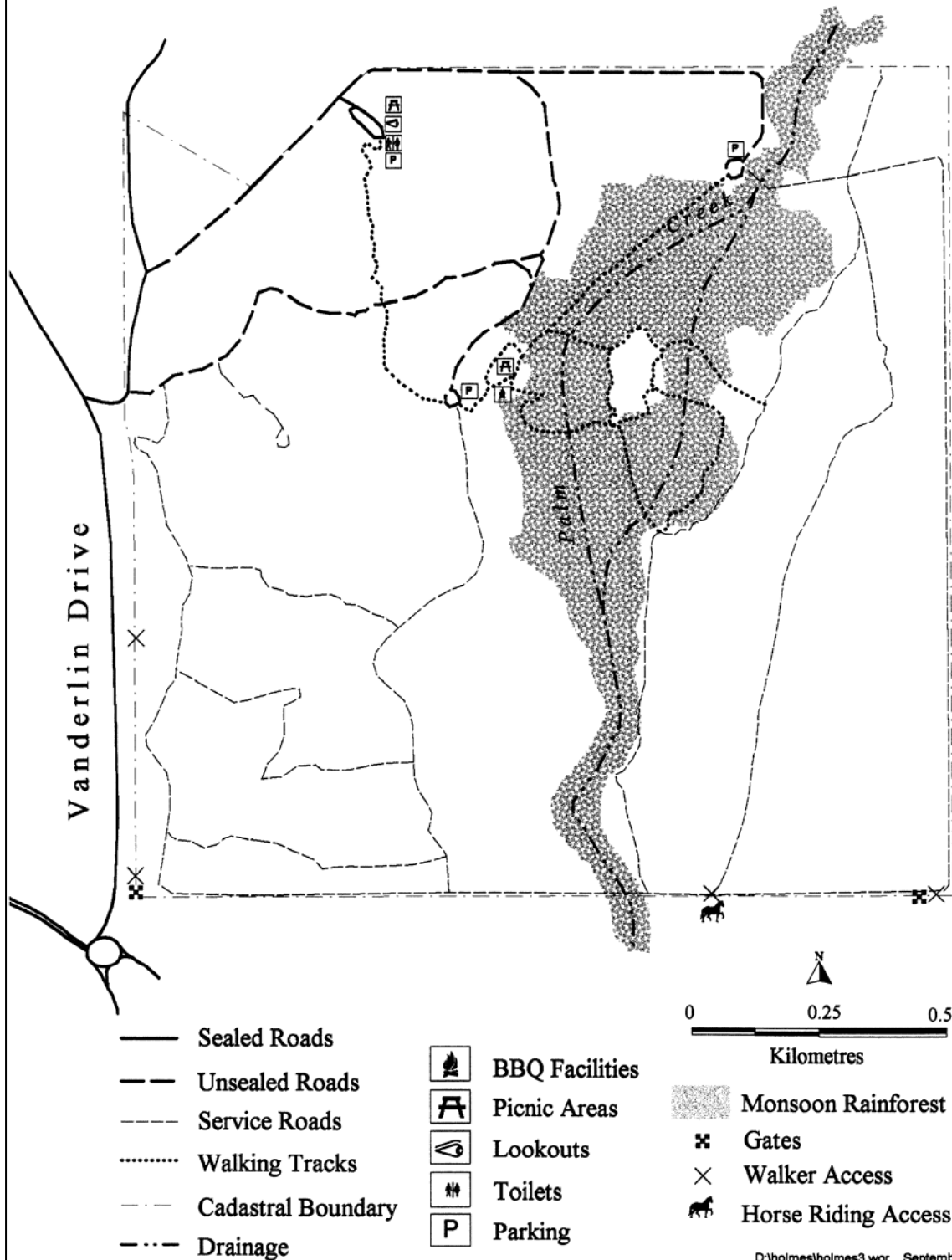
Accordingly the principal purposes of the Nature Park are:

- to provide opportunities for recreational activities consistent with the conservation of the Park's natural values.
- to conserve the monsoon rainforest and surrounding communities and to rehabilitate disturbed areas to a near natural state.
- to provide visitors the opportunity to understand and appreciate the nearby monsoon rainforest, and the pressures placed on the area from surrounding land uses.

### **1.4 Intent of the Plan**

This Plan states the intent of the Parks and Wildlife Commission with regard to the management of Holmes Jungle Nature Park. It sets management objectives, addresses current issues and proposes appropriate measures to guide future management and development. This Plan has been prepared in pursuance of sections 18 and 19 of the *Territory Parks and Wildlife Conservation Act*. The Plan will be in force for a minimum of five years and a maximum of ten years, unless revoked by a new Plan or amended as per section 20 of the Act. The Parks and Wildlife Commission is obliged, under section 21 of the Act, to manage the Nature Park in accordance with this Plan when it has come into operation.

Figure 3: Holmes Jungle Nature Park  
- Current Developments



## 2 ZONING SCHEME

### 2.1 Outline of the Zoning Scheme

The Zoning Scheme for the Nature Park provides a basis for the regulation of activities and developments within defined areas to ensure that visitor activities do not conflict with each other and are compatible with the need to conserve the natural and cultural values of the Park.

Public access within any zone may be regulated and restricted if it is shown to be having a deleterious effect on the values of the area.

Under the Northern Territory *Planning Act* there are two Town Planning Zones over the Holmes Jungle Nature Park. Open Space Zone 01 provides public areas for principally recreational activity and covers the majority of the Park other than the monsoon rainforest. Open Space Zone 03 aims to conserve and protect the flora, fauna and character of natural areas and includes the monsoon rainforest area. Developments and activities proposed within the Park Zoning Scheme are consistent with these Town Planning Zones.

Zones for the Nature Park have been derived by identifying the conservation and recreation values, existing developments and land use capability. Areas suited to particular forms of use have been categorised in a manner that is intended to aid continuity and consistency in management.

The Park has been divided into three zones (Figure 4 and Table 1) :

- Intensive Use Zone
- Dispersed Use Zone
- Conservation Zone.

The purpose of each zone, determined on the basis of its values, is outlined below.

### 2.2 Intensive Use Zone

The purpose of this zone is to provide appropriate visitor and management facilities and foster appreciation of the natural setting of the Park without having a deleterious effect on the values of the Park.

This zone will provide for vehicle access, recreational and management infrastructure. It includes the unsealed access road, and parking and picnic areas. Walking tracks lead from this zone to other areas of the Park. Dogs on a lead are permitted within this zone. Fire control activities will aim to protect the facilities and prevent wildfire.

Should the need arise, additional visitor facilities sited in this area may include sealed roads, walking tracks, parking areas, toilets, visitor information centre and information and interpretive signage. Management fencing may be built to control vehicular access in

strategic locations. There is provision within this zone to provide for management infrastructure such as an office, workshop and a storage area.

### **2.3 Dispersed Use Zone**

The main purpose of this zone is to provide opportunities for a limited variety of recreational activities in a natural setting whilst providing a buffer area for protection of the conservation zone. The conservation values of the vegetation communities present will also be protected. Access will be by foot along unsealed walking tracks with horses and mountain bikes on designated tracks only. Vehicle access is permitted for management purposes only, particularly for fire control activities to ensure wildfire does not affect the monsoon rainforest in the conservation zone.

Developments in this zone will be restricted to low impact walking and vehicle tracks and unobtrusive information and interpretation signs.

### **2.4 Conservation Zone**

The purpose of this zone is to protect the key natural values of the monsoon rainforest and associated ecosystem. Management will aim to monitor and protect the monsoon rainforest from adverse impacts, in particular the effects of concentrated visitation, while providing facilities and information which educate visitors on the values of the rainforest and encourage appropriate behaviour.

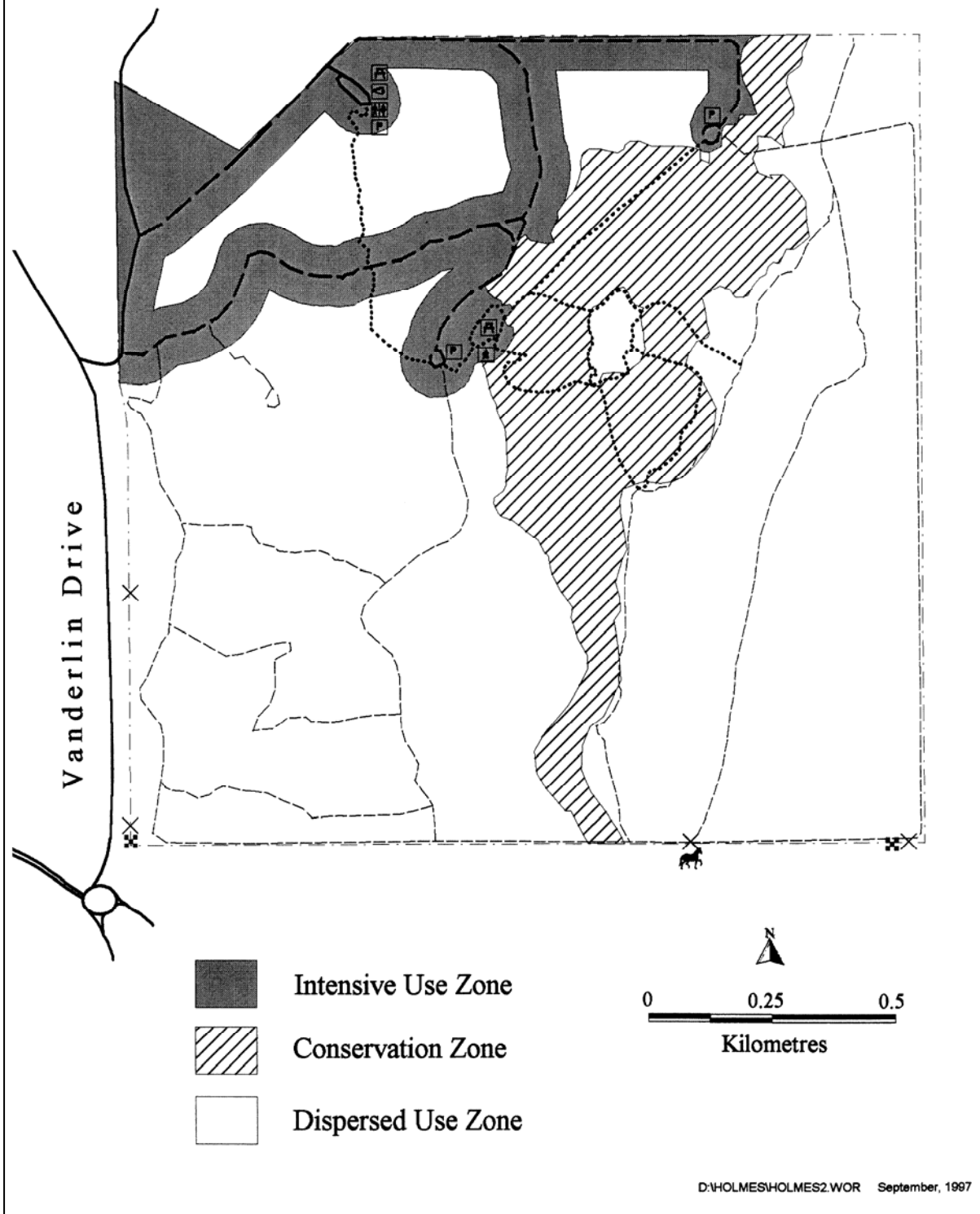
Visitor access will be by foot only on designated walking tracks. Management access for fire control purposes only may be by appropriate small vehicle, such as quad bikes, on the designated walking tracks.

Facilities will be limited to walking tracks and interpretive and information signs.

**Table 1 - Summary of Zoning Scheme**

Management Zone	Intensive Use	Dispersed Use	Conservation
<b>Purpose</b>	To provide appropriate visitor and management facilities and foster appreciation for and enjoyment of the Park.	To provide opportunities for a limited variety of recreational activities in a natural setting while providing a buffer area for protection of .the conservation zone. Conservation of the vegetation communities present.	To protect key natural values of the monsoon rainforest and associated ecosystem.
<b>Management Strategy</b>	To concentrate development and visitor use in an area which can be managed to keep impacts within acceptable limits.	To retain in as natural a state as possible and provide limited facilities which allow for dispersed and low-key activities while allowing fire control activities to protect the monsoon rainforest.	To monitor and protect the monsoon rainforest from adverse impacts. To provide facilities and information which educate visitors on the values of the rainforest and encourage appropriate behaviour.
<b>Access</b>	Conventional vehicle access on sealed roads to day-use areas. Elsewhere by foot. Dogs permitted on a lead.	Visitor access by foot only on designated unsealed tracks. Access by horse and mountain bike on designated tracks only. Vehicle access for management purposes only. Dogs permitted on a lead.	Access by foot on designated walking tracks only. Access by small vehicle for fire control purposes only.
<b>Facilities</b>	Facilities in character with the Park including sealed roads, parking areas, day-use areas, interpretive facilities, toilets, barbeques, management fencing and a range of park furniture. Management facilities including office, workshop and storage area.	Unsealed vehicle and walking tracks, and low-key interpretation/information signs.	Walking track, interpretive/information signs.
<b>Appropriate Uses</b>	Day-use picnicking, photography, walking, nature appreciation, educational activities, contact with Park staff.	Nature appreciation, bush walking, photography, horse riding, mountain bike riding, educational activities.	Nature appreciation, bush walking, photography, scientific research, biological conservation.

Figure 4: Holmes Jungle Nature Park  
- Zoning Scheme



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### **3. MANAGEMENT FOR VISITOR USE**

The Park is situated adjacent to suburban Darwin and contains a significant patch of wet monsoon rainforest. It provides a destination for both tourists and local residents to enjoy low-key recreational activities in a natural setting and to visit and learn about the monsoon rainforest environment.

#### **3.1 Objectives**

- To offer a range of recreational opportunities consistent with the conservation of the Park's natural and cultural values.
- To provide appropriate facilities and access to a range of Park settings allowing effective dispersion of visitors and minimizing social and environmental impacts.
- To develop an information and interpretation service which allows visitors to use and enjoy the Park, enhances their appreciation of Park values and promotes appropriate visitor behaviour.
- To monitor, and where necessary, modify recreational use of the Park.
- To make adequate provision for the safety of visitors and staff, and the protection of personal property and Park assets.

#### **3.2 Access**

Public vehicular access to Holmes Jungle Nature Park is via the sealed Shoal Bay Waste Depot access road off Vanderlin Drive and thence by unsealed two way road to the hill top car park. The remainder of the Park is locked to vehicular access after hours. Although within the Park, the Shoal Bay Waste Depot access road is maintained by the Department of Transport and Works and the Darwin City Council.

Unsealed roads provide access within the Park to two car parks near the monsoon rainforest, with the main circular track being one-way only. Some drivers indulge in inappropriate and unsafe behaviour on the unsealed roads (doing "wheelies" and "dough-nuts"). These activities have led to soil erosion and road maintenance problems.

Vehicle access for management purposes is also provided at the south-west and south-east corners of the Park through locked gates which aim to prevent unauthorised access. There are a number of service roads and walking tracks within the Park available for walkers, mountain bike riders and for management vehicles only. Access within the Conservation Zone is via foot only on designated tracks.

Visitors can also gain walking access to the Park on the entrance and exit roads or via four pedestrian gates and styles along the western and southern boundaries. Access for horses is

provided in the southern boundary adjacent to the track designated for horse use (see section 4.7).

A persistent problem in the Park is the illegal use of off-road bikes, even though this activity is prohibited under the Territory Parks and Wildlife Conservation By-Laws. Off-road bike users gain access to the Park along the southern boundary and also through the main entrance and exit gates and then head bush.

#### **Management Implications and Actions**

- 3.2.1 Public vehicular access to the Park will be via the existing entrance and exit routes. The surface of these routes will be sealed and include effective and appropriate erosion abatement measures. Any extra fill material should also be certified weed free.
- 3.2.2 Access within the Conservation Zone will continue to be by foot only.
- 3.2.3 Tracks which are not required within the Park for visitor access or management purposes will be closed and rehabilitated.
- 3.2.4 Fences will be erected along all boundaries and barrier fences may be placed within the Park if necessary to prevent off-road vehicular access.
- ~~3.2.5 The use of vehicles off designated tracks will be prohibited.~~

### **3.3 Visitor Facilities**

Visitor facilities are required within the Park to enhance the visitor experience without detracting from the natural setting. Any developments of visitor facilities should be commensurate with the purposes of the Park as outlined in this plan. The zoning scheme outlined in section 2 provides for visitor facilities within the Intensive Use Zone.

The main visitor facilities are in the hilltop car park where there are lawned areas, a public toilet, picnic tables, water, rubbish bins, car park, interpretive signs and shelter shed, and the rainforest picnic area where there are mowed areas, picnic tables, water, rubbish bins and a car park.

#### **Management Implications and Actions**

- 3.3.1 The provision of visitor facilities and recreational opportunities will be in accordance with the Zoning Scheme (section 2).
- 3.3.2 Consideration will be given to siting an interpretive visitor centre at the hilltop car park within the Intensive Use Zone.

- 3.3.3 Day use facilities such as toilets, benches, picnic tables, rubbish bins and information and interpretive signs may be provided near the rainforest picnic area within the Intensive Use Zone.
- 3.3.4 All facilities developed will be sited and developed in accordance with Site Development Plans prepared in consultation with environment and landscape planning experts and the Holmes Jungle Nature Park Planning Team.
- 3.3.5 Camping will not be permitted within the Park.

### 3.4 Interpretation and Information

Current interpretive services for the Park include orientation signs positioned in the two picnic areas, an interpretive shelter in the hilltop picnic area with signs discussing the habitats seen from that location, interpretive signs along the Jungle Track with information on the monsoon rainforest environment and an interpretive sign on the Red-backed Fairy Wren (*Malurus melanocephalus*) located along the walking track from the hilltop car park to the Jungle Track.

In addition a pre-visit fact sheet is also available which informs visitors about the natural features of the Park, times to visit and safety aspects. Guided walks are offered during the dry season as part of the 'Explore Top End Parks' Interpretive Program.

Information and interpretive services are important as they enhance visitor appreciation of the Park's values, provide for visitor orientation, comfort and safety, and create awareness of management objectives.

Vandalism of signs and facilities has been exacerbated in Holmes Jungle Nature Park due to its close proximity to residential areas. However, its urban location as well as its diversity of habitats provides an important educational resource to Darwin schools.

#### Management Implications and Actions

- 3.4.1 An Interpretive Plan for the Park will be prepared which will be consistent with strategic Regional and District interpretation, assess existing interpretive and information facilities and activities and develop future directions for interpretive, information and educational services within the Park.
- 3.4.2 Principal messages and themes in the Park's interpretation will include:
  - \* scientific and conservation significance of the monsoon rainforest and the spring fed ecosystems;
  - \* the changing habitats from suburbia to the sea which can be experienced or seen from the Park;
  - \* the impact on the natural environment of its proximity to residential areas particularly with respect to fire management, weed control, stormwater drainage

- and feral domestic animals;
- \* public appreciation of having nature at Darwin's doorstep and the need to protect it;
- \* to encourage public ownership and hence responsibility to care for the Park;
- \* appropriate behaviour in the Park including vandalism and visitor safety; and
- \* European and Aboriginal cultural values.

3.4.3 Traditional custodians and their representative organisations will be consulted regarding the appropriate use and treatment of material on Aboriginal cultural and spiritual beliefs in the Park's Interpretive Program.

3.4.4 The Parks and Wildlife Commission, in consultation with the Department of Education, will give consideration to the establishment of an Environmental Education and Visitor Centre within the Park.

### **3.5 Visitor Monitoring**

There is currently no visitor monitoring conducted at Holmes Jungle Nature Park. It is likely that it is a Type 2 park as defined in the *National Data Standards on Protected Areas Visitation*. These are 'low visitation level parks' which collectively, account for 10 percent (ie. approximately 65,000 per annum) of total visits to PWCNT parks and reserves.

Establishment of a comprehensive visitor monitoring system for the Park is an essential component of environmental and visitor management. The information collected will be used to assist with justification for resourcing and works programs, planning of facilities, determination of zoning and for impact monitoring. Qualitative data on visitor behaviour and attitudes towards the Park will assist in providing better services, facilities and management of the Park.

The short term objectives for a visitor monitoring system at Holmes Jungle Nature Park are to estimate the total number of visitors and the daily and weekly use patterns, to estimate the number of visitors spending time in the monsoon rainforest specifically and to determine the method of transport to the Park. In the longer term qualitative monitoring will be conducted.

#### **Management Implications and Actions**

- 3.5.1 A Visitor Monitoring System will be established for the Park. Visitor numbers will be estimated through the use of electronic vehicle and walking track counting equipment as follows:
- \* An electronic vehicle axle counter will be installed and calibrated on the entrance road off the Shoal Bay Waste Depot access road. Data collection will be continuous and equipment will be calibrated to reflect the number of persons per vehicle, persons entering by other means, daily, weekly and seasonal variations

and management use. The method of calibration will be as outlined in the PWCNT draft Visitor Monitoring Manual.

- \* The number of pedestrians entering via the walker access in the south-western corner of the Park will be monitored.
- \* A model of total visitor use will be developed taking into account persons entering from access points along the southern boundary.
- \* Trail counters will be installed to monitor selected internal walking tracks.

3.5.2 Total person visits will be estimated and recorded in the PWCNT central data base on a monthly basis.

3.5.3 Visitor activity data will be collected during the calibration survey events and by ranger observation.

3.5.4 As a Type 2 Park, qualitative monitoring will be conducted in Holmes Jungle Nature Park as determined by the Parks Visitor Monitoring Steering Committee in accordance with the PWCNT Visitor Monitoring Strategy.

3.5.5 The environmental impacts of visitors in the Park will be assessed by the management staff.

### **3.6 Visitor Safety**

Visitor safety is an essential factor in the management of the Park. Pre-visit fact sheets provide information on walking in the Park with respect to dehydration, sunburn and insect repellent. Drinking water is provided at the two picnic areas within the Park.

#### **Management Implications and Actions**

3.6.1 The Park's Interpretation Plan is an important management tool in ensuring visitor enjoyment and safety whilst in the Park.

3.6.2 The Fire Action Plan (see Section 4.8) will identify emergency response action relating to visitor safety in the event of wildfire in the Park.

3.6.3 Visitor safety is an important consideration in the design, selection, siting and maintenance of visitor facilities.

## **4. MANAGEMENT OF THE PARKS RESOURCES**

### **4.1 Objectives**

- To protect and conserve the diversity of the Park's natural environment including native flora and fauna, landforms, soils, geology and water resources.
- To conserve the present distribution and diversity of native plant and animal species in the Park.
- To protect the natural landscape and scenic values of the Park.
- To inform the visiting public about the natural and cultural values of the Park.
- To minimise and, where possible, reverse deleterious impacts on the monsoon rainforest resulting from human activity and invasion by weeds, feral animals and wildfires.
- To protect the Park from the effects of erosion and where appropriate, rehabilitate disturbed landscapes.
- To conserve and promote historical and any Aboriginal cultural values within the Park.

### **4.2 Geology, Landforms and Soils**

A low plateau surface in the north west of the Park is bounded by sideslopes and low hills which vary in form from gentle gradients with shallow to moderately deep massive earths to low rugged scarps characterized by extensive stone outcrops. These slopes also occur in the south east of the park and are generally formed on lower Proterozoic metasediments which underlie Cretaceous sediments, and which have been exposed by geological erosion of the Mullaman beds. Sandy drainage floors with free draining soils subject to flooding shallowly dissect the slopes and the lower wash slopes. These are flanked by seepage areas which are generally poorly drained and the creeklines and springlines which form Palm Creek and its margins. The focus of the Nature Park is the wet monsoon rainforest referred to as Holmes Jungle which occurs in the area of the creeklines and springlines. Flanking the monsoon rainforest and Palm Creek in the north east of the Park are grasslands with extremely low relief and negligible slopes which are inundated by freshwater in the wet season.

Two stormwater retardation basins were constructed in the west of the Park during 1982 to ensure stormwater runoff from the Karama and Malak subdivisions did not result in massive scouring of the Reserve and the Jungle. These have locally altered the topography, drainage and soils in their vicinity. The drains and associated retardation basins provide a medium for weeds and garden plants to enter the Park and grow in the ideal soil and water conditions provided (see section 4.5).

The soils on the plateau and slopes are well drained, while those on the creek margins and the

sandy drainage floors are liable to flooding and highly erodible if disturbed. There are some eroded areas within the Park where natural erosion has been accelerated by vehicle access and changed drainage patterns for surface water flows. Some erosion control and rehabilitation measures have been undertaken in the Park particularly along access tracks and boundary fire breaks.

Holmes Jungle Nature Park is within Mining Reserve 390 (equivalent to a Reservation from Occupation which ensures no mining will occur in the area) which covers the Darwin town locality.

### **Management Implications and Actions**

- 4.2.1 The Park's geology and geomorphological processes are suitable for inclusion in the Park's interpretive program. In particular, the geology and landforms which have resulted in the emergence and maintenance of Palm Creek and the monsoon rainforest will be included in the Park's Interpretive Plan.
- 4.2.2 Any future developments will be designed, sited and constructed to avoid areas susceptible to erosion, to prevent alterations to water drainage patterns, and undertaken to ensure that only minimal soil disturbance occurs.
- 4.2.3 Appropriate measures will be undertaken to prevent or limit soil erosion on the Park including the regulation of visitor access and visitor activities; fire management and the maintenance of vegetation cover.
- 4.2.4 Areas suffering from soil erosion will be rehabilitated and monitored for further deterioration, after seeking the advice of soil conservation and landscape architect experts. Areas of particular concern include vehicle tracks on the sandy drainage areas in the eastern sector of the Park and boundary firebreaks/vehicle access areas along the southern boundary. Various measures will be used such as diversion of stormwater runoff; controlling visitor and vehicle access; replacement and revegetation of soil; and construction of fences and barriers. Any replaced soil should be certified weed free.
- 4.2.5 Soils will not be excavated, removed or disturbed in the Park except where necessary for management purposes.
- 4.2.6 Use of vehicles, with the exception of emergency and management tasks, will be limited to existing roads and tracks within the Intensive Use Zone.
- 4.2.7 The susceptibility of the soils within the monsoon rainforest area to erosion is an important consideration for siting developments and controlling visitor activities.
- 4.2.8 Access within the Conservation Zone will be restricted to foot access on designated walking tracks to reduce likelihood of impact on the Creek banks.

### 4.3 Water Resources

Holmes Jungle is located at the northern discharge point of a north-south striking aquifer which is located in the top of a weathered Lower Proterozoic dolomite. It is overlain by 40 to 50 metres of Cretaceous clayey sandstones which provide the storage to enable Palm Creek and the monsoon rainforest area to remain saturated during the dry season. The magnitude of the flows in Palm Creek is directly related to the height of the groundwater. Any reduction in the annual infiltration rate to groundwater, such as by catchment development and increase in surface flows, will have a detrimental effect on the monsoon rainforest.

The existence and extent of the monsoon rainforest is controlled by:

- a continuous groundwater flow to the area which is maintained by the high water table to the south;
- an area of flat ground with suitable soil types combined with a near surface water table. Rising ground to the south, east and west of the monsoon rainforest increases the depth to the water table and results in these areas being unable to support a monsoon rainforest community; and
- the freshwater / saline groundwater interface which has been identified downstream of the monsoon rainforest and prevents its northern expansion.

It was feared during planning and development for the Karama subdivision that infiltration rates for groundwater recharge and stormwater discharge channelled into Holmes Jungle Nature Park would adversely impact on the Park's natural and aesthetic environment as well as introduce pollutants and weeds. Baseline hydrological and water quality data were collected and predictions made. Further research is required in conjunction with Water Resources Branch of Department of Lands, Planning and Environment to determine the extent, if any, of the impact of the development.

The catchment for both surface and groundwater flows to Palm Creek is outside the Park boundaries. Activities and developments in the catchment area which have the potential to impact on the water resources of the Park include the management of stormwater drainage systems arising from the alignment of roads adjoining the Park boundary, waste discharge from Crocodylus Park, continued management of urban stormwater from Karama and Malak and management of open drainage networks into the Park.

#### **Management Implications and Actions**

- 4.3.1 Care will be taken that any work and developments do not cause water pollution or reduction of water supply for Palm Creek or the groundwater.
- 4.3.2 Liaison will be maintained with neighbouring landowners and relevant government authorities regarding protection of the catchment of Palm Creek and source of the groundwater.

- 4.3.3 Monitoring of water quality and quantity will be undertaken on a regular basis to determine any impacts such as introduction of weeds or pollutants.
- 4.3.4 Research will be encouraged to determine the sensitivity of the monsoon forest to fluctuations in the water table and quality of the water in Palm Creek. Such research will be in accordance with the research and monitoring program developed for the Park (see Section 5.4).

#### 4.4 Flora

The Park supports a diverse assemblage of vegetation, the most significant community of which is the monsoon rainforest, referred to as Holmes Jungle.

The vegetation of the remainder of the Park is mostly woodland, with grasslands also present in the centre and north-east of the Park. The vegetation along the western boundary and in the hilltop picnic area has been man modified and consists mostly of slashed grasses. Appendix 1 contains a species list of flora so far recorded on the Park.

The two rare species which have been recorded in the Park are *Fimbristylis compacta* (sedge) and *Bracyachne ambigua* (grass). In addition five recorded species are endemic to the NT; *Aristolochia holtzei* (vine), *Drosera falconeri* (sundew), *Desmodium A7567* (herb), *Goodenia D1547* Goodenia) and *Mitrasacme multicaulis* (small herb).

The monsoon rainforest is associated with the springlines where there is permanent moisture. The species found are mixed including *Acacia auriculiformis*, *Calophyllum soulattri*, *Carpentaria acuminata*, *Horsfieldia australiana* and *Syzygium nervosum*. Despite considerable damage by Cyclone Tracey the rainforest has recovered and retains its significance.

Eucalypt woodland to open forest is found on the plateau sideslopes and lower footslope seepage areas. The three Eucalyptus communities present are *Eucalyptus tetradonta*, *E. miniata* open forest; *E. tectifera* low open woodland; and *E. tetradonta*, *E. miniata* woodland to low woodland.

*Pandanus spiralis* low woodland to very low open woodland occurs on the deep sandy loams in the east and adjacent to Palm Creek margins in the south of the Park. It is associated with *Lophostemon lactifluus*, *Sorghum intrans* and *Pennisetum polystachion* (a weed) grassland in small areas along the low scarps below the plateau in the west of the Park.

#### Management Implications and Actions

4.4.1 Vegetation of the monsoon rainforest community requires special protection and will be managed in accordance with the guidelines for the Conservation Zone.

4.4.2 Disturbance to any of the vegetation communities will be minimised. Clearing of

vegetation, including slashing and control burning, will be kept to the minimum necessary for public safety, fire protection and to protect facilities.

- 4.4.3 Disturbed or denuded sites will be revegetated, by colonisation from surrounding natural areas wherever possible. Active management such as scarifying, seeding or planting disturbed areas may be employed where required. Priority areas for action will be the edges of the monsoon rainforest and high erosion risk areas particularly old roads, tracks and boundary lines.
- 4.4.4 Early wet and dry seasons controlled burning may be conducted, where possible, in accordance with the Annual Fire Action Plan designed to reduce fuel and protect the fire-sensitive monsoon rainforest (see section 4.8).
- 4.4.5 Research and monitoring will be undertaken in accordance with the Research and Monitoring Program (see section 5.4) to further the understanding of plant communities in the Park and to determine the impact of weeds, erosion and visitors on these communities.
- 4.4.6 As part of the Interpretation Plan for the Park, information will be made available to visitors about the distribution and composition of the native vegetation, particularly the monsoon rainforest community.
- 4.4.7 Further research regarding the status of the rare and endemic plant species will be undertaken. Management aims to protect their habitat within the Reserve.

#### **4.5 Weed Control**

The close proximity of the Park to urban development and its past use for small-scale agricultural development and human habitation has meant that introduced species are of concern in most sections of the Park, but notably the stormwater retardation basins and the monsoon rainforest fringes. Mangoes and mother-in-law tongues are still present to remind us of this use. At least 42 introduced flora species have been recorded in the Park (see Appendix 1). Noxious weeds present are Mission Grass (*Pennisetum polystachion*), Hyptis (*Hyptis suaveolens*), Spinyhead Sida (*Sida acuta*), Flannel Weed (*Sida cordifolia*), Candle Bush (*Senna alata*), Sicklepod (*Senna obtusifolia*), Common Sensitive Plant (*Mimosa pudica*), Lantana (*Lantana camara*) and snakeweeds (*Stachytarpheta* spp). These species are classified “B” under the *Noxious Weeds Act* and their spread must be controlled. In addition, a number of invasive environmental weeds are causing concern, especially Gamba Grass (*Andropogon gayanus*), Gambia Pea (*Crotalaria goreensis*), Morning Glory Vine (*Ipomoea quamoclit*) and Coffee Bush (*Leucaena leucocephala*)

In the mid-1980's an outbreak of the floating fern *Salvinia molesta* was found in the monsoon rainforest. It was eradicated by Park staff. Monitoring is carried out to ensure that this highly invasive species does not re-occur.

#### **Management Implications and Actions**

- 4.5.1 Regular surveillance will continue in order to locate new weed outbreaks, concentrating on the most likely points of entry or occurrence (stormwater retardation basins, horse tracks, roads, car parks, monsoon rainforest fringes, creek lines).
- 4.5.2 Periodic monitoring of existing weed infestations will continue in order to plan and evaluate control programs.
- 4.5.3 Any previously unrecorded weeds, or small infestations of existing weeds, will be immediately eradicated if found in the Park.
- 4.5.4 Large, established infestations of weeds will be controlled if they occur in key locations that:
  - \* interfere with public access or enjoyment;
  - \* threaten priority conservation areas such as the monsoon rainforest; or
  - \* could lead to further rapid spread, such as along creeks, drains or tracks.
- 4.5.5 A Weed Management Program for the Park will be prepared in conjunction with the Weeds Management Officer, PWCNT. This program will determine the extent and distribution of weeds within the Park, examine the current and potential impact of weeds and the interaction between weeds and fire, and recommend methods for control and subsequent revegetation.
- 4.5.6 Measures that may be used in the control of introduced plants include manual or mechanical removal, burning, biological controls and the judicious use of herbicides.

## 4.6 Fauna

The fauna of Holmes Jungle Nature Park has been relatively well recorded due to its proximity to the scientific and academic institutions in Darwin. The variety of habitats within the Park result in a range of fauna typical of much of the Darwin area. A list of all recorded faunal species for Holmes Jungle Nature Park is at Appendix 2.

Seven native mammal species have been recorded for the Park including the Northern Quoll (*Dasyurus hallucatus*); Grassland Melomys (*Melomys burtoni*); Northern Brown Bandicoot (*Isodon macrourus*) and Brush-tailed Possum (*Trichosurus vulpecula*). This list is far from exhaustive.

The Park is especially rich in birdlife, in particular the waterbirds and waders associated with the seasonally inundated grasslands in the north of the Park. Many of the birds are listed in International treaties. The largest family with species in these categories is the sandpipers and allies (Scolopacidae). All species from this family recorded for the Park are listed on Treaties such as the Bonn Convention, and the Bilateral agreements with the Governments of Japan and China on migratory birds, known as JAMBA and CAMBA respectively. Listing on these Treaties results in obligations in relation to their conservation and the management of their habitat.

The fauna of the park is associated with the monsoon rainforest, the savanna woodland or the swamp environments. Management issues associated with the fauna of monsoon rainforests include maintenance of its integrity through weed control; protection against fire; protection

of the upstream catchment on which the rainforest depends; and maintenance of other rainforest patches in the surrounding area.

Management issues for fauna of the savannah woodland include establishment of a range of fire regimes to maintain heterogeneity and control of weedy grass species.

Management issues for fauna of the swamps include protection of water flow and quality, through the development of whole catchment planning; protection from weeds and feral animals; and development of a fire management program aimed at maintaining wetland plants which provide important food or nesting resources.

A survey by students of the then Darwin Community College in 1978 recorded 21 reptile species and 11 species of frogs. Among the reptile species are the venomous snakes, the Black Whip Snake (*Demansia atra*) and the King Brown Snake (*Pseudechis australis*).

The 11 species of fish recorded in the Park are also listed in Appendix 2. One species is an undescribed gudgeon. These fish were recorded in surveys by the Museum and Art Galleries of the NT in July 1983 and the Aquarium Section of the Territory Wildlife Park in April 1997.

The invertebrate fauna of the Park has received scant attention, although there have been two recent collections under the Monitoring River Health program by the Water Resources Branch of the Department of Lands, Planning and Environment. Species lists and analysis of the findings of these collections are not yet available.

In March 1997 a survey of the butterflies (Lepidoptera) resulted in a total of 26 recorded species for the Park. Further survey work at various times of the year would probably add to this.

Threats to animal populations and habitats in the Park are likely to result from uncontrolled wildfire, alteration of the quantity and quality of water resources available in the Park, weed infestation and the activities of visitors.

Palm Creek and Holmes Jungle on occasions contain high mosquito numbers which can cause problems to Park visitors. Staff from the Entomology Branch, Territory Health Services monitor the presence of mosquito larvae and if required the area is sprayed by Park staff with an environmentally friendly larvicide recommended by the Territory Health Services.

#### **Management Implications and Actions**

4.6.1 The Park will be managed to ensure the long term protection of the natural distribution, abundance and diversity of native animals and their habitats throughout the Park. This will be achieved through effective management of visitors and developments in accordance with the Zoning Scheme, implementation of the Annual Fire Action Plan, and the Weed Management Program.

4.6.2 Hunting, fishing, trapping or other taking of wildlife will be prohibited, unless

approved for research purposes in accordance with the Parks and Wildlife Commission 'Scientific Licences Policy'.

- 4.6.3 The Park's Interpretative Plan will include information regarding the characteristics, distribution and habitats of native animals found in the Park.
- 4.6.4 Additional fauna surveys will be conducted to refine knowledge of the Park's fauna and to monitor the effectiveness of management practices particularly in relation to rare, threatened and vulnerable species .
- 4.6.5 Measures for the control of mosquito breeding in the Park will continue in co-operation with the Entomology Branch, Territory Health Services.
- 4.6.6 Management will ensure that obligations are fulfilled in relation to the conservation and management of species listed on International treaties.

#### **4.7 Feral Animal Control**

Feral animals on the Park include domestic dogs and cats from the nearby residential area which may have an adverse impact on the populations of native animals. Historically pigs and buffaloes were also present in the Jungle. Buffaloes have been eradicated from the area. Pigs have been reduced and have not been a major problem since development of the nearby residential areas, boundary fencing has been erected and increased visitation to the Park.

In accordance with the Parks and Wildlife Commission "Pets in Parks Policy", dogs and horses may only be taken into designated areas within Holmes Jungle Nature Park and must be kept under control at all times. Signs adjacent to walking tracks within the Park designate those areas where dogs and horses are permitted. These areas are reflected in the Zoning Scheme. No domestic animals are permitted in the Conservation Zone to ensure there is no conflict with primary objective of wildlife conservation.

#### **Management Implications and Actions**

- 4.7.1 Signs and pre-visit information will continue to clearly indicate the regulations applying to the entry and control of dogs and horses in the Park.
- 4.7.2 The assistance of people living near the Park will be sought in minimising the impacts of their pets on the Park's natural resources.
- 4.7.3 Stray cats and dogs found on the Park will be removed. Management staff may periodically search for and remove cats using traps or other methods.

#### **4.8 Fire Management**

It is neither practical nor desirable to completely exclude fire from the Park. However, the monsoon rainforest community within the Conservation Zone is highly susceptible to damage

by fire and the proximity of the residential neighbours to the Park requires that fire be controlled. Each year fires are lit in the Park by vandals or enter the Park from outside. It requires constant vigilance by staff and members of the public and a large proportion of Park resources to protect the monsoon rainforest. Fires will not be permitted within the Park other than for management purposes.

An Annual Fire Action Plan is prepared for the Park in conjunction with the NT Fire Service. This sets out measures which are used to reduce the fire hazard including the clearing or slashing of firebreaks, slashing grassed areas, carrying out prescriptive early wet and dry season control burning in areas adjacent to the monsoon rainforest; and excluding/extinguishing any fire from the Conservation Zone.

One of the concerns for the Park's surrounding neighbours is the potential for wildfires to emanate from within the Park's boundaries and cause damage to their properties. The Commission has a similar concern and has collaborated with neighbouring landholders and the NT Fire Service to develop the Annual Fire Action Plans for the Park.

#### **Management Implications and Actions**

4.8.1 The Fire Action Plan will be updated annually after consultation with the NT Fire Service and the neighbouring landholders and will consider:-

- Asset protection: Mechanical clearance of vegetation around park signage, day-use areas, walking tracks, roads and fences.
- Early wet and dry season prescriptive burns in areas that have early curing rates or sufficient fuel loads to establish protection from later wildfires.
- Conservation Zone: exclusion/ extinguishing of fire from the monsoon rainforest.
- Habitat diversification in the woodland areas by maintaining a mosaic of burning regimes.
- Monitoring to determine progress with fire control measures and provision for revision of the Fire Action Plan where necessary.
- Assessment of the affect and management of weeds such as Gamba grass and Mission grass on fire management.

4.8.2 Pre-visit information will remind visitors of the restrictions on the use of fire within the Park.

4.8.3 Regular monitoring and maintenance of the Park's fire breaks will be undertaken by Park staff to facilitate fire control.

## 4.9 Aboriginal Cultural Resources

The area was probably used for traditional hunting, swimming and fishing. The provision of information relating to the use of Park areas by Aboriginals is becoming increasingly of interest to visitors throughout the Territory.

### Management Implications and Actions

- 4.9.1 Research will be encouraged to locate, record, document and protect Aboriginal cultural values within the Park.
- 4.9.2 All new developments in the Park will require a certificate of clearance from the Aboriginal Areas Protection Authority.
- 4.9.3 All Aboriginal artefacts located in the Park are protected as 'Prescribed Archaeological Objects' under the *Heritage Conservation Act*.

## 4.10 Historical Resources

Holmes Jungle has been a site for recreational, nature based activities for the Darwin population since its first non-Aboriginal settlement. Harriet Daly recorded its use in the early 1870s as a destination for picnics, collecting flowers and ferns, and shooting or hunting.

Although it had been used for grazing and agricultural pursuits by Maurice Holtze and Felix Holmes, the Jungle area was once again a prominent recreational site for members of the armed forces during WWII. Little remains in the Park to show any of its former uses, other than the stone road built across the northern end of the Jungle and Palm Creek and the remnants of a cattle holding yard. Components of the WWII equipment dump in the south west corner of the Park have been progressively removed so that no evidence remains. A few mango trees are dotted around the central clearing of the jungle along with other introduced species. These are remnants of the pastoral and agricultural activities.

With the declaration of the area as a reserve in 1971 and as a Nature Park in 1983 the recreational and conservation values of the Jungle were formally recognised. It has since become a Park of value to local residents for recreational activities as well as for its conservation values. Further historical research would provide additional detail on the pastoral, agricultural and WWII uses of the Jungle and the Park area.

### Management Implications and Actions

- 4.10.1 The non-Aboriginal history of the area will be included in the Park Interpretive Plan.
- 4.10.2 The Parks and Wildlife Commission will encourage further research to document the Park's historical use and historical cultural resources.
- 4.10.3 Sites of historical interest within the Park , such as the WWII roadway, will be protected.

## **PARK ADMINISTRATION AND RESEARCH**

## 5.1 Objectives

- To provide responsible management and appropriate and efficient administration of the Park.
- To ensure that management procedures and practices achieve the objectives of this Plan by adhering to the Management Actions.
- To administer the *Territory Parks and Wildlife Conservation Act*, its By-laws and other relevant legislation.
- To cooperate with neighbouring landholders regarding management of the Park.
- To encourage the establishment of appropriate research and monitoring programs for the Park's natural and cultural resources.
- To encourage public input and involvement in the management of the Park.

## 5.2 Staffing and Management Facilities

The Park is currently serviced by PWCNT staff from the Darwin Parks District based at Berrimah. There is no permanent on-site Ranger presence which has implications for the behaviour of some visitors. Problems of vandalism and hooliganism may be reduced by having greater on-site management presence and encouraging public ownership and responsibility for the Park.

Other avenues available for the Commission to gain assistance with park management activities include the "Volunteers in Parks Program" and development of a "Friends of Holmes Jungle" group.

With the development of facilities within the Park and the increase in both Darwin's population and tourism is the potential for visitor numbers to the Park to steadily increase.

Over the past few years fencing of the Park has progressed. Fencing is still required along the northern boundary and a portion of the southern boundary. Fencing reduces access for illegal Park users such as motor bike riders.

Much of the Park's staff time is spent in slashing the grass as part of the fire control program. Rubbish is currently collected by Ranger patrols and disposed of at the Shaol Bay Waste Depot site.

### **Management Implications and Actions**

- 5.2.1 Consideration will be given to siting a Darwin Parks District headquarters in the north-west corner of the Park.
- 5.2.2 The level and frequency of management services provided will be increased, if necessary, to support any increase in visitor numbers while still providing a quality management service.
- 5.2.3 Park management will consider all avenues available to gain assistance with management of the Park, including the “Volunteers in Parks Program” and the establishment of a “Friends of Holmes Jungle” group. Efforts will be made to involve local Aboriginal people in the ‘Friends’ group.

### **5.3 External Relations**

Holmes Jungle Nature Park borders Vanderlin Drive and the suburb of Karama to the west, Crocodylus Park and vacant Crown Land to the south and Micket Creek Shooting Range to the east. Shoal Bay Waste Depot lies immediately to the north-west of the Park. Co-operative relations with neighbouring landholders need to be maintained to ensure the effective management of the Park.

Issues of mutual concern include:

- \* land use planning in the area;
- \* Park security;
- \* fencing of the Park boundary;
- \* visitor access and safety;
- \* vandalism, litter management and general amenity of the area;
- \* run-off from neighbouring activities into the Park;
- \* noise intrusion from the shooting range;
- \* the presence of resident scavenger species feeding from the Waste Depot;
- \* interpretation and promotion of the Park and area; and
- \* natural resource management issues such as control of fire, weeds, domestic and introduced animals and soil degradation.

### **Management Implications and Actions**

- 5.3.1 The Park’s neighbours and interested local groups and individuals will be consulted regarding issues of mutual concern with the hope of resolving these issues through co-operation and joint planning.

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- \* interpretation and promotion of the Park and area; and
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### **Management Implications and Actions**

- 5.3.1 The Park’s neighbours and interested local groups and individuals will be consulted regarding issues of mutual concern with the hope of resolving these issues through co-operation and joint planning.

## 5.4 Research and Monitoring

Research and monitoring of the Park's flora, fauna, hydrology, cultural history and recreational use will continue with the aim of protecting the natural environment of the Park and in particular the monsoon rainforest. Research also provides baseline data which with future comparisons will help gauge the effectiveness of management and provide valuable information for interpretation to the public.

### Management Implications and Actions

- 5.4.1 Research and monitoring will be undertaken by PWCNT staff or other suitably qualified persons or agencies to provide baseline data and to understand ecosystem interactions.
- 5.4.2 All research and monitoring activities proposed by persons or agencies external to the PWCNT will require the approval of the Director pursuant to section 111 of the *Territory Parks and Wildlife Conservation Act* and must be consistent with guidelines specified in the 'PWCNT Scientific Licences Policy'.

## 6. MANAGEMENT PROGRAMS

This Plan has specified a number of actions that will be undertaken in order to meet management objectives. Priorities for the implementation of these actions are summarized below.

Priorities have been assigned according to the action, relative importance and urgency for implementation:

- Ongoing:** Must be implemented on an ongoing basis in order to achieve the objectives of the Plan.
- High:** Imperative in order to achieve the Plan's stated objectives.
- Medium:** Very important to achieve the Plan's stated objectives but subject to the availability of resources.
- Low:** Desirable to achieve the Plan's stated objectives but only if the necessary resources are available and only after higher priorities have been satisfied.

<b>_ACTION</b>	<b>PAGE</b>	<b>PRIORITY</b>
<b>Management for Visitor Use</b>		
Seal entrance and loop roads	11	Medium
Close and rehabilitate tracks not required	11	Ongoing
Complete boundary fencing	11	High
Erect internal barrier fences	11	High
Consider Education and Interpretive Visitor Centre	11	Low
Provide additional day use facilities near rainforest picnic area	12	Medium
Prepare Site Development Plan for all developments	12	Ongoing
Prepare Interpretive Plan including		High
- geology and geomorphological processes	12, 16	
- monsoon rainforest	12, 17	
- native vegetation	19	
- native fauna	21	
- control of dogs and horses	22	
- European history	13, 24	
Consult Aboriginal Areas Protection Authority	13, 23	Ongoing
Establish Visitor Monitoring System	13	High

<b>_ACTION</b>	<b>PAGE</b>	<b>PRIORITY</b>
Install electronic vehicle axle counter on entrance road	13	High
Install walker counter at pedestrian access in south-west corner	14	High
Develop model of total visitor use	14	High
Install trail counters on selected walking tracks	14	Medium
Record person visits on PWCNT central data base	14	Ongoing
Conduct qualitative monitoring	14	Medium
Monitor environmental impact of visitors	14, 16	Ongoing
Consider visitor safety when developing visitor facilities	14	Ongoing
<b>Management of the Park's Resources</b>		
Rehabilitate areas subject to soil erosion	16, 19	High
Prevent soil erosion	16	Ongoing
Monitor water quality and quantity	17	Ongoing
Protect monsoon rainforest ecosystem	16, 18, 19	Ongoing
Surveillance to prevent new weed outbreaks	16, 19	Ongoing
Monitor existing weed infestations	20	Ongoing
Eradicate small infestations of invasive weeds	20	High
Control certain large, established weed infestations	20	High
Prepare Weed Management Program	20, 21	High
Conduct further fauna surveys	21	Medium
Control of mosquito breeding	21	Ongoing
Remove stray cats and dogs	22	Ongoing
Annual Fire Action Plan	14, 18, 19, 21, 23	High
Obtain Certificate of Clearance from AAPA for any developments	23	High
Protection of archaeological and sacred sites	23	Ongoing
Protect historic sites	24	Medium
<b>Park Administration and Research</b>		
Consider Darwin Parks District HQ in Park	26	Medium
Develop programs to provide management assistance for the Park	26	High
Liaison with neighbours and interested groups	17, 26	Ongoing

<b>_ACTION</b>	<b>PAGE</b>	<b>PRIORITY</b>
Encourage research and monitoring of	27	Medium
- Water quality and quantity	17	
- Plant communities	19	
- Native fauna	21	
- Aboriginal culture	23	
- Historical use	24	
- Visitor expectations	14	

## 7. BIBLIOGRAPHY

Daly, Mrs Dominic, 1887, *Digging, Squatting and Pioneering Life in the Northern Territory of South Australia*, London.

Fogarty, P, Howe, D and Dunlop, C, 1979, *The Land Resources of the Darwin Area*, Land Conservation Unit, Territory Parks and Wildlife Commission.

National Parks Service, Victoria, 1996, *National Data Standards on Protected Areas Visitation*, Report for ANZECC Working Group on benchmarking and best practice for National Parks and protected areas.

## APPENDIX 1 - FLORA LIST FOR HOLMES JUNGLE NATURE PARK

Rare	R
Endemic to NT	e
Introduced	*
Noxious Weed Class B	B

Family	Species	Common Name	Conservation Status
ACANTHACEAE	<i>Andrographis paniculata</i>		*
ARACEAE	<i>Hygrophila angustifolia</i> <i>Caladium</i> <i>Colocasia esculenta</i> <i>Lazarum</i>		
ARECACEAE	<i>Carpentaria acuminata</i> <i>Livistona humilis</i>		
ARISTOLOCHIACEAE	<i>Aristolochia holtzei</i>		e
ASCLEPIADACEAE	<i>Cynanchum carnosum</i>		
ASTERACEAE	<i>Adenostemma lavenia</i> <i>Bidens</i> <i>Bidens bipinnata</i> <i>Blumea saxatilis</i> <i>Epaltes australis</i> <i>Pleurocarpaea denticulata</i> <i>Wedelia trilobata</i>	Singapore Daisy	*
BIXACEAE	<i>Cochlospermum fraseri</i>		
BORAGINACEAE	<i>Heliotropium</i> <i>Heliotropium bracteatum</i> <i>Heliotropium ventricosum</i>		
BURSERACEAE	<i>Canarium australianum</i>		
BYBLIDACEAE	<i>Byblis liniflora</i>		
CAESALPINIACEAE	<i>Cassia fistula</i> <i>Chamaecrista mimosoides</i> <i>Senna alata</i> <i>Senna obtusifolia</i>	Golden Shower Candle Bush Sickle Pod	* *B *B
CLUSIACEAE	<i>Calophyllum soulattri</i>		
COMBRETACEAE	<i>Quisqualis indica</i> <i>Terminalia ferdinandiana</i> <i>Terminalia pterocarya</i>	Chinese Lantern	*
COMMELINACEAE	<i>Cartonema spicatum</i> <i>Cyanotis axillaris</i>		
CONVOLVULACEAE	<i>Ipomoea quamoclit</i> <i>Ipomoea triloba</i> <i>Merremia aegyptia</i> <i>Merremia dissecta</i>	Morning Glory	* * * *
CUCURBITACEAE	<i>Luffa cylindrica</i>		
CYPERACEAE	<i>Bulbostylis barbata</i> <i>Cyperus</i> <i>Cyperus angustatus</i> <i>Cyperus compressus</i>		
<b>Family</b>	<b>Species</b>	<b>Common</b>	<b>Conservation</b>

		<b>Name</b>	<b>Status</b>
		<i>Cyperus difformis</i>	
		<i>Cyperus exaltatus</i>	
		<i>Cyperus iria</i>	
		<i>Cyperus javanicus</i>	
		<i>Cyperus nervulosus</i>	
		<i>Cyperus polystachyos</i>	
		<i>Cyperus pulchellus</i>	
		<i>Cyperus rotundus</i>	Nut Grass *
		<i>Cyperus scariosus</i>	
		<i>Eleocharis dulcis</i>	
		<i>Eleocharis spiralis</i>	
		<i>Fimbristylis compacta</i>	R
		<i>Fimbristylis densa</i>	
		<i>Fimbristylis dichotoma</i>	
		<i>Fimbristylis littoralis</i>	
		<i>Fimbristylis microcarya</i>	
		<i>Fimbristylis rara</i>	
		<i>Fimbristylis recta</i>	
		<i>Fimbristylis schoenoides</i>	
		<i>Fimbristylis tetragona</i>	
		<i>Fuirena ciliaris</i>	
		<i>Fuirena umbellata</i>	
		<i>Lipocarpha microcephala</i>	
		<i>Rhynchospora corymbosa</i>	
		<i>Rhynchospora heterochaeta</i>	
		<i>Rhynchospora longisetis</i>	
		<i>Rhynchospora subtenuifolia</i>	
		<i>Rhynchospora wightiana</i>	
		<i>Scleria levis</i>	
		<i>Scleria polycarpa</i>	
		<i>Tricostularia undulata</i>	
DROSERACEAE		<i>Drosera falconeri</i>	e
		<i>Drosera indica</i>	
ERIOCAULACEAE		<i>Eriocaulon setaceum</i>	
EUPHORBIACEAE		<i>Euphorbia heterophylla</i>	Milkweed *
		<i>Euphorbia hirta</i>	
		<i>Euphorbia vachellii</i>	
		<i>Flueggea virosa</i>	
		<i>Glochidion perakense</i> var. <i>supra-axillare</i>	
		<i>Macaranga involucrata</i> var. <i>mallotoides</i>	
		<i>Macaranga involucrata</i>	
		<i>Petalostigma pubescens</i>	
		<i>Petalostigma quadriloculare</i>	
		<i>Phyllanthus flagellaris</i>	*
		<i>Phyllanthus minutiflorus</i>	
		<i>Sauropus paucifolius</i>	
		<i>Sebastiania chamaelea</i>	
<b>Family</b>	<b>Species</b>	<b>Common Name</b>	<b>Conservation Status</b>

FABACEAE	<i>Aeschynomene americana</i>		*
	<i>Alysicarpus glumaceus</i>		
	<i>Alysicarpus vaginalis</i>	Buffalo Clover	*
	<i>Calopogonium mucunoides</i>	Calopo	*
	<i>Canavalia papuana</i>		
	<i>Centrosema pubescens</i>	Centro	*
	<i>Clitoria ternatea</i>	Butterfly Pea	*
	<i>Crotalaria goreensis</i>	Gambia Pea	*
	<i>Crotalaria montana</i>		
	<i>Crotalaria pallida</i> var. <i>obovata</i>	Streaked Rattlepod	*
	<i>Crotalaria quinquefolia</i>		
	<i>Cyclocarpa stellaris</i>		
	<i>Desmodium</i> A7567		e
	<i>Desmodium muelleri</i>		
	<i>Desmodium trichostachyum</i>		
	<i>Indigofera linifolia</i>		
	<i>Indigofera trifoliata</i>		
	<i>Macroptilium atropurpureum</i>	Siratro	*
	<i>Pongamia pinnata</i>		
	<i>Pycnospora lutescens</i>		
	<i>Smithia conferta</i>		
	<i>Stylosanthes hamata</i>	Verano	*
	<i>Vigna radiata</i> var. <i>sublolata</i>		
	<i>Vigna vexillata</i> var. <i>angustifolia</i>		
	<i>Zornia prostrata</i>		
FLAGELLARIACEAE	<i>Flagellaria indica</i>		
GOODENIACEAE	<i>Goodenia</i> D1547		e
	<i>Goodenia neglecta</i>		
	<i>Goodenia porphyrea</i>		
HAEMODORACEAE	<i>Haemodorum coccineum</i>		
HYDROCHARITACEAE	<i>Vallisneria spiralis</i>		
JUNCAGINACEAE	<i>Triglochin dubium</i>		
LAMIACEAE	<i>Hyptis suaveolens</i>	Hyptis	*B
	<i>Pogostemon stellatus</i>		
LAURACEAE	<i>Cassytha filiformis</i>		
	<i>Litsea glutinosa</i>		
LECYTHIDACEAE	<i>Barringtonia acutangula</i>		
	<i>Planchonia careya</i>		
LEEACEAE	<i>Leea rubra</i>		
LENTIBULARIACEAE	<i>Utricularia chrysantha</i>		
	<i>Utricularia lasiocaulis</i>		
	<i>Utricularia leptoplectra</i>		
LENTIBULARIACEAE	<i>Utricularia odorata</i>		
LILIACEAE	<i>Crinum angustifolium</i>		
	<i>Crinum uniflorum</i>		
	<i>Curculigo ensifolia</i>		

Family	Species	Common Name	Conservation Status
LOGANIACEAE	<i>Mitrasacme connata</i>		

	<i>Mitrasacme exserta</i>		
	<i>Mitrasacme latiflora</i>		e
	<i>Mitrasacme multicaulis</i>		
	<i>Mitrasacme nummularia</i>		
	<i>Mitrasacme subvolubilis</i>		
LYTHRACEAE	<i>Rotala mexicana</i>		
MALVACEAE	<i>Abelmoschus moschatus</i>		
	<i>Hibiscus meraukensis</i>		
	<i>Hibiscus sabdariffa</i>	Rosella	*
	<i>Malachra fasciata</i>		*
	<i>Sida acuta</i>	Spinyhead Sida	*B
	<i>Sida cordifolia</i>	Flannel Weed	*B
	<i>Urena lobata</i>		
MELIACEAE	<i>Vavaea australiana</i>		
MENISPERMACEAE	<i>Stephania japonica</i>		
MENYANTHACEAE	<i>Nymphoides minima</i>		
	<i>Nymphoides parvifolia</i>		
MIMOSACEAE	<i>Acacia</i>		
	<i>Acacia aulacocarpa</i>		
	<i>Acacia auriculiformis</i>		
	<i>Acacia dimidiata</i>		
	<i>Acacia oincinocarpa</i>		
	<i>Acacia plectocarpa</i>		
	<i>Leucaena leucocephala</i>	Coffee Bush	*
	<i>Mimosa pudica</i>	Common Sensitive Plant	*B
MORACEAE	<i>Ficus congesta</i>		
	<i>Ficus hispida</i>		
	<i>Ficus opposita</i>		
	<i>Ficus racemosa</i>		
	<i>Ficus scobina</i>		
MYRISTICACEAE	<i>Horsfieldia australiana</i>		
MYRTACEAE	<i>Myrstica insipida</i>		
	<i>Eucalyptus polycarpa</i>		
	<i>Lophostemon lactifluus</i>		
	<i>Melaleuca viridiflora</i>		
	<i>Syzygium eucalyptoides subsp. bleeseri</i>		
	<i>Syzygium nervosum</i>		
NYMPHAEACEAE	<i>Nymphaea hastifolia</i>		
OLEANDRACEAE	<i>Nephrolepis biserrata</i>		
ONAGRACEAE	<i>Ludwigia hyssopifolia</i>		
	<i>Ludwigia octovalvis</i>		
OPHIOGLOSSACEAE	<i>Ophioglossum costatum</i>		
ORCHIDACEAE	<i>Habenaria ochroleuca</i>		
PASSIFLORACEAE	<i>Passiflora foetida</i>	Wild Passion Fruit	*
PHILYDRACEAE	<i>Philydrum lanuginosum</i>		
POACEAE	<i>Alloteropsis semialata</i>		
<b>Family</b>	<b>Species</b>	<b>Common Name</b>	<b>Conservation Status</b>
	<i>Andropogon gayanus</i>	Gamba Grass	*
	<i>Bothriochloa bladhii</i>		
	<i>Brachiaria piligera</i>		

	<i>Brachyachne ambigua</i>		R
	<i>Ectrosia agrostoides</i>		
	<i>Heteropogon contortus</i>		
	<i>Imperata cylindrica</i>		
	<i>Isachne confusa</i>		
	<i>Ischaemum australe</i>		
	<i>Ischaemum rugosum</i>		
	<i>Melinis repens</i>	Red Natal Grass	*
	<i>Mnesithea rottboellioides</i>		
	<i>Oryza meridionalis</i>		
	<i>Panicum decompositum var. tenuior</i>		
	<i>Panicum trachyrhachis</i>		
	<i>Paspalidium rarum</i>		
	<i>Paspalum scrobiculatum</i>		
	<i>Pennisetum pedicellatum</i>		*
	<i>Pennisetum polystachion</i>	Mission Grass	*B
	<i>Perotis rara</i>		
	<i>Phragmites karka</i>		
	<i>Pseudopogonatherum contortum</i>		
	<i>Rottboellia cochinchinensis</i>		
	<i>Sacciolepis indica</i>		
	<i>Schizachyrium pseudeulalia</i>		
	<i>Setaria apiculata</i>		
	<i>Sorghum exstans</i>		
	<i>Sporobolus pyramidalis</i>		*
	<i>Sporobolus virginicus</i>		
	<i>Themeda arguens</i>		
	<i>Whiteochloa capillipes</i>		
	<i>Xerochloa imberbis</i>		
POLYGALACEAE	<i>Polygala</i>		
PORTULACACEAE	<i>Calandrinia gracilis</i>		
	<i>Calandrinia oblonga</i>		
PROTEACEAE	<i>Grevillea dryandri</i>		
	<i>Hakea arborescens</i>		
	<i>Persoonia falcata</i>		
RHAMNACEAE	<i>Alphitonia excelsa</i>		
RHIZOPHORACEAE	<i>Carallia brachiata</i>		
RUBIACEAE	<i>Canthium schultzei</i>		
	<i>Mitracarpus hirtus</i>		*
	<i>Morinda citrifolia</i>		
	<i>Nauclea orientalis</i>		
	<i>Oldenlandia galioides</i>		
	<i>Oldenlandia mitrasacmoides</i>		
	<i>Spermacoce</i>		
	<i>Spermacoce breviflora</i>		

Family	Species	Common Name	Conservation Status
	<i>Spermacoce exserta</i>		
	<i>Spermacoce hispida</i>		*
	<i>Spermacoce leptoloba</i>		
	<i>Timonius timon</i>		
RUTACEAE	<i>Melicope elleryana</i>		
	<i>Micromelum minutum</i>		
SAPOTACEAE	<i>Pouteria pohlmaniana</i>		
SCHIZAEACEAE	<i>Lygodium microphyllum</i>		
SCROPHULARIACEAE	<i>Buchnera gracilis</i>		
	<i>Centranthera cochinchinensis</i>		
	<i>Linnophila fragrans</i>		
	<i>Lindernia ciliata</i>		
	<i>Lindernia lobelioides</i>		
	<i>Lindernia vitacea</i>		
	<i>Mimulus uvedaliae</i>		
	<i>Scoparia dulcis</i>		*
SINOPTERIDACEAE	<i>Cheilanthes</i>		
SMILACACEAE	<i>Smilax australis</i>		
SOLANACEAE	<i>Physalis minima</i>		
STERCULIACEAE	<i>Melochia corchorifolia</i>		
	<i>Waltheria indica</i>		
STYLIDIACEAE	<i>Stylidium uliginosum</i>		
TACCACEAE	<i>Tacca leontopetaloides</i>		
THELYPTERIDACEAE	<i>Cyclosorus interruptus</i>		
THYMELAEACEAE	<i>Thecanthes punicea</i>		
TILIACEAE	<i>Corchorus aestuans</i>		
	<i>Grewia retusifolia</i>		
	<i>Triumfetta pentandra</i>		*
TYPHACEAE	<i>Typha domingensis</i>		
VERBENACEAE	<i>Clerodendrum costatum</i>		
	<i>Huxleya linifolia</i>		
	<i>Lantana camara</i>	Lantana	*B
	<i>Stachytarpheta australis</i>	Snakeweed	*B
	<i>Stachytarpheta cayennensis</i>	Snakeweed	*B
	<i>Vitex glabrata</i>		
VIOLACEAE	<i>Hybanthus enneaspermus</i>		
VITACEAE	<i>Ampelocissus frutescens</i>		
	<i>Cayratia trifolia</i>		
XYRIDACEAE	<i>Xyris complanata</i>		
	<i>Xyris indica</i>		

## APPENDIX 2 - RECORDED FAUNA LIST FOR HOLMES JUNGLE NATURE PARK

Family	Species	Common Name	
<b>Mammals</b>			
Dasyuridae	<i>Dasyurus hallucatus</i>	Northern Quoll	
Macropodidae	<i>Macropus agilis</i>	Agile Wallaby	
Muridae	<i>Rattus colletti</i>	Dusky Rat	
	<i>Hydromys chrysogaster</i>	Water Rat	
	<i>Melomys butoni</i>	Grassland Melomys	
Peramelidae	<i>Isodon macrourus</i>	Northern Brown Bandicoot	
Phalangeridae	<i>Trichosurus vulpecula</i>	Brush-tailed Possum	
<b>Birds</b>			
Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk	
	<i>Aquila audax</i>	Wedge-tailed Eagle	
	<i>Circus assimilis</i>	Spotted Harrier	
	<i>Elanus axillaris</i>	Black-shouldered Kite	
	<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	
	<i>Haliastur indus</i>	Brahminy Kite	
	<i>Haliastur sphenurus</i>	Whistling Kite	
	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	
	<i>Hieraaetus morphnoides</i>	Little Eagle	
	<i>Milvus migrans</i>	Black Kite	
	Alaudidae	<i>Mirafra javanica</i>	Singing Bushlark
	Alcedinidae	<i>Alcedo azurea</i>	Azure Kingfisher
	Anatidae	<i>Anas gibberifrons</i>	Grey Teal
<i>Anas superciliosa</i>		Pacific Black Duck	
<i>Dendrocygna arcuata</i>		Wandering Whistling-Duck	
<i>Tadorna radjah</i>		Radjah Shelduck	
Anseranatidae	<i>Anseranas semipalmata</i>	Magpie Goose	
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift	
Ardeidae	<i>Ardea alba</i>	Great Egret	
	<i>Ardea garzetta</i>	Little Egret	
	<i>Ardea ibis</i>	Cattle Egret	
	<i>Ardea intermedia</i>	Intermediate Egret	
	<i>Ardea novaehollandiae</i>	White-faced Heron	
	<i>Ardea picata</i>	Pied Heron	
	<i>Ixobrychus flavicollis</i>	Black Bittern	
	<i>Nycticorax caledonicus</i>	Nankeen Night Heron	
	Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow
		<i>Artamus leucorhynchus</i>	White-breasted Woodswallow
Burhinidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird	
	<i>Esacus neglectus</i>	Beach Stone-curlew	
Cacatuidae	<i>Burhinus grallarius</i>	Bush Thick-knee	
	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	
	<i>Cacatua roseicapilla</i>	Galah	
	<i>Cacatua sanguinea</i>	Little Corella	
<b>Family</b>	<b>Species</b>	<b>Common Name</b>	

Campephagidae	<i>Calyptorhynchus banksii</i>	Red-tailed Black-cockatoo	
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	
	<i>Coracina papuensis</i>	White-bellied Cuckoo-shrike	
	<i>Lalage leucomela</i>	Varied Triller	
	<i>Lalage sueurii</i>	White-winged Triller	
Centropodidae	<i>Centropus phasianinus</i>	Pheasant Coucal	
Charadriidae	<i>Charadrius leschenaultii</i>	Greater Sand Plover	
	<i>Charadrius mongolus</i>	Lesser Sand Plover	
	<i>Charadrius ruficapillus</i>	Red-capped Plover	
	<i>Erythrogonys cinctus</i>	Red-kneed Dotterel	
	<i>Pluvialis dominica</i>	American Golden Plover	
	<i>Pluvialis squatarola</i>	Grey Plover	
	<i>Vanellus miles</i>	Masked Lapwing	
	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork
	Columbidae	<i>Chalcophaps indica</i>	Emerald Dove
		<i>Ducula bicolor</i>	Pied Imperial Pigeon
<i>Geopelia humeralis</i>		Bar-shouldered Dove	
<i>Geopelia striata</i>		Peaceful Dove	
<i>Ptilinopus regina</i>		Rose-crowned Fruit-dove	
<i>Eurystomus orientalis</i>		Dollarbird	
Coraciidae	<i>Corvus orru</i>	Torresian Crow	
Corvidae	<i>Cuculus variolosus</i>	Brush Cuckoo	
Cuculidae	<i>Chrysococcyx minutillus</i>	Little Bronze-Cuckoo	
	<i>Cuculus saturatus</i>	Oriental Cuckoo	
	<i>Eudynamys scolopacea</i>	Common Koel	
Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird	
Dicruridae	<i>Dicrurus bracteatus</i>	Spangled Drongo	
	<i>Grallina cyanoleuca</i>	Magpie-lark	
	<i>Myiagra alecto</i>	Shining Flycatcher	
	<i>Myiagra inquieta</i>	Restless Flycatcher	
	<i>Myiagra rubecula</i>	Leaden Flycatcher	
	<i>Rhipidura leucophrys</i>	Willie Wagtail	
	<i>Rhipidura rufiventris</i>	Northern Fantail	
	Falconidae	<i>Falco berigora</i>	Brown Falcon
		<i>Falco cenchroides</i>	Nankeen Kestrel
		<i>Falco peregrinus</i>	Peregrine Falcon
Gruidae	<i>Grus rubicunda</i>	Brolga	
Haematopodidae	<i>Haematopus longirostris</i>	Pied Oystercatcher	
Halcyonidae	<i>Dacelo leachii</i>	Blue-winged Kookaburra	
	<i>Todiramphus macleayii</i>	Forest Kingfisher	
	<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher	
	<i>Todiramphus sanctus</i>	Sacred Kingfisher	
	<i>Hirundo nigricans</i>	Tree Martin	
Hirundinidae	<i>Chlidonias hybridus</i>	Whiskered Tern	
Laridae	<i>Chlidonias leucopterus</i>	White-winged Black Tern	
	<i>Sterna nilotica</i>	Gull-billed Tern	
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	
Loriidae	<i>Malurus melanocephalus</i>	Red-backed Fairy-wren	
Maluridae	<i>Megapodius reinwardt</i>	Orange-footed Scrubfowl	
Megapodiidae	<i>Conopophila albogularis</i>	Rufous-banded Honeyeater	
Meliphagidae	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater	

**Family**

**Species**

**Common Name**

	<i>Lichenostomus unicolor</i>	White-gaped Honeyeater
	<i>Lichmera indistincta</i>	Brown Honeyeater
	<i>Manorina flavigula</i>	Yellow-throated Miner
	<i>Melithreptus albogularis</i>	White-throated Honeyeater
	<i>Myzomela obscura</i>	Dusky Honeyeater
	<i>Philemon argenticeps</i>	Silver-crowned Friarbird
	<i>Philemon buceroides</i>	Helmeted Friarbird
	<i>Philemon citreogularis</i>	Little Friarbird
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater
Motacillidae	<i>Anthus novaeseelandiae</i>	Richard's Pipit
Oriolidae	<i>Oriolus flavocinctus</i>	Yellow Oriole
	<i>Oriolus sagittatus</i>	Olive-backed Oriole
	<i>Sphecotheres viridis</i>	Figbird
Pachycephalidae	<i>Colluricincla megarhyncha</i>	Little Shrike-thrush
	<i>Pachycephala simplex</i>	Grey Whistler
Pardalotidae	<i>Gerygone chloronotus</i>	Green-backed Gerygone
	<i>Gerygone magnirostris</i>	Large-billed Gerygone
	<i>Pardalotus striatus</i>	Striated Pardalote
	<i>Smicrornis brevirostris</i>	Weebill
Passeridae	<i>Lonchura castaneothorax</i>	Chestnut-breasted Mannikin
	<i>Neochmia phaeton</i>	Crimson Finch
	<i>Poephila acuticauda</i>	Long-tailed Finch
	<i>Poephila personata</i>	Masked Finch
	<i>Taeniopygia bichenovii</i>	Double-barred Finch
Petroicidae	<i>Microeca flavigaster</i>	Lemon-bellied Flycatcher
Phalacrocoracidae	<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant
	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant
Phasianidae	<i>Coturnix chinensis</i>	King Quail
	<i>Coturnix australis</i>	Brown Quail
Pittidae	<i>Pitta iris</i>	Rainbow Pitta
Ploceidae	<i>Poephila bichenovii</i>	Double-barred Finch
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler
Psittacidae	<i>Aprosmictus erythropterus</i>	Red-winged Parrot
	<i>Platycercus venustus</i>	Northern Rosella
	<i>Psitteuteles versicolor</i>	Varied Lorikeet
Ptilonorhynchidae	<i>Chlamydera nuchalis</i>	Great Bowerbird
Rallidae	<i>Gallinula olivacea</i>	Bush-hen
	<i>Rallus philippensis</i>	Buff-banded Rail
	<i>Poliolimnas cinerea</i>	White-browed Crake
	<i>Porphyrio porphyrio</i>	Purple Swamphen
	<i>Porzana pusilla</i>	Baillon's Crake
Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt
	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet
Scolopacidae	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper
	<i>Calidris ferruginea</i>	Curlew Sandpiper
	<i>Calidris ruficollis</i>	Red-necked Stint
	<i>Gallinago megala</i>	Swinhoe's Snipe
	<i>Gallinago stenura</i>	Pin-tailed Snipe
<b>Family</b>	<b>Species</b>	<b>Common Name</b>
	<i>Heteroscelus brevipes</i>	Grey-tailed Tattler

	<i>Limosa limosa</i>	Black-tailed Godwit
	<i>Numenius madagascariensis</i>	Eastern Curlew
	<i>Numenius minutus</i>	Little Curlew
	<i>Numenius phaeopus</i>	Whimbrel
	<i>Tringa glareola</i>	Wood Sandpiper
	<i>Tringa hypoleucos</i>	Common Sandpiper
	<i>Tringa nebularia</i>	Common Greenshank
	<i>Tringa stagnatilis</i>	Marsh Sandpiper
	<i>Xenus cinereus</i>	Terek Sandpiper
Strigidae	<i>Ninox connivens</i>	Barking Owl
	<i>Ninox novaeseelandiae</i>	Southern Boobook
Sylviidae	<i>Acrocephalus stentoreus</i>	Clamorous Reed-Warbler
	<i>Cisticola exilis</i>	Golden-headed Cisticola
	<i>Cisticola juncidis</i>	Zitting Cisticola
	<i>Megalurus timoriensis</i>	Tawny Grassbird
Threskiornithidae	<i>Platalea regia</i>	Royal Spoonbill
	<i>Plegadis falcinellus</i>	Glossy Ibis Ct
	<i>Threskiornis molucca</i>	Australian White Ibis
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis
Turnicidae	<i>Turnix maculosa</i>	Red-backed Button-quail

## Reptiles

Agamidae	<i>Chlamydosaurus kingii</i>	Frilled Lizard
	<i>Lophognathus temporalis</i>	Northern Water Dragon
Boidae	<i>Liasis fuscus</i>	Water Python
	<i>Liasis olivaceus</i>	Olive Python
	<i>Morelia spilota</i>	Carpet Python
Chelidae	<i>Chelodina rugosa</i>	Northern Snake-Necked Turtle
Colubridae	<i>Boiga irregularis</i>	Brown Tree Snake
	<i>Dendrelaphis punctulatus</i>	Common Tree Snake
	<i>Enhydris polylepis</i>	Water Snake
	<i>Stegonotus cucullatus</i>	Slatey-grey Snake
	<i>Styphorhynchus mairii</i>	Freshwater Snake
Elapidae	<i>Demansia atra</i>	Black Whip Snake
	<i>Furina ornata</i>	Moon Snake
	<i>Pseudechis australis</i>	King Brown Snake
Pygopodidae	<i>Delma borea</i>	No common name
	<i>Delma tincta</i>	No common name
Scincidae	<i>Ctenotus inornatus</i>	No common name
	<i>Ctenotus robustus</i>	No common name
	<i>Glaphyromorphus douglasi</i>	No common name
Varanidae	<i>Varanus gouldii</i>	Gould's Goanna; Sand Monitor
	<i>Varanus mertensi</i>	Merten's Water Dragon

Family	Species	Common Name
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## Amphibians

Hylidae	<i>Litoria bicolor</i>	Northern Dwarf Tree Frog
	<i>Litoria caerulea</i>	Green Tree Frog
	<i>Litoria inermis</i>	No common name
	<i>Litoria nasuta</i>	Rocket Frog
	<i>Litoria rothi</i>	No common name
	<i>Litoria wotjulumensis</i>	No common name
Myobatrachidae	<i>Crinia bilingua</i>	Bilingual Froglet
	<i>Limnodynastes convexiusculus</i>	Marbled Frog
	<i>Limnodynastes ornatus</i>	Ornate Burrowing Frog
	<i>Ranidella bilingua</i>	No common name
	<i>Uperoleia inundata</i>	No common name

## Fish

Ambassidae	<i>Ambassis agrammus</i>	Sailfin Perchlet
Centropomidae	<i>Lates calcarifer</i>	Barramundi
Eleotrididae	<i>Hypseleotris compressa</i>	Empire Gudgeon
	<i>Mogurnda mogurnda</i>	Purple Spotted Gudgeon
	<i>Oxeleotris nullipora</i>	Dwarf Gudgeon
	<i>Oxeleotris sp.</i>	Sinuuous Gudgeon
Megalopidae	<i>Megalops cyprinoides</i>	Ox-eye Herring or Tarpon
Melanotaeniidae	<i>Melanotaenia nigrans</i>	Black-lined Rainbowfish
Pseudomugilidae	<i>Pseudomugil gertrudae</i>	Spotted Blue-eye
	<i>Pseudomugil tenellus</i>	Delicate Blue-eye
Teraponidae	<i>Leiopotherapon unicolor</i>	Spangled Grunter

## Insects - Butterflies

Hesperiidae	<i>Borbo impar</i>	Yellow Swift
	<i>Pelopidas lyelli</i>	Lyell's Swift
	<i>Telecota colon</i>	Pale Darter
Lycaenidae	<i>Famegana ateuslus</i>	Black Spotted Grass Blue
	<i>Arhopala centaurus</i>	Dull Oak Blue
	<i>Candalides erinus</i>	Small Dusky Blue
Nymphalidae	<i>Cethosia penthesilea</i>	Orange Lacewing
	<i>Danaus affinus</i>	Black and White Tiger
	<i>Danaus chrysippus</i>	Lesser Wanderer
	<i>Danaus genuita alexis</i>	Orange Tiger
	<i>Euploea core</i>	Common Crow
	<i>Euploea sylvester</i>	Two Brand Crow
	<i>Hypocysia adiante</i>	Darwin Ringlet
	<i>Hypolimnas alimena</i>	Blue Banded Eggfly
	<i>Hypolimnas bolina</i>	Common Eggfly
	<i>Junonia hedonia</i>	Brown Soldier
	<i>Junonia villida</i>	Meadow Argus
	<i>Melanitis leda</i>	Evening Brown
	<i>Mycalasis perseus</i>	Dingy Bushbrown
	<i>Phalanta phalantha</i>	Leopard
	<i>Precis orithya albicinta</i>	Blue Argus

<b>Family</b>	<b>Species</b>	<b>Common Name</b>
Papilionidae Pieridae	<i>Cressida cressida cassandra</i>	No common name
	<i>Catopsilia pomona</i>	Lemon Migrant
	<i>Eurema hecabe</i>	Common Grass Yellow
	<i>Eurema smilax</i>	Small Grass Yellow
	<i>Eurema sana</i>	Spotless Grass Yellow