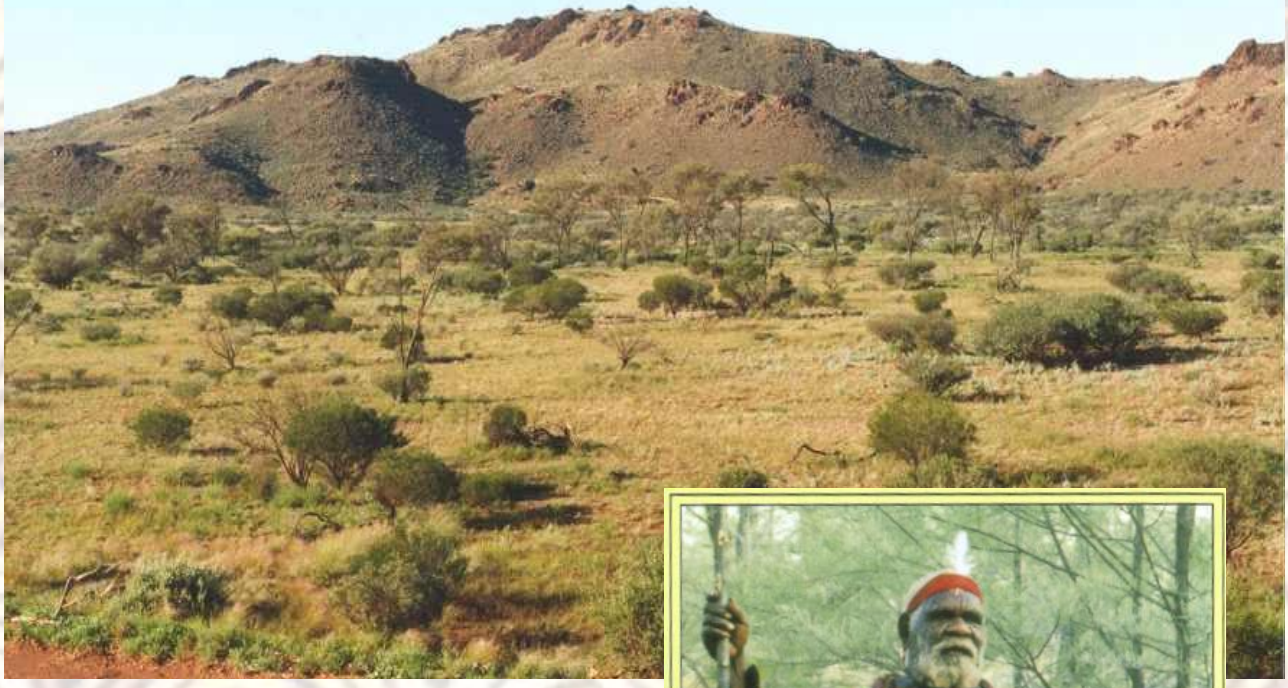
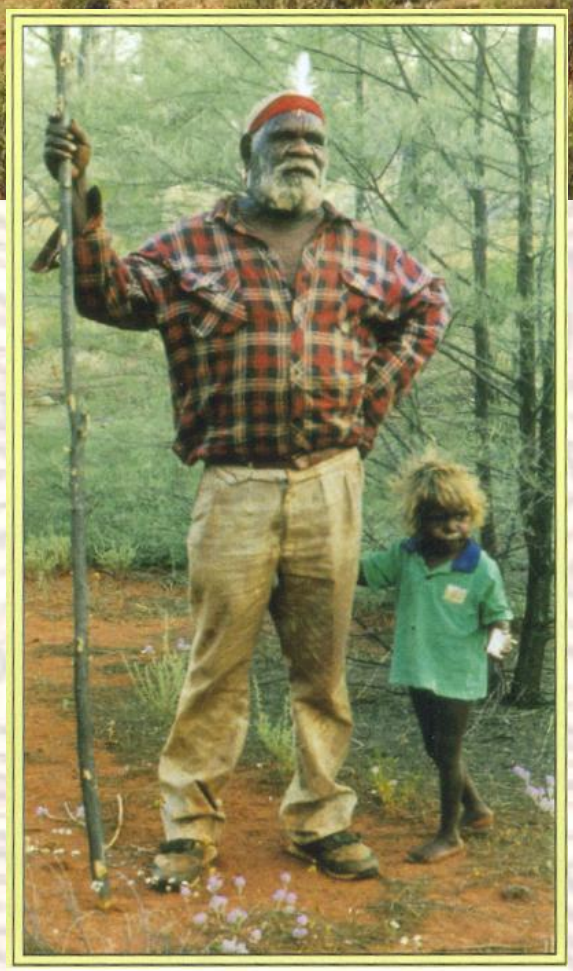
PLAN OF MANAGEMENT

for the

NGAANYATJARRA LANDS

INDIGENOUS PROTECTED AREA





Ngaanyatjarra Council
Land Management Unit

August 2002

Ngaanyatjarraku Manta Miranykanyilkitja

PLAN OF MANAGEMENT

for the

Ngaanyatjarra Lands Indigenous Protected Area

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People & Ecology

on behalf of the:

Ngaanyatjarra Land Management Unit

August 2002

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Notes on Yarnangu Orthography

The Plan of Management seeks to conform to the current Yarnangu (Aboriginal) orthography. Yarnangu words contain letter combinations that will be unfamiliar to many readers of this document. The following notes are intended to assist newcomers in the correct pronunciation of these words:

Sounds having English Equivalents

aa as 'ar' in 'cart'

uu as 'or' in 'corner'

p as in 'spike' not 'pike'

t as in 'skate' not 'take'

k as in 'skate' not 'Kate'

ng as in 'singer'

rr as in Scottish 'run' (alveolar)

ii as 'ee' in 'seen'

Sounds not having English Equivalents

Dentals (Tongue between or against the teeth)

tj as in katja 'son'

ny as in nyangu 'saw'

ly as in palya 'all right'

Retroflex (Tongue turned up to roof of mouth)

rt as in warta 'tree'

rn as in parna 'ground'

rl as in marlu 'kangaroo'

Acknowledgements

Neither the developmental process nor IPA declaration could have occurred without Environment Australia's financial assistance (through Natural Heritage Trust funding) or staff support, specifically Steve Szabo, Bruce Rose, Dennis Rose and Ivan Haskovic.

The Western Australian Department of Conservation (formerly Conservation and Land Management) have also been generous financial and moral supporters of both the IPA project and Ngaanyatjarra people, particularly Ian Kealley, Rob Thomas, and Sarah Adriano.

The Ngaanyatjarra Native Title Unit provided the initial impetus and funding for the Land Management Unit and continues to provide invaluable advice and expertise, particularly Sally Hodson, David Brooks, Helen O'Malley and Vicki Plant. The Ngaanyatjarra Bible Project, with special thanks to Aimee Glass, assisted with translations and standardizing the spelling of place names.

All Ngaanyatjarra Community Chairmen and Advisors assisted with consultation meeting logistics, accommodation and advice, as did all other Ngaanyatjarra staff when necessary.

Special thanks to: Damian MacLean, President of the Shire of Ngaanyatjarraku and Warburton Community Development Advisor for sharing his extensive history and intimate understanding of how things operate; Ian Ward, IPA Project Officer, translator, and overall talented bloke; and Arthur Robertson for his advice, commitment and friendship.

However, it is to the Ngaanyatjarra Council (Aboriginal Corporation) and its members that final acknowledgement for this project must be made. Their preparedness to consider and develop the proposal was enthusiastic and sincere, as is their commitment to their land and to their future.

Cover photos

1. Blackstone Ranges, part of the Central Ranges biogeographic Region

2. John Ward and granddaughter, Sakara Gibson.

Abbreviations

CALM	Western Australian Department of Conservation (formerly Conservation and Land Management)
EA	Environment Australia
IBRA	Interim Biogeographic Regionalisation for Australia
NIPA	Ngaanyatjarra Lands Indigenous Protected Area
NGLMU	Ngaanyatjarra Council Land Management Unit

Summary

Aboriginal and Torres Strait Islander people's identity, culture, rights and obligations are part of Australia's land and seascapes (Smyth and Sutherland, 1996). Given the primacy of land issues for indigenous people, the concept of conservation needs to go beyond biodiversity. Cultural conservation needs to occur to assist indigenous landowners to continue caring for the physical well being of their country, and achieving this is the fundamental intent of this plan of management.

Declaration of the 98,129 km^2 Ngaanyatjarra Lands Indigenous Protected Area is the result of five years careful consideration and discussion by Ngaanyatjarra Traditional Owners. Ngaanyatjarra Council through its Land Management Unit facilitated this process.

Declaration of the greater area is made under IUCN Category 6: Managed Resource Protected Area. Within this area a system of management zones are identified, some of which will be managed under different IUCN categories to balance land use and protect fragile areas. Specifically, these are Cultural Areas managed as IUCN Category 3: Natural Monument, and Nature Conservation Areas managed as IUCN Category 4: Habitat / Species Management Areas.

Neither the developmental process nor Indigenous Protected Area declaration could have occurred without Natural Heritage Trust financial assistance, or the support of staff from both Environment Australia and the Western Australian Department of Conservation.

Declaration of this, the largest protected area in Australia, is an explicit act of self determination by the Ngaanyatjarra people that demonstrates to an international audience that conservation values exist on their Lands as a consequence of indigenous land management, and that today's Traditional Owners continue to maintain the Law and their association with their country.

Through the Ngaanyatjarra Lands Indigenous Protected Area we, Yarnangu, the Traditional Owners of this country, invite all Australians to be a part of the Ngaanyatjarra journey.

1 Introduction

Pirni-ya kutjuparringu nyangka tjukurrpa-lampa tirtu ngarala. Nyangka yakirri-lan tjiinya kanyira walypalaku purturru. Nyangka kutjulpirtu-ya wayurta purrmungka yakirri palyalpayi. Puru-ya Yarnangu*ku mangkangkatja kartara palyalpayi. Nyangka kuwarri-kuwarri-latju walypalaku purturrungka karrpira kanyira. Tjiinyamarntu-latju walypalawana nyinarranytjalu yakirri kanyira. Nyangka walypalalu-ya nintilu nyakula ngurrkarntara. Munta yuwa ngaalu-yanku tirtu tjukurrpa puru pikangurluwanalu manta miranykanyira.*

(Things change, but the idea can remain the same. The yakiri we wear is made of wool. It used to be made of possum skin or human hair, but now it's made of wool and white fellas make the wool. But it's still a yakiri, and it still represents the Law. These IPAs could be like this – a white fella way (of doing the job we used to do)).

Senior Ngaanyatjarra Custodian, 1998.

People are an essential part of the fabric of landscapes. In recognizing that there is probably no ecosystem that remains unaffected in some way by human activity, people and their activities are considered a part of a biosphere reserve (i.e. beyond the 'core' protected area). They are encouraged in their participation and ownership of the program at a local level. This can be done by integrating public, private and community sectors through genuine partnerships, developing an understanding of landscape and social processes beyond one's own patch, and being given real responsibility and an opportunity to be involved in regional landscape management. This not only encourages greater acceptance and understanding of the need to conserve biodiversity but also ensures the operation of the biosphere reserve becomes a vehicle for social and institutional transformation of attitudes, values and practices towards common goals for a sustainable future.

David Brunckhorst, 2000.

What David Brunckhorst proposes in "Bioregional Planning: Resource Management for the New Millennium" (2000: 78) is a strategy familiar to the past millennia of Ngaanyatjarra land managers as evidenced by the preceding statement – made by a senior Ngaanyatjarra Traditional Owner at the first consultation community meeting that ultimately resulted in this plan of management.

It is hoped this plan of management for the Ngaanyatjarra Lands Indigenous Protected Area can meet the challenge of ensuring continuity of Ngaanyatjarra land management application, and through appropriate outcomes facilitate recognition of its continuing relevance by the broader Australian community.

1.1 Background

Aboriginal and Torres Strait Islander people's identity, culture, rights and obligations are part of Australia's land and seascapes (Smyth and Sutherland, 1996). Given the primacy of land issues for indigenous people, the concept of conservation needs to go beyond biodiversity. Cultural conservation needs to occur to assist indigenous landowners to continue caring for the physical well being of their country.

In 1998, Ngaanyatjarra Council secured Environment Australia funding to investigate the establishment of Indigenous Protected Areas (IPA) on their land. The IPA program is a Commonwealth Government initiative funded through the Natural Heritage Trust and based on International Union for the Conservation of Nature (IUCN) guidelines (IUCN 1994).

The project adopted a staged approach in consideration of:

i. Development of a cooperative management agreement with the Western Australian Department of Conservation and Land Management (CALM) for the existing Gibson Desert Nature Reserve (a draft plan has been completed, but is separate from this plan of management); and
ii. Development of a new IPA in the Central Ranges IBRA region – the Ngaanyatjarra Lands Indigenous Protected Area (NIPA).

Background information presented within this plan is to provide the reader with an overview of Ngaanyatjarra Council, the natural values of the Lands, and to provide context for management proposals. The plan is not intended as an exhaustive assessment of all values contained within the NIPA and could not be so, as relatively few environmental baseline studies have been undertaken within the Ngaanyatjarra Lands.

1.2 Ngaanyatjarra Council

The Ngaanyatjarra Lands operate as 11 separately incorporated communities for which Ngaanyatjarra Council (Incorporated 24th March, 1981) operates as the "community of interest". Ngaanyatjarra Council therefore represents the ~2,000 Traditional Owners resident in Warburton (seat of the Shire of Ngaanyatjarraku), Warakurna (Giles), Irrunytju (Wingellina), Papulankutja (Blackstone), Mantamaru (Jamieson), Wanarn, Tjukurla, Tjirrkarli, Patjarr, Cosmo Newberry and Kiwirrkurra communities.

Ngaanyatjarra Council supports its members through involvement in health, education, housing, essential services, law and justice, finance, native title and land management; and has assisted Ngaanyatjarra people with the establishment of several large commercial enterprises that provide the communities with social, economic and financial benefits. These enterprises include an airline, building and works service, roadhouses, a buying and transport service, and insurance brokerage.

1.3 Brief Description of the Ngaanyatjarra Lands

The Ngaanyatjarra Lands comprise a vast area of Western Australia (250,000 km^2 or approximately 3% of mainland Australia) adjoining the Northern Territory and South Australian borders. These Lands are entirely within the state of Western Australia and fall within three shires: Ngaanyatjarraku, East Pilbara and Laverton - see Map 1: The Ngaanyatjarra Lands and Communities.

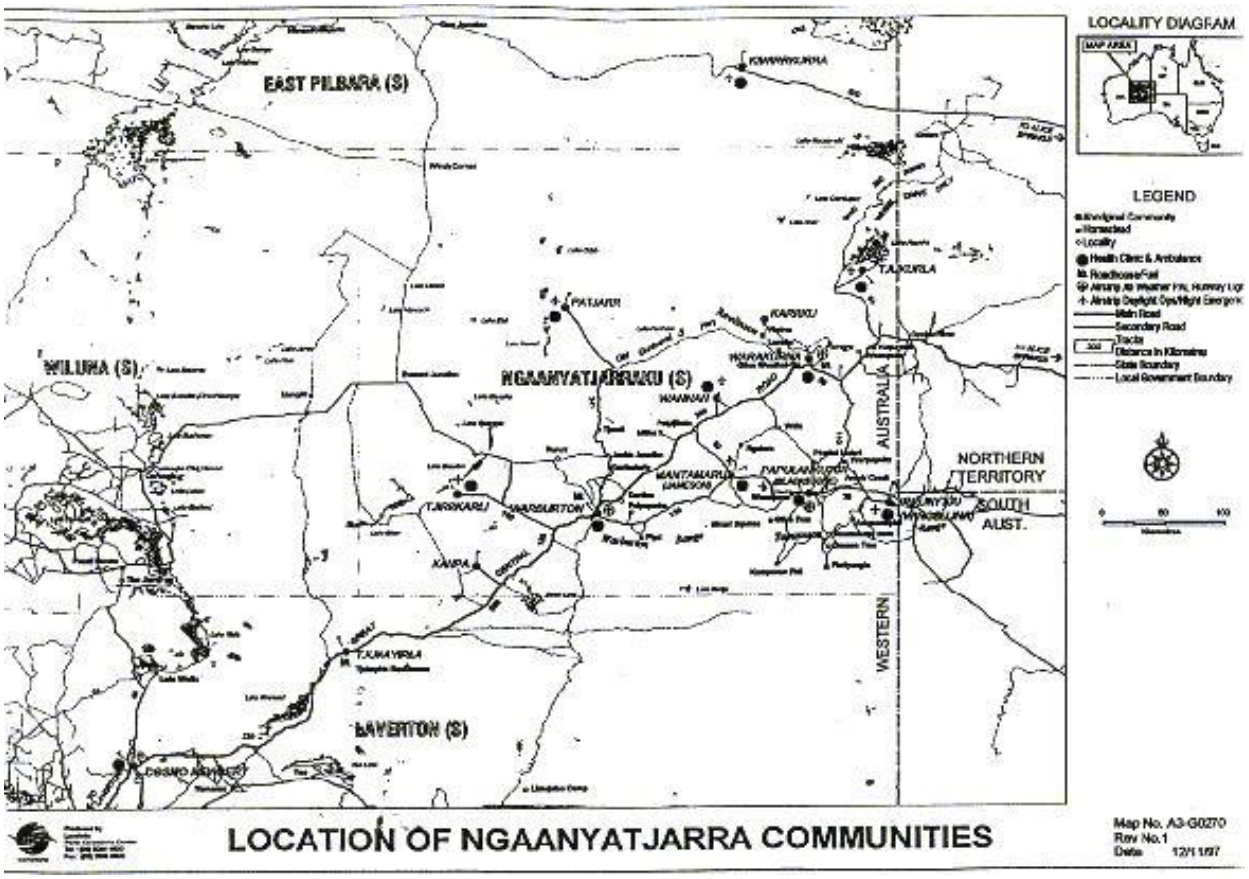
The Outback Highway (Great Central Road) bisects the Ngaanyatjarra Lands east to southwest, providing access to two major regional centres: Alice Springs (1,000 km NE of Warburton) and Kalgoorlie (900 km SW of Warburton). The 1,000 km section of road from Laverton to Uluru National Park is unsealed and subject to wet weather closure. Whilst numerous other roads exist, they are generally poorly (if at all) maintained and require special permits for transit.

The unique nature of the Ngaanyatjarra Lands, coupled with their remote location, precludes many land management activities considered 'normal' elsewhere in Australia: there has never been a pastoral industry, and apart from a few activities such as sandalwood harvesting, collection of dingo scalps and prospecting, there has been no other industry. Traditional Owners have maintained continuous association with their country, comprise the majority resident population, and provide the entire regional infrastructure such as roads, roadhouses, stores, health clinics, and aerial services.
The Ngaanyatjarra Lands encompass sections of the Gibson Desert, Great Sandy Desert, Great Victoria Desert, and all of the Central Ranges that occur in Western Australia. These four regions correspond to the Interim Biogeographic Regionalisation for Australia (IBRA) regions of the same name, as described by Thackway and Cresswell (1995).

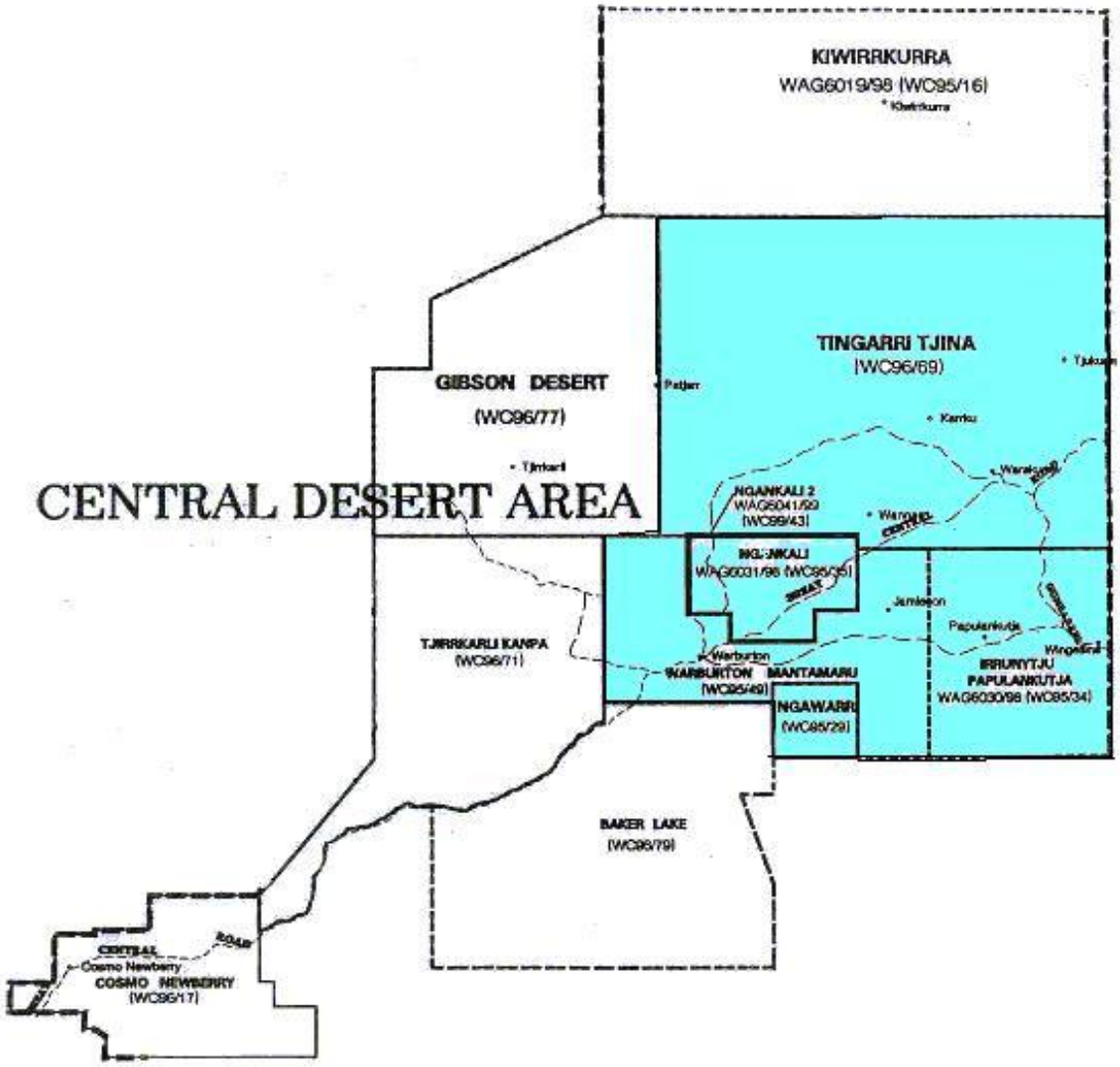
These immense areas of spectacular scenery have few obvious signs of human presence. In particular, the Central Ranges are considered by the Australian Heritage Commission to have "great conservational [sic] and recreational importance which is equal to or greater than that of Ayers Rock" (AHC 1981).

Ngaanyatjarra Land Council holds some of this land as 99-year and 50-year leases and Aboriginal Reserve. However, the traditional lands are more extensive and represented by 10 native title claims. Although the people of the Western Desert Cultural Bloc are not limited by boundaries or borders and have traditional responsibilities that go beyond these (Glass 1997), historic events led to the provision of services being defined by state borders and the formation of the Ngaanyatjarra Council that defines the Ngaanyatjarra Lands.

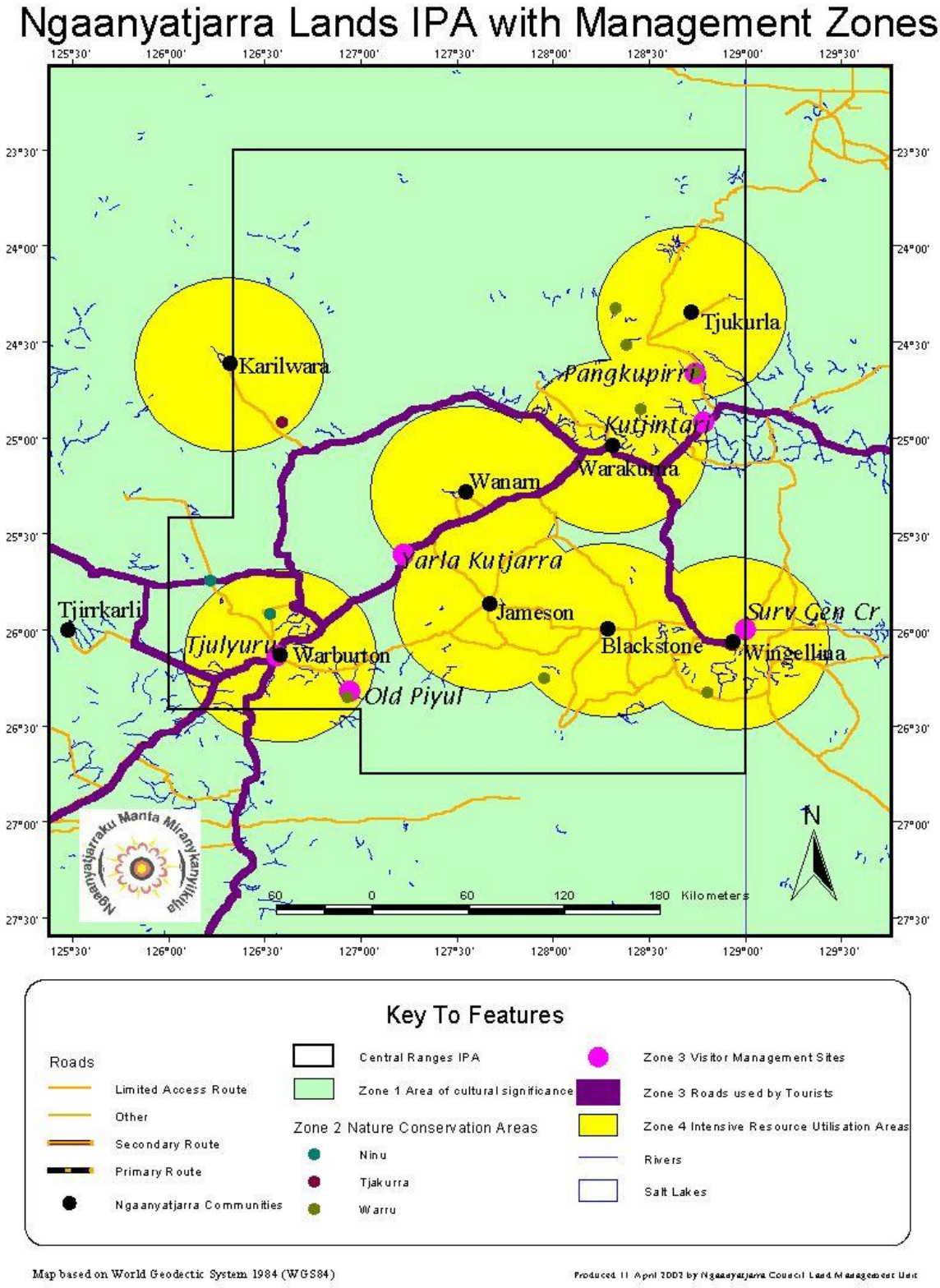
Permits for entry by non-Aboriginal people onto the Ngaanyatjarra Lands is under the authority of the Aboriginal Lands Trust, administered by Ngaanyatjarra Council.



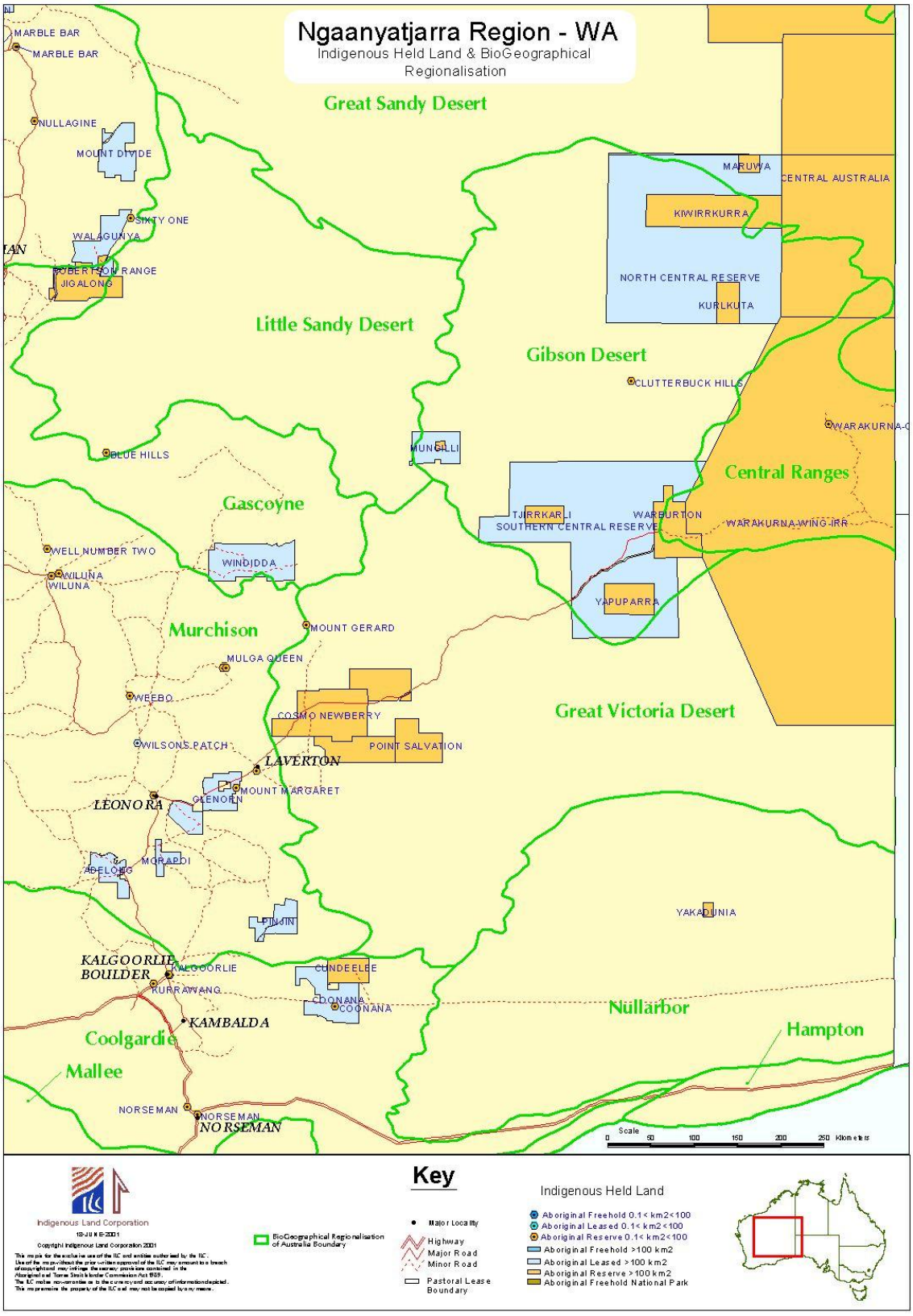
Map 1: The Ngaanyatjarra Lands and Communities



Map 2: Ngaanyatjarra Native Title Claims with Ngaanyatjarra Lands Indigeous Protected Area highlighted



Map 3: Ngaanyatjarra Lands Indigenous Protected Area with Management Zones



Map 4: Biogeographic Regions within the Ngaanyatjarra Lands

1.4 Ngaanyatjarra Lands and Communities Within the NIPA

The Ngaanyatjarra Lands Indigenous Protected Area comprises an area of 98,129 square kilometers centred on Latitude 25° 17' 00" South, Longitude 127° 35' 00" East; and is geographically aligned with the five (adjoining) registered Native Title claims of Tingarri-Tjina (58,820 km^2), Warburton – Mantamaru (contains Ngawarr and Ngankali) (24,278 km^2) and Irrunytju – Papulankutja (15,030 km^2) shown in Map 2: Ngaanyatjarra Native Title Claims.

The NIPA commences at a point on the Western Australian eastern border at Latitude 23° 30' 00" S and extends south along that border, past Surveyor General's Corner (the intersection of the Northern Territory, South Australian and Western Australian borders) till meeting the southern boundary of the Shire of Ngaanyatjarraku. Proceed west along the Shire boundary to Longitude 127° 0' 00" E, thence north to 26° 25' 00" S. Thereupon head due west to a point 26° 25' 00" S 126° 0' 00" E, thence north to intersect the southern boundary of Reserve 34606 (Gibson Desert Nature Reserve) at Longitude 126° 0' 00" East; thence east along that reserve boundary to its south eastern corner, whereupon head due north along the eastern boundary of that reserve and Reserve 29452 (Use and benefit of Aboriginal Inhabitants) and onwards to Latitude 23° 30' 00", thence east back to the commencement point.

The NIPA contains the seven communities of Warburton, Warakurna, Tjukurla, Wannan, Jamieson, Blackstone and Wingellina as shown in Map 3: Ngaanyatjarra Lands Indigenous Protected Area with Management Zones; and thereby the majority of Ngaanyatjarra Council members.

The NIPA contains all of the Western Australian Central Ranges bioregion, bordered by the Gibson Desert to the north and west, and the Great Victoria Desert to the south. The western boundary of the NIPA is contiguous with the existing Gibson Desert Nature Reserve, which is itself the subject of a joint management plan between the Ngaanyatjarra Council and the WA Department of Conservation. The eastern boundary is the Western Australia state border.

Alignment of the NIPA with registered Native Title claims provides a "control point" for management, particularly when referencing decisions to appropriate Traditional Owners and family groups, and is a more realistic alignment with a Ngaanyatjarra perspective than one based solely on bioregions.

1.5 Climate

Climate in the Ngaanyatjarra Lands is arid to semi-arid with average annual rainfall at Giles and Warburton of 200-250 mm with a distinct summer pattern. It is more usual to receive 150-190 mm per annum with occasional very high rainfall years. Relative humidity is generally low throughout the year and the annual evaporation rate considerably exceeds rainfall. Periods of prolonged drought are not uncommon.

Summertime mean daily maximum temperatures are around 37^0C and days of 40^0C + are common. Winters are cool with a mean daily temperature range of the order of 6-21^0C; sub-zero temperatures are not often experienced.

Climate information has been collected from Giles Meteorological Station since 1957, and from Warburton since 1941. Climate information is available on-line from Giles Meteorological Station at www.bom.gov.au.

1.6 Biogeography

The Ngaanyatjarra Lands IPA includes large portions of the Gibson Desert, the Great Victoria Desert and all of the Western Australian section of the Central Ranges as shown in Map 4: Biogeographic Regions.

The Gibson, Great Sandy and Great Victoria Deserts form an ecologically unique central core to the Australian continent, characterized by uncoordinated drainage, lack of permanent freshwater lakes and rivers, extreme variability in rainfall, and a particularly high evaporation rate to rainfall. In combination these deserts form what is commonly called the Western Desert: a plateau region which principally lies along the mid to southern part of eastern Western Australia but also extending into the south-western portion of the Northern Territory and the north-western portion of South Australia.

The Central Ranges are characterised by Proterozoic ranges of both massive quartzite and basalt, which give the area much of its scenic quality. The ranges are interspersed by red sand plains with spinifex, mulga woodlands, and groves of the distinctive *Allocasuarina decaisnea* (desert oak).

However it is the ranges themselves that, through their substrate, topography, and water catchment contribute to the uniqueness of the area. Prior to IPA declaration by Ngaanyatjarra Council, the Central Ranges were one of only two of Australia's 80 biogeographic regions with no conservation reserves or management for conservation as a priority (Thackway & Cresswell, 1995).

1.7 History of Indigenous Occupation

According to archaeological evidence from excavations in the Warburton area, continuous Aboriginal occupation dates back at least 10,000 years. Whilst artefacts on their own provide relatively little information, artefacts grouped together and the relationships between these groups and their locations in a landscape can tell a great deal about prehistoric settlement of rangelands (Holdaway et al, 2000).

Human population has always been sparse in this region both in classical Aboriginal times and in the present. The Ngaanyatjarra Lands provide opportunities to correlate archaeological information with living memories of land use practices – information that could assist interpretation elsewhere in the Australian rangelands.

The striking uniformity of landform and climate in the Western Desert, when compared to other parts of the Australian continent, is paralleled by the cultural homogeneity of its inhabitants. This has led anthropologists to speak of a "Western Desert culture" that is distinguishable from other Aboriginal sub-cultures (Tonkinson 1978; Berndt 1959, 1980) and continues today.

Yarnangu who reside on the Ngaanyatjarra Council Lands are part of this single social system referred to as the "Western Desert Cultural Bloc" which extends from Woomera in the southeast to Kalgoorlie in the southwest, north through Wiluna and Jigalong almost to the Kimberleys at Balgo. The dialects spoken within the Ngaanyatjarra Lands are Ngaanyatjarra, Ngaatjatjarra, Manjintjatjarra, Pitjantjatjara and Pintupi.

Through common ceremony and underlying philosophical traditions, a complex network of relationships through marriage, economic exchange and reciprocal transmission of religious knowledge is maintained. Fundamental to this commonality is *tjukurpa*, or Dreaming - the Aboriginal cultural expression of the link between people and the land (Ngaanyatjarra Council 1993).

Yiwara, the routes the ancestral beings traveled, criss-cross the desert. They are life-ways spanning vast distances, connecting individuals and family groups across hundreds of kilometers and are crucial to the cultural homogeneity found in the Western Desert.

Importantly, there is much evidence that Warburton-Mantamaru people do not see the existence of a gulf between their past and present. Rather, the story of their encounter with the 'outside world' is of gradual changes in living circumstances and the accompanying social forms (pers. comm. David Brooks 1999).

1.8 History of European Contact

The post-contact history of Traditional Owners began in the 1880s with the arrival of European explorers and prospectors to the region. These 'early day' explorers included Goose (1873), Giles (1873) and Forrest (1874). Scientific expeditions such as the Elder expedition in 1891 marked the beginning of government-sponsored expeditions into this region. It is estimated that between the turn of the century and 1930 at least 80 expeditions totaling 500 men traveled through the Central Ranges (McCaulay 1967:8). More information about European exploration of the area can be found in "The Great Victoria Desert", Chapter 7 (Shepherd, 1995).

By the 1930s the United Aborigines Mission (UAM) had established an outpost at Warburton Ranges. Increasing contact with Europeans, in particular the presence of the mission brought about profound changes in the lifestyle of Yarnangu including the incorporation of Christianity into the traditional religious belief system and increased sedentarisation.

The initial impetus for the establishment of a mission outpost was to halt the migration of Ngaanyatjarra people to the Eastern Goldfields region. The treatment of Aboriginal people at the hands of the native police, doggers and miners was also of great concern to the missionaries (pers. comm. Herbert Howell, 1998).

The Laverton to Warburton section of the Great Central Road was constructed following the establishment of Warburton Mission. Senior custodians for the area recall working on this road - spinifex clumps were burnt to level the ground, trees were cut by hand and dry wood used to fuel the steam driven road building machinery (pers comm. Ian Ward, 1998)

During its operation the UAM traded flour, tea and sugar for game, cared for orphans, and provided schooling and dormitory style accommodation and meals for children while parents moved in and out of the mission. Young people were employed as shepherds and stockmen, camel handlers, road makers, bore maintenance, supply delivery and within the operations of the community including the market garden and bakery.

The Education Department took over the responsibility for education in 1957 and the dormitories closed in 1961 by which time many adults were resident in the mission settlement and cared for the children themselves (Plant, 1996). The Warburton mission remained in operation until 1973, whereupon it passed under the administration of the Aboriginal Affairs Department.

Many Aboriginal people were moved to Warburton during the Woomera atomic tests and *Blue Streak* rocket development of the 1960s, as much of the Ngaanyatjarra Lands lay under the flight path of the rocket trials. Patrols into the Pintupi lands to the north were conducted to bring people into safety (Long 1964), and the people of what is now Kiwirrkurra community were settled in Papunya in the Northern Territory. The Giles Meteorological Station (now managed by the Bureau of Meteorology) was also established as a consequence of the Woomera weapons testing programme, and is located within a few kilometres of what is now Warakurna Community (Shepherd, 1995).

Another consequence of the Australian Weapons Research projects was the creation of a road network by Len Beadell's 'Gunbarrel Road Construction party': the Gunbarrel Highway - Warburton to Giles section constructed in 1958,followed by the Connie Sue, Heather Highway and Gary Highway (Beadell 1965).

The section of road now linking Warburton with Warakurna/Giles bypasses the original Gunbarrel Highway alignment (which passed through dry country) and was built by Ngaanyatjarra people in 1967 to follow a line of traditional water holes and soakages (pers comm. Ian Ward, 1997).

In the 1970-80s Yarnangu began returning to their traditional lands as part of the Outstation Movement, which resourced the establishment of bores, dwellings and delivery of stores and medical attention. The Land Rights movement resulted in the subleasing of 99-year leases to the Ngaanyatjarra Council in 1988.

Prior to the incorporation of the Ngaanyatjarra Council on 24th March 1981 representation of Ngaanyatjarra people was through the Pitjantjatjara Council. The formation of a special Ngaanyatjarra

'community of interest' was based on the sharing of a historical association with the Warburton Mission, a common language, and the imposition of the Western Australian state border. The latter was an important factor in the inclusion of Wingellina, a Pitjantjatjara community. The principal objectives of the council were to achieve Land Rights and to mediate with mining companies and other Europeans and to support the development of its members in all ways (pers comm. Damian McLean, 1997).

Each Ngaanyatjarra community remains an autonomous, separately Incorporated Body as well as being a member of Ngaanyatjarra Council (Aboriginal Corporation). In the twenty years since Council's formation, membership has expanded from the original five communities (Milyatjarra (Warburton Ranges), Irrunytju (Wingellina), Papulankutja (Blackstone), Mantamaru (Jameson), and Warakurna) to eleven (in 2002) as outstations developed into communities in their own right (Tjirrkarli, Patjarr, Wannan and Tjukurla).

Two communities outside traditional Ngaanyatjarra territory were also invited to join - Cosmo Newberry and Kiwirrkurra. Cosmo Newberry joining recognised its cultural links and shared aspirations with Ngaanyatjarra people, whilst Kiwirrkurra (established 1982 when people moved west from Papunya to Kintore and beyond) joining was more a consequence of state borders and funding streams (pers comm. Damian McLean, 1997).

1.9 Existing Landuse

The pattern of existing land use within the Ngaanyatjarra Lands IPA is complex and varied, though traditional practices continue to predominate. There has never been a pastoral industry in the region although the United Aboriginal Mission at Warburton managed sheep, cattle, goats and horses until the mid-1980s. The only export industries have been sandalwood harvest, collection of dingo scalps, and prospecting, although increasingly mining exploration appears to be yielding attractive mineral deposits that may alter this.

Many alternative land use enterprises have been trialed by communities with varying degrees of success, including: fruit orchards; intensive poultry, rabbit and emu farming; feral camel harvest; and tourism; but few have endured. However, service related community enterprises such as mechanic workshops, roadhouses and stores are generally stable and profitable, but the staffing of these and administrative, health, education, construction and essential services remains principally non-Aboriginal.

The most enduring land based enterprises operated by y*arnangu* are those that involve the production (or collection) of items for sale that can be done with minimal capital investment and no prescriptive time frame, e.g.:

- Warburton Community holds a three-year Forest Products Commission Sandalwood Harvesting license;
- Firewood collection is supported through the CDEP program and supplies a major source of cooking and heating fuel;
- Harvest of bush foods and meat continues as a significant component of diet, though actual percentages have not been quantified. Collection is focused around communities, as more remote country is difficult to access;
- There is an emerging market in bush foods and medicine both within and outside of the Lands;
- Art, crafts and artefact production are an important income source, and include acrylic on canvas and slumped glass art works. Work is sold through city galleries, roadhouses, privately, or through Tjulyuru -the Ngaanyatjarra Cultural and Civic Centre in Warburton (see www.tjulyuru.com).

Apart from small-scale chrysoprase extraction, no mineral exploration has resulted in an operational mine to date. However this situation could change as a result of the extended exploration licenses granted to companies presently working near Jamieson and Wingellina.

Physical access to and within the NIPA is difficult, as even major roads are not all weather. Permits for travel by non-Aboriginal people anywhere other than the Great Central Road has to be approved by Ngaanyatjarra Council (permits for transit on the Great Central Road can be readily obtained from the Council's Alice Springs office or WA Department of Indigenous Affairs in Kalgoorlie).

Throughout the NIPA, numerous unsigned tracks can confuse visitors and complicate management through wandering public vehicles entering areas of environmental or cultural sensitivity. These also pose safety concerns, as most are not mapped and lack obvious water resources.

Ngaanyatjarra Council is aware of the increasing tourism interest in their Lands, and has supported Warburton Community in construction of Tjulyuru. Located halfway between Uluru and Kalgoorlie, this building provides a contact and interpretation point for existing and future tourism opportunities. It also houses the Warburton Arts Project Collection, which is the largest Aboriginal-owned art collection in the country and through its reputation has been able to attract funding for touring collections, cultural heritage projects, and construction of Tjulyuru.

Increasingly there is recognition of the area's contemporary biological conservation values, principally through work undertaken by the Ngaanyatjarra Land Management Unit (NGLMU) in conjunction with external agencies including WA Dept of Conservation, Environment Australia, Wildlife Recovery Teams, and organizations such as the WA Herbarium and Birds Australia.

The overall impression of existing land use is one of multiple use co-existing with conservation of environmental, cultural, archaeological and recreation values.

1.10 Development Process of The Ngaanyatjarra Lands IPA

In 1998, Ngaanyatjarra Council secured Environment Australia funding to investigate establishment of Indigenous Protected Areas on their Lands.

The project adopted a staged approach in consideration of:

i. Development of a cooperative management agreement with the Western Australian Department of Conservation and Land Management (CALM) for the Gibson Desert Nature Reserve; and

ii. Development of a new IPA in the Central Ranges IBRA biogeographic region.

The project stages were:
Phase I - consultation with Traditional Owners to identify and discuss issues and management needs so they were informed and prepared to make a decision on whether to proceed further with the project. Also, the compiling and development of sufficient information (biological and cultural) for the Central Ranges to define conservation values and preferred sites for Indigenous Protected Area(s).
Phase II - Preparation of draft management plans for the GDNR and Central Ranges IPA
Phase III – Agreements for management and funding
Phase IV – Implementation.

This Plan of Management concludes Phase III and will allow the project to progress to Phase IV – implementation. However, it is worth taking the time to describe the Phase I consultation process.

No suitable process was found in the literature for consultation with a geographically dispersed non-homogenous population with low literacy/numeracy and English as a second language. Therefore a modified *Delphi process*[1] was developed to convey opinions, issues and outcomes between communities for further discussion, and to facilitate a shared community understanding of and involvement in decision making.

[1] The *Delphi process* is a means for collecting and aggregating the judgement of individuals to improve the quality of their decision-making (see Mortiss 1993: 94).

An initial workshop was held in Irrunytju community, to which all members of the Native Title Executive[2] were invited. The meeting was video recorded, and an edited copy sent to all other communities. Individual community meetings were then organised. A week prior to these meeting, a notice/poster was sent to the community office. Updates on meeting outcomes were given at the monthly Ngaanyatjarra Council meetings.

A male and female interpreter was present at each meeting. The Project Manager raised points for discussion sequentially with the assistance of visual aids (where appropriate) such as maps, photographs, books, magazine articles, and brochures. Discussion was allowed to continue until a natural conclusion, with the Project Officer recording points as they were raised and/or interpreted. If the discussion moved to a new topic, this was not resisted unless it proved to be a completely unrelated subject. A checklist ensured that all points were covered, and new issues recorded for inclusion at subsequent meetings.

These first round workshops were designed to provide information, stimulate discussion, and record and answer questions. No decision was asked for. The second round of community workshops presented community response to date, answered questions, and asked participants to decide whether they would like to progress to the second project phase – development of draft management plans.

Most meetings took place outdoors in communal shady areas. When meetings were outdoors, everyone would sit on the ground. Cool drinks (packaged fruit juice) and fresh fruit were supplied. Everyone was encouraged to attend. It would normally take between half and one hour for sufficient numbers to gather. What was considered sufficient numbers would always be signaled by a senior person from the community, normally by a signal or a quiet "he's right". Until then, the Project Manager would sit in the meeting area, either by himself or chatting individually. No mention was made of the subject matter until the meeting commenced.

The problems of noise, dogs, wind, dust, and motor vehicles associated with out door venues were offset by people being relaxed and able to join or leave the meeting at will. People could also move away from the meeting for some purpose, but remain aware of proceedings. People continued the conversation with each other and with others in the community after the consultation team left – to continue talking up the idea. IPA consultations also occurred during field trips (discussed separately), and opportunistically wherever appropriate.

As a result of the consultation process, the IPA concept was seen by Ngaanyatjarra people as an appropriate vehicle to assist with addressing their primary land management concerns, these being:

1. Securing the resources and employment opportunities to enable Traditional Owners to continue managing their country;

2. Facilitating appropriate assistance for Traditional Owners to consider and address impacts on their lands outside the scope of traditional law; and

3. Ensuring the continuity of inter-generational transfer of cultural knowledge.

However, there was also recognition that IPA declaration (and funding) would require additional outcomes of relevance to the broader Australian and international communities, particularly nature conservation.

A full report was made at the November 1998 Council meeting, where approval was given to progress to Phase II –development of draft management plans.

[2] A 32-member group from the 11 communities that oversees and supports the Ngaanyatjarra Council Native Title Unit.

Figure 1: "Take a photo and tell the Government ‘These are the people who want to look after their Land’ ". Participants in the first IPA consultation meeting, Wingellina 1998.

2 Primary Values and Objectives

The Ngaanyatjarra Lands Indigenous Protected Area is unique because:

- It is a huge area comprised solely of Aboriginal land with an unbroken record of management by its Traditional Owners;
- Traditional ecological knowledge of the area is intact and actively implemented, providing opportunities for documentation and interaction with western science;
- It is country far from and largely free of modern development and disturbance including pastoralism;
- Until NIPA declaration the Central Ranges were one of only two of Australia's 80 IBRA regions without any recognised management for conservation as a priority;
- It is emerging from isolation into an era of dynamic social and technological change.

To address this uniqueness, and provide a balanced framework for management, the following primary values and objectives have been established and provide the premise for this management plan.

2.1 Cultural Maintenance

- Recognise contemporary conservation values exist because of traditional Yarnangu management. In the first instance, assist the maintenance and continuity of this knowledge rather than documenting or explaining.
- Assist the continuity of inter-generational transfer of cultural knowledge through additional relevancies such as trips to country, and employment and career structures that recognise and value such knowledge.
- Facilitate appropriate assistance for Yarnangu to consider and address impacts outside the scope of traditional knowledge including tourism, mining, roads, weeds and feral animals.
- Ensure Ngaanyatjarra Council retains an appropriate degree of control and management over the IPA.

2.2 Nature Conservation

- Protect and enhance existing biodiversity, threatened species, wetlands and vegetation communities.
- Rehabilitate flora and fauna and manage feral species.
- Facilitate Yarnangu interaction with mainstream conservation agencies and technologies.

2.3 Resource Sustainability

- Protect the quantity and quality of community and roadside groundwater and other water supplies.
- Ensure continued Yarnangu access to bush foods, medicine and other resources.
- Manage the extraction of sand, gravel and other resources for community use.
- Work with and monitor the impact of mining exploration and future extraction.

2.4 Recreation and Interpretation

- Develop an appropriate spectrum of recreational opportunities and public access.
- Facilitate opportunities for cross-cultural interaction and interpretation.
- Interpret primary values to enhance visitor awareness, experience and enjoyment.
- Provide opportunities for nature based and cultural tourism.

3 Main Issues

Whilst the following issues have been considered in this Management Plan, it is recognised that new issues will arise or priorities change over time. These will need to be addressed through future planning. However, as much as possible this plan attempts to provide a framework to achieve desired outcomes rather than a prescriptive approach, and assumes an adaptive management approach by all parties.

3.1 Cultural Maintenance

This area is not a void by virtue of its Aboriginal occupancy. This area requires, and indeed desires to be part of an Australian vision for conservation, mapping of biodiversity, and sustainable management; but in a way that acknowledges and nourishes its Ngaanyatjarra heritage and cultural values.

3.1.1 Protection of Yarnangu Cultural Values

Ngaanyatjarra Council's Native Title Unit has collected extensive cultural and site-specific information. Whilst of restricted access, this database will assist Yarnangu in management planning for protection of these values within the Ngaanyatjarra Lands IPA.

Protection of these cultural values is a fundamental underpinning of Indigenous Protected Area declaration. Furthermore, NIPA management does not need to describe these values or limit in any way their interpretation by Yarnangu.

3.1.2 Access

Whilst Yarnangu movement through or access to country is not limited in any way by IPA declaration, management strategies need to address the current physical limitations on people accessing more remote areas of their Lands i.e. limited access to vehicles, safety considerations when traveling with very young or old people.

3.1.3 Inter-Generational Continuity of Traditional Knowledge and Management Practices

Traditional knowledge is no longer as essential for individual survival in contemporary Ngaanyatjarra society as in pre-European times, as people have access to health care, education, and other trappings of contemporary Australian society. However, ensuring continuity of Traditional Knowledge is considered essential to the well being of Ngaanyatjarra society by senior custodians, and from a pragmatic viewpoint this knowledge is a valuable commodity e.g. sale of bush foods, medicines and paintings.

Ngaanyatjarra Lands IPA management will provide additional recognition of Traditional Ecological Knowledge - particularly by younger generations - through a conservation management career structure and cultural tourism opportunities.

3.1.4 Impacts Outside the Scope of Traditional Law

Concern with over-exploitation of natural resources is pan-cultural. Contemporary governments respond via world treaties, moratoriums on harvest, and sanctions against non-complying countries in much the same way that traditional Aboriginal society used totemic prohibitions to ensure sustainable resource use (Davies et al, 1999). However, can traditional knowledge systems limit the environmental impacts of new technologies before irreversible damage occurs?

Traditional knowledge reliant on oral transfer is not easily renegotiated by successive generations. Knowledge develops slowly, gaining power and momentum through the cumulative experience of generations. However, like an ocean liner, it cannot change course quickly to avoid unexpected obstacles. Countless indigenous cultures have already foundered on the icebergs of external impacts and western technology. The extreme isolation of the Ngaanyatjarra Lands has to date helped protect them and Ngaanyatjarra culture from many of the devastating impacts experienced elsewhere in Australia over the last 2 centuries, but this protection is disappearing.

Whilst a cursory inspection would suggest that environmental degradation is not significant on the Ngaanyatjarra Lands, it does exist. Changed burning patterns have altered species diversity through the Central Ranges, and many new impacts, while not of the Traditional Owners making, exist; e.g. introductions of feral animal and exotic weeds, people are now concentrated in communities and use vehicles, rifles and other technologies.

3.2 Nature Conservation

There are two sources of flora and fauna information in the region – scientific observations and collections, and traditional knowledge held by Ngaanyatjarra men and women throughout the region. Improving mainstream scientific knowledge will be greatly facilitated by working co-operatively with local people to document and apply their knowledge.

However, contemporary conservation values continue to exist on the Ngaanyatjarra Lands because of traditional Aboriginal management. **In the first instance, this knowledge does not need to be explained or documented. What is important is to ensure that it continues**. Then, the opportunity for scientists to work with Yarnangu will also continue. But if knowledge is lost for one generation it can never be retrieved.

3.2.1 Protection of Natural Heritage Values

Some of the most significant aspects of the Ngaanyatjarra Lands IPA are its continuity of traditional land management practices and absence of European impacts over such a large area. This affords its flora and fauna a high level of protection and opportunity for sustainable management.

A total of 1,930 plant specimens from the Central Ranges are lodged at the Western Australian herbarium, representing 648 species, subspecies varieties and forms in 78 families, and there is indirect evidence that this list (see Appendix 1) is incomplete. The flora, like other areas in arid Australia, is dominated by a few families - the grasses (POACEAE), daisies (ASTERACEAE), acacias (MIMOSACEAE), salt bushes (CHENOPODIACEAE), legumes (PAPILIONACEAE) and eucalypts and their relatives (MYRTACEAE).

Thirteen Priority[3] taxa have been collected in the region, and their location records highlight the importance of gorges and waterholes in the Rawlinson Ranges as habitats for rare flora. However, this could be artefactural due to higher intensity collecting in these areas, ease of access and / or higher natural species diversity relating to available shade and moisture. Habitats can also be temporally rare, and new records may be made following exceptionally good seasons or effective rains at unusual time of year (eg during spring-time).

[3] Western Australian Department of Conservation and Land Management conservation codes (Hopper et al 1990)

Two map sets covering the region exist: *The Vegetation Survey of Western Australia* 1:1,000,000 (Beard 1974, Beard & Webb 1974), and the map of *Australian Vegetation* at 1:5,000,000 (AUSLIG 1990). These large-scale vegetation maps of the region provide a useful overview, but are of little use for detailed discrimination of vegetation formations and alliances at the local level.

Non-Aboriginal people rarely see the diversity of animal species in the region, as many species are nocturnal to avoid the extreme heat, while many reptiles avoid the cool winter weather by hibernating underground. Available fauna lists include eleven frogs, 103 reptiles, between 35 and 47 mammals and 150 bird taxa. Lists of taxa and known conservation status are presented in Appendices 2, 3 and 4.

As with the region's flora, there is significant doubt and lack of detailed knowledge about many aspects of faunal occurrence, and research and survey work is needed to fill these gaps. Again, such work will be more reliable and effective if conducted in collaboration with Yarnangu.

3.2.2 Fire

Fire is an integral and essential element in arid zone natural history and must be fully considered in land management strategies (see Latz 1995a,b; Flannery 1994; Morton 1989; Griffin and Friedel 1984a,b).

Many species have developed specific adaptive responses to fire, and it may be as important as rainfall in explaining their distributions and lifestyle strategies. Many species require fire to avoid predators, reproduce, or win living space from their neighbours. Different land systems can require different kinds of fire e.g. moderate fires no more frequently than 10 to 20 years for *Callitris* or mulga communities, or hot fires no more than 10 years apart for some spinifex grasslands (Morse 1999).

For mid-size mammals the requirement appears to have been for a range of fire types, preferably burning no more than a few hectares at a time. A lapse of this typically traditional burning practice in many areas could have contributed to the demise of this fauna class. Recent research implicates this effect in reduced distribution of *tjakura* (Great Desert Skink *Egernia kintorei*) (pers comm. Steve McAlpine, 2000).

It is probable that extensive vegetation change due to burning is episodic, with great burnings associated with periods of high rainfall. Patterns such as this would tend to dramatically reduce variation in seral stage of vegetation over large areas. Under average rainfall conditions spinifex would not carry fire without a strong wind even some years after the previous fire, but with above average rainfall it could carry fire in as little as one year.

Apart from the cycles of droughts with low fuel loads and good years with their devastating fires, there appears to have been major fire regime changes between 50 and 25 years ago from traditional burning practices to todays less ordered situation. This time frame coincides closely with the exodus of Aboriginal peoples from the deserts and the loss of mid-sized mammals (Morse 1999).

However, devastating fires have not been universal in the region, and whilst some species may be in decline (eg *Callitris* in the Rawlinson Range and *Mulga* communities near Wingellina) due to increased fire impact, many examples of intact stands of fire sensitive plants attest to the considerable variation in local fire history. Examples of the latter include the large areas of almost pure *Thryptomene maisonneuvei* stands north of the Sherwin Mural Crescent, extensive areas of mature spinifex and shrubs in dunes north of Warburton, and the very extensive areas of mature mulga woodland throughout the southern ranges.

3.2.3 Water

Water resources in the Ngaanyatjarra Lands IPA include waterholes and soakages, ephemeral claypans and freshwater lakes, salt lakes, creek lines and floodouts, and bores. Generally surface water is limited to rockholes and soaks except after rain.

In essence, traditional life revolved around seasonal cycles of water shortage (in dry periods) and abundance (following rain) (Shephard 1995). During dry periods people were dependent on well-known underground supplies and waterholes, and were therefore limited in their ability to travel. The abundance

of surface water following rain enabled widespread dispersal of small groups across country. There was a distinction between 'rain-time' water and 'hot-time' water (which comes from underground). Consequently larger aggregations of people were found in drier times.

Both the northern and southern ranges harbour many permanent or semi-permanent rockholes in deep gorges and elsewhere. Pankupirri rockhole located in the Walter James Range (62 kms NE of Giles Weather Station) has been described in the 'Directory of Important Wetlands in Australia' (Commonwealth of Australia 1996: 785-6) but many other important permanent rockholes are known to Yarnangu. Whilst knowledge of these rockholes is intact and largely documented by Ngaanyatjarra Native Title Unit, most are not regularly maintained, and may no longer be considered reliable. Ngaanyatjarra LMU, through the NHT-funded "Traditional Land Management Planning in Action" project has commenced a process of rockhole maintenance as part of its trips to country.

Two significant areas of salt lakes occur in the region. The first is an area of scattered small lakes between Lake Christopher (immediately NW of the Rawlinson Range) and the Van der Linden Lakes to the north of the Bedford Range - 60 kms to the southwest. The second, more extensive area covers 15,000 sq km centred in Lake Hopkins in the northeast quadrant of the NIPA. Whilst the salt lakes are more or less sterile, the surrounding areas are rich and diverse in vegetation pattern and structure (Morse 1999).

3.2.4 Threatened Species

At least 12 species (and possibly more) have been lost from the region in recent times (Morse 1999). With this level of species loss, it is not surprising that several of those that remain have suffered reduced abundance and severe range retraction and are now increasingly endangered or vulnerable.

Twenty inland species are currently classified as either endangered or vulnerable. Of these, five species are known to occur in the Ngaanyatjarra Lands IPA - the Mulgara, Marsupial Mole, Greater Bilby, Black-footed Rock-wallaby and the Ghost Bat. Little is known of current trends in mammal populations but it is likely that some other species are declining and will appear on future conservation lists. With increased knowledge of local species gained from survey work, some species will be shown to be more threatened than is presently thought. Others may be shown to be more abundant and in less danger. Appendix 4 includes lists of mammals found or likely to be found in the region, and provides a basis for future investigations.

The lost species generally weigh between 50 gm and 5 kg, a critical weight range recognised in several previous studies (Burbidge and MacKenzie 1987, 1989; Morton and Baynes 1985). Birds, reptiles and smaller and larger mammals were virtually unaffected by comparison, with some important exceptions (eg Crescent Nailtail Wallaby, Black-footed Rock-wallaby). Three hypotheses have been proposed to account for the dramatic decline of the middle-sized desert mammals. These include changes to fire regimes brought about by vacation of the desert areas by Aboriginal people moving into settlements, predation by foxes and cats, and competition from exotic herbivores (rabbits and camels).

These factors are summarised by Burbidge et.al. (1988) and Flannery (1994). For middle-sized mammals the change in habitat structure, pattern and diversity combined with drastic increases in predation by foxes and cats and increased competition for scarce food resources, has been devastating. In the past, when Aboriginal people regularly burnt country, wildfires were prevented from burning large tracts by the consequent firebreak mosaic formed. This pattern of change is probably significantly less pronounced in central Australia (where plant growth is modest) than in more northerly areas such as the Tanami Desert, which receive higher summer rainfall. Flannery (1994: 239) explains that "The larger species, such as the red kangaroo, along with birds, are able to travel long distances. When a fire burns their habitat they simply move on. The very tiny mammals can find refuge in the few unburnt patches left by the fire. The reptiles cannot move, but they can aestivate for months under the ground or in termite mounds until some vegetation cover returns. These options are not open to the middle-sized mammals. They are too small to migrate and must eat and find shelter daily. Furthermore they need considerable habitat areas in order to meet their daily requirements of food and shelter."

3.2.5 Collaborative work

Napitji-napitji – you help me, I help you - together we do this thing.

This expression encapsulates Yarnangu attitude towards collaboration - an essential part of traditional desert society to ensure survival in an often-harsh environment. It requires commitment by both parties! This spirit continues in contemporary society and should be remembered by external agencies seeking to form partnerships for scientific surveys, research or management outcomes. There has to be a worthwhile outcome for Yarnangu. This can be achieved in a variety of ways, including providing employment opportunities and ensuring information is delivered back to Yarnangu in a relevant format.

The Kalgoorlie CALM office has consistently demonstrated this commitment, resulting in numerous successful project outcomes that have provided opportunities for other agency involvement. Examples of successful collaborative projects include:

- 'Operation Warru' – collaborative management of threatened desert fauna
- Other NHT funded projects including 'Warburton Community Vegetation for Health', 'Traditional Land Management Planning in Action', and 'Ngaanyatjarra Regional Groundwater Database'
- Collaborative management of the Gibson Desert Nature Reserve
- Cross cultural training for CALM staff
- Ngaanyatjarra Council hosting the 2001 Joint Arid Zone Recovery Meetings at Tjulyuru[4]
- Two CALM sponsored land management study trips for Traditional Owners elsewhere in Western Australia
- Extended field collection trips by WA Herbarium staff
- Birds Australia Atlas survey 2000, 2001.

The Ngaanyatjarra Lands IPA will provide additional opportunities and resources for collaborative projects. These projects will be coordinated through the Ngaanyatjarra LMU who, in consultation with the Native Title Unit, will provide advice on methodology, logistics, and cultural appropriateness.

3.2.6 Feral Animals

Five exotic species are currently recorded within the NIPA, these being the camel, rabbit, cat, fox, and house mouse. Camels, rabbits (following good seasons) and cats are common throughout the region, and are responsible for serious deleterious effects.

Camels can drain limited rockhole waters to the detriment of native species that lack the ability to travel to alternative sources. Camels can also become trapped in rockholes where they die and pollute the water. This is a source of extreme concern to Yarnangu, who worry for the welfare of animals (including the camels) as well as damage caused to important sites. There is also anecdotal evidence that selective grazing by camels may effect some native flora eg quandong (*Santalum acuminatum*) (pers comm. Rob Thomas, 1997).

There is some conjecture that the arrival of feral cats could predate European settlement on the Lands e.g. Carnegie (1988) reported large numbers of cats in remote Gibson Desert country in 1896. Foxes, whilst apparently not so common, are formidable predators and can impact severely on native fauna, particularly

[4] The Ngaanyatjarra Cultural and Civic Centre in Warburton Community – see section 1.9 *Existing Landuse*

warru (black-footed rock wallabies) whose reduced range and abundance is mainly attributed to fox predation (Pearson, 1992).

However, Yarnangu now regard cat, rabbit and fox as important sources of kuka (meat), with fox meat believed to have medicinal properties (pers comm. Tjatitjara, 1997). So whilst Yarnangu have directly assisted with some feral animal management programmes, automatic consent should not be assumed for all such operations.

3.2.7 Weeds

The isolation and arid environment of the Ngaanyatjarra Lands IPA has limited invasion by exotic plant species to date. Serious weed invasions currently appear confined to two species in the southern ranges from Wingellina to Warburton – rosy dock *Rumex vesicarious*, and buffel grass *Cenchrus ciliarus*. Probably introduced in the 1970s when cattle were grazed extensively through the area, their spread was assisted by reduced competition through overgrazing by rabbits. Nowadays their spread continues to be facilitated by road traffic and frequent roadside burning.

Potential environmental weeds include, in order of perceived threat (from Morse 1999):

- Athel pine *Tamarix aphylla*
- Mexican poppy *Argemone ochroleuca*
- Saffron thistle *Carthamus lanatus*
- Rubber bush *Calotopis procera*
- African lovegrass *Eragrostis curvular*
- Mossman River grass *Cenchrus echinatus*
- Wild turnip *Brassica tournefortii*
- Couch grass *Cynodon dactylon*
- Feather top Rhodes grass *Chloris virgata*
- Parkinsonia *Parkinsonia aculeate*
- Castor oil plant *Ricinus communis*
- Mesquite *Prosopis spp*
- Pepper tree *Schinus molle.*

Several of these species already occur in the area, generally in close proximity to communities. The list is probably incomplete, and other ornamental plants growing in communities may have the potential to escape and multiply.

Weed infestations are most likely to develop along drainage lines, in disturbed areas or along roadsides. Increasing vehicular traffic, particularly tourist vehicles arriving from outside the Lands, pose the greatest threat of new infestations; but accidental introductions in building materials, earth-moving machinery, and community planting of ornamental species should not be discounted.

Regular monitoring and education will be required to detect early establishment and control of pest plants.

3.3 Resources

Resources within the Ngaanyatjarra Lands IPA are relatively unexploited compared to elsewhere in Australia. Whilst its richness in scenic, cultural and natural values is described in this document, there is increasing interest in both the region's mineral and tourism potential.

3.3.1 Access

Access into and through the NIPA is a key issue. Once extremely isolated and accessible to only well prepared travelers via the Gunbarrel Highway[5], the area is now bisected by the Great Central Road. This in turn is being promoted as 'The Outback Highway' – Australia's third transcontinental link between the Goldfields and the Great Barrier Reef via Uluru. Whilst still a dirt road for the 1,000 km from Laverton to Uluru, the road is now generally all-weather and could even be bitumenised within 5 to 10 years. However, there are many small unsigned and unmapped roads that pose safety concerns for travelers as well as worry for Yarnangu about unauthorized access to important sites.

Entrance to the Ngaanyatjarra Lands is subject to permit (administered by the Aboriginal Lands Trust and Ngaanyatjarra Council) and is currently restricted to the Great Central Road although 100 – 200 special permits are granted each year to 4WD enthusiasts wishing to travel theoriginal Gunbarrel Highway, and around 60 permits are granted to visitors wishing to visit the tri-state border at Surveyor Generals Corner.

3.3.2 Water

All Ngaanyatjarra communities are reliant on groundwater resources, but these have not been quantified. Ngaanyatjarra LMU has utilised NHT funding to develop a groundwater database for the Ngaanyatjarra Lands (Global Groundwater, 2002), but more advanced studies on the adjoining Anangu Pitjantjatjara Lands suggests communities are drawing on water supplies 1,000 to 3,000 years old, giving only 50 – 100 year life for community water reserves based on current usage (Rainer, 2001). Communities are understandably concerned about any additional water usage, especially the high volumes required by some mining operations.

3.3.3 Sustainable Natural Resource Utilisation

Contemporary resource use within the Ngaanyatjarra Lands IPA includes:

- collection/harvest of waru (firewood), kuka (meat), mirrka (vegetable foods), warta (timber) for artefacts, and kinti kinti (medicine);
- groundwater for communities, outstations and roadside bores;
- sand, gravel and laterite for building and road construction;
- sandalwood harvesting (drywood only);
- and possibly extractive mining in the future.

Warburton Community has a three-year license from WA Forest Products Commission to collect dead sandalwood, and the emerging 'bush tucker' commercial market is generating increasing Yarnangu involvement in wild harvest.

The impact of harvest activities in the Ngaanyatjarra Lands IPA is focused closer to communities. There is anecdotal evidence suggesting this is having an impact on some species eg having to travel further to source quandong for artefact production, depletion of river gums for piti (bowl) manufacture for sale

[5] Constructed by Len Beadel in 1958 as part of the Woomera weapon's testing program.

(pers comm. Herbert Howell, 1997). However, evidence suggests some species are in decline through the absence of human activity in their environment eg Tjakara (Great Desert Skink).

Traditionally, sustainable harvest levels were achieved through adherence to law and custom and whilst these are still observed, changes associated with communal living and new technologies have influenced outcomes faster than they can be incorporated into traditional management practices. Initial IPA consultations recognised that achieving sustainable harvest levels of some species will need further investigation, but that this not be a precondition for IPA declaration. Certainly, the impact of Yarnangu harvest should be considered in context with the numerous impacts outside of Yarnangu control, such as introduction of feral predators.

3.3.4 Mining

Mineral exploration has found copper, nickel, gold, diamonds, cadmium, chrysoprase, oil and gas in the Ngaanyatjarra Lands. Whilst numerous granted and pending applications for mining tenements exist, there is currently no mining within the NIPA. The NIPA southern section is the source of greatest mining interest and large-scale laterite and sulphur nickel deposits there are the subject of further exploration.

Ngaanyatjarra Council has an established protocol for Work Site Clearance and mining liaison, but it is difficult to comprehend the scale of impacts should a full-blown mining operation begin. Ngaanyatjarra Council is seeking to address issues associated with production mining anticipated to begin near Jamieson community in the next few years through social and economic impact studies, training, and investigation of employment and business opportunities.

The environmental impacts of mining infrastructure and services, acidic water disposal and revegetation will need consideration, and will be complicated by the current paucity of scientific baseline information for the region. This needs to be recognised for what it is – a lack of information rather than an absence of environmental value. Recognition of conservation values through IPA status will increase requirements for environmental assessment and monitoring. It is also anticipated that mining will provide additional land-related employment opportunities for the Ngaanyatjarra LMU through such activities as site preparation, rehabilitation, seed collection and propagation.

3.3.5 Other Resource Use

There has never been a pastoral industry within the Ngaanyatjarra Lands IPA, and apart from sandalwood harvest, limited bush food and seed collecting, collection of dingo scalps and prospecting, there has been no export industry.

Art, crafts and artefact making are a source of income for many people, and the Warburton Arts Project collection enjoys an international reputation. Enormous opportunities exist for nature-based and cultural tourism within the IPA. The underlying value of these products is derived through their representation of and association with indigenous culture, and this combined with traditional ecological and medicinal knowledge constitute a valuable resource.

Many forums including academic research and internet discussion groups[6] are advancing protection of this resource through recognition of intellectual property rights, but it remains important to ensure that it is Yarnangu who retain control of and benefit from this resource.

[6] IN_LAND exists to support indigenous people to achieve improved outcomes in land and environmental management. IN_LAND is short for Indigenous land and water management forum. For more information about IN_LAND contact: paul.jenkins@ilc.gov.au, adrian.stanley@ilc.gov.au, jocelyn.davies@adelaide.edu.au

3.4 Recreation and Visitor Management

The extreme isolation and poor roads that have previously protected this country from the worst excesses of tourism are rapidly disappearing, paralleled by increasing national and international interest in indigenous culture and nature-based tourism. The Ngaanyatjarra Lands IPA offers extensive recreation, education and interpretative opportunities, but care is needed that these are not developed at the expense of the environment or Yarnangu. Yarnangu also have recreational expectations of the area, and it is important that these are maintained.

3.4.1 Yarnangu Requirements

Yarnangu enjoy their country. Their delight in being 'out bush' is evident and contagious whenever people go off in family groups or take along visitors – Yarnangu like to have a good time. Recreation is just another facet of Yarnangu relationship with their country.

Respect for Yarnangu remains the threshold management issue. Management of all facets of the NIPA will not impose additional restrictions on Yarnangu uses and activities. All management activities ultimately focus on satisfying Yarnangu that the values they ascribe to the NIPA are protected. If Yarnangu values are threatened, management strategies will be modified to remove the threat.

Fundamental Yarnangu requirements are:

- Ensuring the continuity of inter-generational Traditional Knowledge transfer;
- Access to resources for visiting country and undertaking management activities;
- Assistance with the management of impacts outside the scope of Traditional Law.

The fact that declaration has been a measured and voluntary process has reassured Yarnangu that it is not a threat to self-management and self-determination. Quite apart from financial support, declaration of the Ngaanyatjarra Lands IPA is an explicit act of self-determination providing an additional avenue for national and international recognition of Ngaanyatjarra Council's rights, responsibilities and capabilities.

3.4.2 Tourism

The scenic, cultural and biological values of the Ngaanyatjarra Lands IPA are enormous. While upgrading and promotion of the 'Outback Highway' attracts ever-increasing numbers of tourists, they are currently restricted in places they can legitimately visit and there is very little opportunity for cultural interaction.

Yarnangu see tourism as an inevitable (and not undesirable) development that can be directed and controlled by proactive planning. In recognition of this, Warburton Community has built Tjulyuru[7] – the Ngaanyatjarra Cultural and Civic Centre – whose gallery displays the community's extensive collection of paintings, artefacts, archival material and artglass. There is also a café and shop for visitors, and opportunities for interaction with community members. Located halfway between Kalgoorlie and Uluru, Tjulyuru provides a contact point and training opportunity for existing and proposed tourism activities. It is also the seat of local government for the Shire of Ngaanyatjarraku.

Additionally, Ngaanyatjarra communities own and operate roadhouses at Tjukayirla (300 km NE of Laverton), Warburton and Warakurna that provide fuel, food, spare parts, and accommodation to travelers, and a Local Government grant is being used to construct a wayside rest and education facility at Yarla Kutjarra, on the Great Central Road between Warburton and Warakurna.

Other existing tourism opportunities within the Ngaanyatjarra Lands IPA include:

[7] See www.Tjulyuru.com

- Day permits for visitors to the tri-state border at Surveyor General's Corner, issued by Wingellina community;

- Patjarr community has operated a fly-in fly-out tourist operation and aircraft refueling service;

- Numerous rockholes and geographic formations are now shown with GPS coordinates on 4WD maps. This has been done without permission from Ngaanyatjarra Council or Traditional Owners and without any site management considerations, and is likely to be a source of conflict unless resolved.

Ngaanyatjarra Council and the Shire of Ngaanyatjarraku contributed to the regional Goldfields Tourism 2000+ Plan, but there is presently no specific tourism strategy for the Lands.

3.4.3 Protection of Other Community Values

Aspirations and values are also held for this country by non-resident Traditional Owners and the broader Australian and international communities. These include:

- economic and/or development opportunities;

- wilderness values;

- preservation of traditional indigenous association with country;

- opportunities for freedom, travel and adventure that have disappeared elsewhere.

Some of these values will be at odds with the reality of contemporary Aboriginal ownership and management. However, denial of their existence will neither address nor prevent them. The adaptive management approach proposed for the Ngaanyatjarra Lands IPA will enable Yarnangu to develop the understanding and expertise to progressively deal with these issues.

4 IPA Management Framework

4.1 Management Context

The scale of the Ngaanyatjarra Lands IPA enables adoption of a bioregional approach to land-use planning and management which, to be used as well as useful must reflect human identity with the local regional landscapes - a sense of place. Essentially this is a cultural landscape or biocultural region defined by ecological and biophysical features as well as by the (human) communities, social systems and political economies within (or affecting) it (Brunckhorst 2000: vii).

Berry (1997) describes a culture as not a collection of relics or ornaments, but a practical necessity, and that its corruption invokes calamity. "A healthy culture is a communal order of memory, insight, value, work, conviviality, reverence and aspirations. It reveals the human necessities and the human limits. It clarifies our inescapable bonds to the earth and to each other. It assures that the necessary restraints are observed, that the necessary work is done, and that it is done well". This is a fundamental principle for management of the Ngaanyatjarra Lands IPA.

Management of the NIPA needs to produce conservation outcomes whilst ensuring the appropriate degree of control, management and resource use is provided to Ngaanyatjarra Council. Non-resident Traditional Owners will also have concerns and aspirations for this land, as will the broader Australian and international community. These values may not in all cases be presently defined, but through treating policy applications and outcomes as experiments that are monitored, lessons can be learnt and incorporated into future implementation phases – an adaptive management approach (Brunckhorst 2000: 51).

Alignment of the NIPA with native title claims enables the Prescribed Body Corporates (as the recognised Traditional Owner bodies) to address matters relating to both legal and traditional tenures.

Monitoring and management of the NIPA will be undertaken by the Ngaanyatjarra Land Management Unit on behalf of and in consultation with all Ngaanyatjarra Council members. Applied management activities will continue to be carried out by appropriate Traditional Owners with assistance from the NGLMU.

Since its inception in 1997, the NGLMU has strived to achieve a holistic management approach whilst developing infrastructure and services aligned with outputs. During this time Environment Australia's support through the Indigenous Protected Area project has been critical by providing continuity of funding.

Successful management of the Ngaanyatjarra Lands IPA will require support and expansion of the NGLMU. It is anticipated this will be resourced through a collaborative effort between various agencies including Environment Australia, WA Dept of Conservation, and the Indigenous Land Corporation. Ngaanyatjarra Council recognises its pivotal role in future development on the Lands, including tourism and mining, and requests that Federal, State and local government and industry recognise that role through support for the Ngaanyatjarra LMU via a resourcing package designed to produce long-term outcomes.

The Indigenous Land Corporation has pledged three years salary and operational funding for the Land Use Planner position. This position is pivotal for implementation of this plan. If this funding does not eventuate it is likely that major elements of this plan will not be achievable.

4.2 Management Goals

1. Ngaanyatjarra Council (through the NGLMU) will manage the land and other natural resources of the Ngaanyatjarra Lands IPA for the sustained benefit of present and future Yarnangu and to meet legal obligations under the conditions of its land tenure. Community members will continue to live, hunt, and conduct economic enterprises and cultural activities as independent, self-managing communities of indigenous Australians.

2. Ngaanyatjarra Council recognises it is responsible for land and natural resource values important to the national and international community, and will endeavor to manage those values to ensure their future whilst meeting its own objectives for community development, employment and cultural maintenance.

3. Through collaborative processes Ngaanyatjarra Council seeks to contribute to scientific knowledge whilst improving broader community awareness of the continuing value of Traditional Ecological Knowledge.

4. Ngaanyatjarra Council will, through its Land Management Unit, balance the management of differing values within the NIPA and conflicting land uses, and assist Yarnangu to consider options and make informed decisions. These decisions will contribute to Ngaanyatjarra Council Land Use Policy and Plans.

5. Controlled public access will be available to selected locations within the NIPA, this access being dependent on the Ngaanyatjarra LMU having the resources and infrastructure to manage the impacts of such access.

6. Ngaanyatjarra Council will seek to develop the tourism potential of the Lands consistent with the definition of eco-tourism contained within the National Eco-tourism Strategy:

   Eco-tourism is nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable (where the natural environment includes cultural components and sustainable includes an appropriate return to the local community and long term conservation of the resource).

7. Ngaanyatjarra Council accepts the need and value of integrating its land management activities with those of government and the regional community. It will attempt to liaise with such organizations to develop projects and systems of mutual benefit.

8. Ngaanyatjarra Council will strive to achieve the above goals to the best possible outcome in line with the resources available.

4.3 Strategic Management Directions

Ngaanyatjarra Council, through the NGLMU, advocates recognition by external agencies that whilst sustainable management has previously been achieved on the Lands, new technologies and impacts outside the scope of Traditional Knowledge jeopardize its continuity. Assistance is required to ensure an appropriate structure is established for management of the Ngaanyatjarra Lands IPA including staff, training, recurrent and capital funding; and that these externally sourced contributions have continuity and do not unduly restrict Yarnangu ability to manage their own affairs.

Furthermore, the NGLMU seeks to develop programs and possible new ventures (including tourism) at a pace and in a style that maximizes community development, training and employment opportunities for Yarnangu.

The NLMU will assist Yarnangu in the consideration of sustainable wild harvest levels (including commercial bush tucker ventures and hunting) through a process of awareness, education, and liaison with Traditional Owners and other indigenous resource management groups elsewhere.

External agencies will be encouraged to establish collaborative projects of mutual benefit. Such projects could include but not be limited to: threatened species management, water and mineral exploration, identification of bush foods and medicines, and ecotourism ventures.

A zoning system will be established to:

- enable visitor management through identification of permitted sites and activities;
- preserve the integrity of cultural sites;
- assist in the management of specific flora and fauna;
- address issues related to effective resource use and delivery over such a large area.

5 Implementation of Management

Indigenous Protected Area management for this region is like a painting – a representation on paper of reality. Put simply it provides recognition of pre-existing and continuing indigenous management, and provides a mechanism/reference point for external contact, negotiation and collaboration.

This plan aims for "best-bet" management based on current knowledge and required resource projection. It could also be viewed as a "rubber band" plan, that is one capable of expansion/contraction in direct response to the available resources without significantly altering its fundamental intent.

5.1 Management Structure and Resources

The over-riding responsibility for NIPA management rests with Ngaanyatjarra Council as the body representing Traditional Owners of the area. The Ngaanyatjarra Land Management Unit will carry out day-to-day management under Council's direction. Decision-making will be undertaken collaboratively by the IPA Project Officer, the Ngaanyatjarra Council Land Use Planner, other members of the NGLMU and community representatives.

The NGLMU is based in Warburton Community- on the Lands and within the Ngaanyatjarra Lands IPA. Warburton is also the largest Ngaanyatjarra community and seat of local government for the Shire of Ngaanyatjarraku. The NGLMU has an office in Tjulyuru – the Ngaanyatjarra Cultural and Civic Centre.

Currently, NGLMU staff comprises the Land Use Planner who also acts as Coordinator for the unit, an Environment Australia funded Indigenous Protected Area Project Officer, and an NHT-funded Land Management Field Officer.

The Land Use Planner salary and operational funding has been negotiated for the next three years through the Indigenous Land Corporation (ILC). NHT funding continuity for the Land Management Field Officer is uncertain at present, and it would be appropriate for this essential position to be funded through the NIPA along with the NIPA Project Officer. Both these position encumbents are presently male, and any additional position appointments should consider the importance of increasing support for female Traditional Owners.

A pool of CDEP[8] workers from various communities is available at call to undertake fieldwork, for which they are paid additional 'top-up' money from project-specific funding. Whilst this system has worked reasonably to date, it has necessarily been focused around Warburton Community. For effective NIPA management an expansion of staff and resources will be required, aligned with a more devolved on-ground capability.

Management nodes could be progressively established in (i) Tjukurla (ii) Papulankutja (Blackstone) and (iii) Warakurna, in line with available resources and appropriate personnel availability.

NIPA funding equivalent to one full time Field Officer position would be required for each of these three management nodes in addition to maintaining the current IPA Project Officer and Land Management Field Officer position in Warburton. These positions could be filled through job-sharing arrangements if communities preferred.

An equipped and resourced 4WD vehicle would also be required for each of these positions. It is proposed that the Indigenous Land Corporation be approached for funding initial purchase by Council, and then the vehicles be leased to the NIPA project .

Administrative support for the NGLMU will be required, and it is recommended that funding be pursued through either the WA Dept of Training or Ngaanyatjarra College for a training position based in Warburton.

[8] Community Development Employment Program

Operational and training funds will be required for NIPA-related operations of the NGLMU. However, it is anticipated that the unit will continue to source project funding from various sources with assistance from the WA Dept of Conservation, mining companies and other agencies.

The Land Use Planner, in consultation with the NGLMU and Community Chairpersons, will be responsible for day-to-day operational decisions. Financial delegations will, in the first three years of management, be restricted to the Land Use Planner under Council guidelines. Ngaanyatjarra Council will hold ultimate responsibility for decisions relating to policy and/or applicable across the wider area.

It is important to state that management of the NIPA is dependant on the continued existence and operation of the Ngaanyatjarra Land Management Unit.

5.2 Zoning

Declaration of the NIPA is made under **IUCN Category 6 guidelines: *Managed Resource Protected Area*** – a protected area managed mainly for the sustainable production use of natural ecosystems.

Within this greater area a system of management zones has been identified, some of which will be managed under different IUCN categories. Zoning is an important technique available to land managers to balance land use and protect fragile areas which tend to conflict with more intensive land use.

The Ngaanyatjarra Lands IPA envisages zoning that permits Yarnangu to accomplish community development objectives while providing opportunities for scientific research, visitors, and protection of land systems, landscape quality and sites of cultural, archaeological and ecological significance.

The identified zones within the NIPA are:

1. Cultural areas;
2. Nature conservation areas;
3. Tourism areas;
4. Intensive resource utilisation areas.

This does not mean these activities are limited to these zones; rather it is recognition of the need to focus management resources to achieve specified outcomes.

5.2.1 Zone 1: Cultural Areas

All of the Ngaanyatjarra Lands IPA has cultural significance to Yarnangu. Within the NIPA however, identification of specific cultural zones has been made to ensure adequate resources are available to achieve specified outcomes for particular areas.

These zones will be managed as **IUCN Category 3: *Natural Monument*** – to protect or preserve specific outstanding natural features because of their spiritual connotations.

Specific management requirements include: providing vehicular assistance for site visits, anthropological involvement, visitor management to avoid accidental or deliberate incursions, design and construction of keeping places, applied management of wildfire and other impacts.

Sites will not be identified on maps.

5.2.2 Zone 2: Nature Conservation Areas

These zones have been identified through scientific research as 'hot spots' for biodiversity or biological conservation, and their identification recognises that nature conservation will be a deliberate outcome of NIPA declaration. They will be managed as **IUCN Category 4: *Habitat / Species Management* Area** – to secure and maintain habitat conditions necessary to protect significant species, groups of species, biotic communities or physical features of the environment where these require specific human manipulation for management.

Future identification of additional zones need not be dependant on western science and may include Yarnangu proposals. Specific management requirements will be dependant on the intended outcome, but will conceivably include fire management, feral animal and/or exotic plant management, regular survey and monitoring of impacts, possible voluntary restriction of hunting/gathering activities.

Initial areas to be managed as Zone 2: Nature Conservation Areas include:

1. Piyul (Townsend Ridges) for warru (Blackfooted Rock Wallaby) conservation;

2. Sand country surrounding the Clutterbuck Hills for tjakara (Great Desert Skink) conservation;

3. Other warru sites as identified in the 'Operation Warru' report to the Threatened Species Network.

5.2.3 Zone 3: Visitor Management Areas

Ngaanyatjarra Council recognises the attraction to the wider community of both traveling through and camping in the NIPA and the opportunity to directly experience and understand some aspects of Yarnangu culture. Ngaanyatjarra Council also recognises that providing access and recreation opportunities will contribute to the effectiveness of NIPA management as well as contributing to the regional economy. Therefore Ngaanyatjarra Council wishes to continue to make areas available for use by the wider community.

However, current tourism is predominately by self-drive 4WD vehicles, which has an environmental impact on country requiring management. The NIPA also has two additional factors to be considered: safety of travellers relating to the remoteness and extreme climate, and the protection of cultural sites.

Most visitors to the NIPA enter via the Great Central Road (Outback Highway) - from the east via Uluru National Park and Docker River, from the west via Tjukayirla Roadhouse. A limited number travel south along the Gary Highway, north along the Connie Sue Highway, or from the Anangu Pitjantjatjara Lands via Wingellina. At their point of entry visitors will require information that:

- Indicates where they are;

- Indicates who the land manager is;

- Describes where they can get more detailed information on services and things to do;

- Restates permit conditions and how they can get be obtained.

More detailed information is then required at secondary points that

- orientate the visitor (a map);

- more fully explains the range of services and accommodation;

- explains the choice of opportunities;

- indicates the crucial behavior rules for visitors and provides basic safety information.

The proposed secondary points are Tjulyuru in Warburton, and the roadhouses at Warburton and Warakurna.

Through these contact points Ngaanyatjarra Council has the opportunity to welcome the visitor, permit them to make choices as to how to use their time, and to set the tone, ambience and overall quality of visitor management in the mind of the visitor.

Zone 3 Tourism areas will be managed under **IUCN Category 6 guidelines:** ***Managed Resource Protected Area,*** and initial areas will include:

1. Piyul Outstation;
2. Surveyor General's Corner;
3. The Old Gunbarrel Highway;
4. Yarla Kultarra Wayside Rest and Interpretative Area;
5. Pankupirri rockhole;
6. Kutjintari (Gills Pinnacle).

N.B. Sites 5 and 6 will not be promoted to visitors. Existing (and largely unauthorised) visitation requires management to reduce environmental and cultural impacts.

In addition to tourism, areas associated with mining exploration or mineral extraction will be managed under Zone 3 guidelines. The density of mining tenements within the NIPA will necessitate a regional approach to management of associated camps to minimize social as well as environmental impacts.

5.2.4 Zone 4: Intensive Resource Utilisation Areas

The orientation of contemporary Ngaanyatjarra society is around community hubs. Consequently, country close to communities is often subjected to increased hunting and gathering pressure. However, it is also generally easier to facilitate community involvement in land management activities situated close to communities.

Identification of Intensive Resource Utilisation zones is therefore both to assist in monitoring and managing impacts, and to draw upon the greater resources and opportunities they provide. They will be managed as **IUCN Category 6 guidelines:** ***Managed Resource Protected Area***.

Areas to be managed as Zone 4: Intensive Resource Utilisation Areas are shown in Map 3: Ngaanyatjarra Lands Indigenous Protected Area with Management Zones (page 4) and comprise a 50 km radius of:

1. Warburton Community;
2. Mantamaru Community;
3. Papulankutja Community;
4. Irrunytju Community;
5. Warakurna Community;
6. Wanarn Community;

7. Tjukurla Community;

8. Patjarr Community.

The 50 km radius is an arbitrary figure that can be refined through survey and discussion. Intensive resource utilisation zones also occur further from communities, often in relation to preferred hunting or artefact collection areas. These areas will be identified and recorded through NIPA discussions and management.

5.3 Inter-agency Collaboration

The NIPA declaration will provide a platform for cooperative projects and service delivery between Ngaanyatjarra Council (represented by its Land Management Unit) and all external agencies with an interest in or responsibility related to land management of this country.

5.3.1 Local Government

The NIPA is wholly contained within the Shire of Ngaanyatjarraku. The majority of the Shire's services are directed towards community issues and road maintenance. The Shire provides office space for the NGLMU in Tjulyuru and has supported tourism training through Ngaanyatjarra College. In 2000 a consultant was retained to produce a tourism plan for the Shire.

NGLMU has signed a Service Agreement with the Shire for 2002 – 2003, and additional resources could be sourced through local government networks for such things as signage and regional tourism funding.

5.3.2 State Government

5.3.2.1 Department of Indigenous Affairs

DIA has previously assisted NGLMU purchase of 4WD vehicles (in collaboration with the WA Lotteries Commission) and provided one-off funds for Protecting Heritage Sites. AAD provided this assistance in recognition of the NIPA project, and future assistance could realistically be anticipated.

DIA in association with NHT and the ILC have launched an Indigenous Start Up and Incentive Landcare Grants scheme in WA, and the Aboriginal Lands Trust has indicated an interest in supporting mining related education and training through this.

5.3.2.2 Agriculture WA

This department could be approached for assistance with weed and feral animal management projects.

5.3.2.3 Department of Aboriginal Employment and Training

Indications of support for infrastructure and training have been made to NGLMU and should be pursued.

5.3.2.4 Department of Conservation

This department is responsible for management of conservation reserves and conserving flora and fauna in Western Australia regardless of land tenure.

The long standing professional and personal relationships between this agency and Ngaanyatjarra people in Warburton and Patjarr are strong and have been a primary contributor towards NIPA acceptance by Ngaanyatjarra people.

5.3.2.5 Department of Environmental Protection and Environmental Protection Authority

This department conducts environmental impact assessments and produces environmental protection policies for WA. This function could be called upon in evaluation of mining proposals within the NIPA, particularly with respect to social issues and impacts.

5.3.2.6 Department of Lands Administration

This department administers and allocates all Crown land based on the active monitoring of the community's needs. It is not anticipated to be of concern subsequent to Native Title determination, though the department does have mapping and GIS resources that could be utilised.

5.3.2.7 Department of Mineral and Petroleum Resources

Responsible for the mapping and evaluation of the State's mineral resources, DMPR has previously assisted Ngaanyatjarra Council through mine site rehabilitation training and advice. Numerous mining tenements exist within NIPA and it is anticipated that the NGLMU could continue to work with DMPR.

There are some indications though that DMPR wants to defer mine site rehabilitation and training to the actual mining companies unless the stakeholder/community raises an issue of concern, so it is possible that DMPR support could be limited to ensuring all parties are aware of and abide by their obligations for environmental management.

5.3.2.8 Fire and Emergency Services

Assistance is limited to emergency response. Assistance with strategic and regional fire management is no longer available, though it appears the Dept of Conservation have been encouraged to assist in this role.

5.3.2.9 Goldfields Esperance Development Commission

Ngaanyatjarra Council has contributed to the regional tourism strategy produced by this commission (Goldfields Tourism 2000+).

5.3.2.10 Waters and Rivers Commission

Assistance is being provided to development of the Ngaanyatjarra Regional Groundwater Data Base.

5.3.3 Commonwealth Agencies

5.3.3.1 Aboriginal and Torres Strait Islander Commission

ATSIC provides support for some land management activities through the CDEP scheme, repair and maintenance of outstation bores and windmill, and provision of trees for landscaping and dust suppression.

5.3.3.2 Indigenous Land Corporation

Support has been offered through the cultural, social and environmental program to consolidate Ngaanyatjarra Council's land management capabilities, including salary and operational costs for the Land Use Planner and the Land Management Unit.

5.3.3.3 Bureau of Resource Science

The BRS was a partner in the Anangu Pitjantjatjara Lands Water study and sought funds to assist Ngaanyatjarra Council and other Western Desert communities in the same way. It appears this assistance is no longer available.

5.3.3.4 Environment Australia

Environment Australia (through the Natural Heritage Trust) has supported Ngaanyatjarra Council in the investigation and declaration of the NIPA and in the cooperative management of the existing Gibson Desert Nature Reserve.

The Threatened Species Network within this same department has supported the community fox baiting project and a number of threatened species surveys.

The continuity of both these funding streams is presently unclear.

5.4 Monitoring and Management of the NIPA's Natural Resources

The objectives of monitoring and management are to:

1. Improve the baseline knowledge of the biological resources of the NIPA;

2. Establish self management systems to ensure sustainable management and resource utilisation;

3. Identify, limit and rehabilitate areas of land degradation and instability.

Baseline environmental information for the NIPA is generally limited. The survey and literature search "Natural History of the Central Ranges, WA" undertaken by Morse (1999) provides an overview of current scientific knowledge and makes strong recommendations for further research and survey, specifically:

- The extent of threat to many species of mammals, birds and reptiles remains unknown and requires detailed studies;

- Survey is required throughout the region to expand flora and fauna lists and identify special places and features. Morse cites Pearson's work (1991, 1992) as a model for undertaking this work with local people;

- Priority be given to ethno-ecological research that draws on traditional knowledge and skills still held by older people;

- Investigation of fire history and current burning patterns is required to develop fire management plans for the region;

- A detailed survey of extent and status of fire sensitive plants and communities is required so planning for protection can be undertaken;

- A detailed and user-directed water resource research and planning effort is needed that includes traditional water knowledge, research, mapping and data basing of bore and underground reserve data similar to the Western Water study (described in Toyne et al, 1995).

The scale of the Ngaanyatjarra Lands IPA precludes application of management efforts evenly across the landscape. It will be more useful (and realistic) for the Land Management Unit to direct resources and effort towards strategic issues through the zoning system and engagement with Traditional Owners.

5.5 Access

There is an extensive network of roads and tracks throughout the NIPA that facilitates access to country by Traditional Owners. Some of these roads are mapped, but many poorly defined and not maintained.

Visitor access under normal permit conditions is limited to the Great Central Road, with access to the Old Gunbarrel Highway and Surveyor General's corner restricted to special permit holders. This is still an extensive amount of road traversing a diversity of country.

Whilst the extensive track network has developed in direct response to need and is clearly of value to Yarnangu, there are associated problems. These include:

- Facilitating unauthorised public access - whilst visitors are usually not permited access to these roads experience has shown that some continue to use them. Recent practice of 4WD guidebooks mapping these roads and including GPS coordinates has exacerbated the problem.

- Unrealistic community expectations relating to track maintenance and repair. Presently the Shire of Ngaanyatjarraku allocates $15,000 per annum to assist with upgrade and maintenance of outstation roads and one road per year of cultural significance. This equates to ~ 250 km of road. Also, in some sections the Old Gunbarrel highway is now approaching 50 metres in width as vehicles travel progressively wider to avoid corrugations and bog holes.

- Potential public risk responsibilities under the land managers public duty of care even though permits include disclaimers relating to trespass.

- The spread of weeds, particularly for vehicles entering cross-country from outside the Lands.

- Navigation difficulties for visitors who mistake roads they can legitimately travel on, though recent signage undertaken by the Shire of Ngaanyatjarraku should reduce genuine mistakes by travelers.

- Potential for erosion and land degradation, though this must be balanced against assisting Yarnangu access to country.

Very limited mechanical services are available to visitors to the NIPA, and there are no facilities for remote vehicle breakdown recovery.

Most roads are only used by Yarnangu, but with tracks increasingly being mapped by 4WD clubs and outback travel directories a combination of signage, inclusion of interpretative material with permits, and dialogue with 4WD clubs and map service providers should be undertaken as a matter of urgency to enable planning for safe, functional access to locations of community or visitor interest, with all other tracks clearly closed to the public using (as appropriate) bollard barriers, fences and signage.

5.6 Visitor Management

Visitor numbers to the Ngaanyatjarra Lands have been steadily increasing over time (pers comm. Damian MacLean, 1999). However, visitor numbers are still low compared to other places in Australia and the Ngaanyatjarra Lands IPA is fortunate insofar that there is still the opportunity to establish desirable visitor management guidelines before numbers increase out of hand or undesirable practices become entrenched.

Ngaanyatjarra Council and the Shire of Ngaanyatjarraku have supported this approach through participation in the Outback Highway consultations and construction of Tjulyuru. Patjarr community has operated a fly-in fly-out tourism operation that thereby restricts visitor on-ground movement. Wingellina community has a day permit system for visitors to Surveyor General's corner and is developing a camping ground there. These existing activities can provide models for future visitor management, but presently no defined strategy exists for visitor management within the NIPA.

People traveling through the area without permits, especially off-road, cause considerable anxiety to Yarnangu. This worry is as much about the welfare of travelers as about damage to cultural sites. Presently, Yarnangu have very limited resources to monitor such activities or enforce permit conditions. Reliance on police assistance is of limited value as there is no permanent police presence on the Lands.

Visitor advice and information could be provided through interpretative material attached to permits, signage at the three Ngaanyatjarra roadhouses and at road entry points to the NIPA. However, dealing with the public requires special skills and training, particularly if law enforcement or compliance is required, and it should not be expected that the NGLMU would accept this responsibility without appropriate consideration, training and resources.

Elsewhere in Australia local governments are assuming responsibility for tourism promotion and management. Whilst approval of visitor access remains at the discretion of communities and Ngaanyatjarra Council, the Land Management Unit in association with the Shire of Ngaanyatjarraku could provide strategic coordination and a contact point for visitors. How such a system could operate should be investigated during the life of this plan.

6 Performance Assessment

It is important that Ngaanyatjarra Land Management Unit is able to assess its performance under this NIPA plan of management. To achieve this outcome, performance will be assessed against the following criteria:

6.1 Monitoring the Protection of Yarnangu Values

This will be achieved through direct feedback from Yarnangu. It will be a primary task for the NGLMU to ensure Yarnangu continue to be engaged in all aspects of NIPA management, and that strong clearly defined pathways are provided for feedback and dialogue.

The NGLMU will continue to assess NIPA management performance against the three keystone criteria established during the IPA consultation process, these being:

1. Securing the resources and employment opportunities to enable Traditional Owners to continue managing their country;

2. Facilitating appropriate assistance for Traditional Owners to consider and address impacts on their lands outside the scope of traditional law; and

3. Ensuring the continuity of inter-generational transfer of cultural knowledge.

6.2 Monitoring the Protection of Natural Heritage Values

Indicators of performance will be:

- Continuing collaborative biological research projects between Yarnangu and external agencies;

- Continuing feral animal control projects in key habitat areas;

- Establishment of a Ngaanyatjarra GIS that enables monitoring of fire, groundwater resources, rockhole maintenance, and spatial impacts including roads, tracks, feral animals and weeds.

- Monitoring the sustainability of visitor use and impact through establishment of photo points at key sites

6.3 Monitoring the Protection of Other Community Values

A system of visitor survey could be established to monitor user motivations, experiences and preferences. This could be achieved through the permitting system and solicited Tjulyuru visitor feedback.

6.4 Monitoring Sustainable Resource Utilisation

Community awareness of how land degradation occurs and how symptoms manifest themselves will be promoted through a process of education, providing opportunities to learn from other places, and engaging community schools in activities and discussions.

A process to record community attitudes over time towards such issues should be developed.

7 Plan Revision

It is anticipated that this plan will form the basis for three years of management from the date of declaration of the Ngaanyatjarra Lands IPA. During this period the NGLMU will, subject to resource availability, record and collate outcomes to continually refine management through an adaptive management approach.

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9 Appendices

9.1 Appendix 1: Plant taxa in the Central Ranges of WA, represented by specimens in the WA Herbarium (from Morse, 1999)

FAMILY, Genus, species	N	S	FAMILY, Genus, species	N	S
ACANTHACEAE			ASCLEPIADACEAE		
Rostellularia adscendens (R.Br.)R.M.Barker var. pogonanthera (F.Muell.)R.M.Barker	X	X	Sarcostemma viminale (L.)R.Br. subsp. australe (R.Br.)P.I.Forst. ms	X	X
			Rhyncharrhena linearis (Decne.)K.L.Wilson		X
ADIANTACEAE (Ferns)					
Cheilanthes austrotenuifolia H.M.Quirk & T.C.Chambers	X		ASPLENIACEAE (Ferns)	XX	
Cheilanthes lasiophylla Pic.Serm.	X	X	Pleurosorus subglandulosus (Hook.& Grev.) Tindale	X	
Cheilanthes sieberi subsp. pseudovellea H.M.Quirk & T.C.Chambers	X				
Cheilanthes sieberi Kunze subsp. sieberi		X	ASPHODELACEAE		XX
Paraceterach reynoldsii (F.Muell.)Tindale in J.M.Black	X		Bulbine sp.		X
			ASTERACEAE		
AIOZACEAE		XX	Angianthus tomentosus J.C.Wendl.		X
Trianthema triquetra Willd.		X	Bidens bipinnata L.		X
Zaleya galericulata (Melville)H.Eichler		X	Brachyscome blackii G.L.R.Davis	X	
			Brachyscome ciliaris var. lanuginosa (Steetz)Benth.		X
AMARANTHACEAE					
Amaranthus mitchellii Benth.	X	X	Brachyscome ciliaris (Labill.)Less.		X
Alternanthera nana R.Br.	X		Brachyscome sp.		X
Ptilotus aervoides (F.Muell.)F.Muell.		X	Brachyscome tesquorum J.M.Black		X
Ptilotus chippendalei Benl		X	Bracteantha bracteata (Vent.) Anderb.& Haegi	X	X
Ptilotus clementii (Farmar)Benl		X			
Ptilotus decipiens (Benth.)C.A.Gardner	X		Calocephalus platycephalus (F.Muell.)Benth	X	
Ptilotus drummondii (Moq.)F.Muell.	X		Calotis erinacea Steetz in Lehm.	X	
Ptilotus exaltatus Nees var. exaltatus		X	Calotis hispidula (F.Muell.)F.Muell.		X
Ptilotus exaltatus var. exaltatus / pallidus	X		Calotis latiuscula F.Muell.& Tate	X	X
Ptilotus helipteroides (F.Muell.)F.Muell. var. helipteroides	X	X	CONSERVATION STATUS: P3 Calotis multicaulis (Turcz.)Druce	X	X
Ptilotus latifolius R.Br. var. latifolius	X	X	Calotis plumulifera F.Muell.		X
Ptilotus macrocephalus (R.Br.)Steud.	X	X	Calotis sp.		X
Ptilotus obovatus var. "unsorted"	X		Centipeda minima (L.)A.Braun & Asch.	X	
Ptilotus obovatus (Gaudich.)F.Muell. var. griseus Benl		X	Chrysocephalum apiculatum (Labill.)Steetz in Lehm.	X	X
Ptilotus obovatus (Gaudich.)F.Muell. var. obovatus	X	X	Chrysocephalum eremaeum (Haegi) Anderb	X	
			Chrysocephalum pterochaetum F.Muell.	X	X
Ptilotus polystachyus (Gaudich.)F.Muell. var. polystachyus	X	X	Chrysocephalum puteale (S.Moore) Paul G. Wilson		X
Ptilotus sessilifolius (Lindl.)Benl var.			Chrysocephalum semicalvum		

			(F.Muell.) Paul		
sessilifolius		X	G.Wilson	X	X
Ptilotus royceanus Benl	X		Eriochlamys behrii Sond.& F.Muell.	X	
Ptilotus schwartzii Tate var. schwartzii	X		Euchiton sphaericus (Willd.)Holub	X	
Ptilotus sp.	X		Gnephosis arachnoidea Turcz.		X
			Helichrysum ambiguus var. semicalvus		X
			Helipterum pterochaetum (F.Muell.)Benth.		X
ANTHERIACEAE	XX		Ixiochlamys filicifolia Dunlop		X
Thysanotus inaequalis H.R.White & T.Macfarlane ms	X		Ixiolaena tomentosa Sond.& F.Muell.		X
			Lawrencella davenportii (F.Muell.) Paul		
			G.Wilson	X	X
APIACEAE			Leucochrysum fitzgibbonii (F.Muell.) Paul		
Hydrocotyle trachycarpa F.Muell.	X		G.Wilson	X	X
Trachymene glaucifolia (F.Muell.)Benth.	X	X	Leucochrysum stipitatum (F.Muell.) Paul		
			G.Wilson		X
ASTERACEAE continued			Heliotropium moorei Craven	X	X
Leptorhynchos panaetioides		X	Heliotropium pachyphyllum Craven	X	
Minuria cunninghamii (DC.)Benth.	X		Heliotropium pleiopterum F.Muell.	X	
Minuria leptophylla DC.		X	Heliotropium tanythrix Craven		X
Minuria multiseta P.S.Short	X		Heliotropium tenuifolium R.Br.	X	
Olearia ferresii (F.Muell.)F.Muell.ex Benth.	X		Omphalolappula concava (F.Muell.)Brand	X	X
Olearia stuartii (F.Muell.)F.Muell.ex Benth.	X	X	Trichodesma zeylanicum (Burm.f.)R.Br.	X	X
Othonna gregorii (F.Muell.)C.Jeffrey		X			
Ozothamnus kempei (F.Muell.)Anderb.	X		BRASSICACEAE		
Pluchea dentex R.Br.ex Benth.		X	Cuphonotus andraeanus (F.Muell.)E.A.Shaw	X	
Pluchea squarrosa Benth.	X		Lepidium muelleri-ferdinandii Thell.	X	X
Podolepis canescens A.Cunn.ex DC.		X	Lepidium oxytrichum Sprague		X
Podolepis rugata Labill.		X	Lepidium phlebopetalum (F.Muell.)F.Muell.		X
Polycalymma stuartii Sond.	X		Menkea lutea E.A.Shaw		X
Pseudognaphalium luteo-album (L.) Hilliard & B.L.Burtt	X		CONSERVATION STATUS: P1 Menkea sphaerocarpa F.Muell.	X	X
Pterocaulon serrulatum (Montrouz)Guillaumin	X		Menkea villosula (F.Muell.& Tate)J.M.Black	X	X
Pterocaulon sphacelatum (Labill.)F.Muell.	X	X	Pachymitus cardaminoides (F.Muell.)		
Pterocaulon sphaeranthoides (DC.)F.Muell.	X	X	O.E.Schulz	X	X
Rhodanthe charsleyae (F.Muell.) Paul G.Wilson		X	Sisymbrium orientale L.		X
Rhodanthe citrina (Benth.)Paul G.Wilson		X	Stenopetalum anfractum E.A.Shaw	X	X
Rhodanthe floribunda (DC.)Paul G.Wilson	X	X	Stenopetalum decipiens E.A.Shaw		X
Rhodanthe stricta (Lindl.)Paul G.Wilson		X	Stenopetalum lineare R.Br.ex DC.		X
Rhodanthe tietkensii (F.Muell.)Paul G.Wilson	X	X	Stenopetalum velutinum F.Muell.		X
Rutidosis helichrysoides DC.	X	X	Stenopetalum sp.	X	
Schoenia ayersii (F.Muell.)J.M.Black		X	CAESALPINACEAE		
Schoenia cassiniana (Gaudich.)Steetz		X	Petalostylis cassioides (F.Muell.)		

			Symon		
Senecio gregorii F.Muell.		X	in Jessop	X	X
Senecio laceratus (F.Muell.)Belcher	X	X	Senna artemisioides (DC.)Randell subsp.		
Senecio lautus subsp. dissectifolius Ali		X	x artemisioides	X	X
Senecio lautus Willd.		X	Senna artemisioides subsp. artemisioides		
Senecio magnificus F.Muell.		X	x filifolia		X
Sigesbeckia orientalis L.	X	X	Senna artemisioides (DC.)Randell subsp.		
Sonchus oleraceus L.	X		filifolia Randell		X
Tietkensia corrickiae P.S.Short	X	X	Senna artemisioides (DC.)Randell subsp.		
Vittadinia sp.		X	glaucifolia Randell		X
Waitzia acuminata Steetz var. acuminata	X	X	Senna artemisioides (DC.)Randell subsp.		
Wedelia stirlingii Tate		X	aff. glaucifolia Randell	X	X
			Senna artemisioides (DC.)Randell subsp.		
BIGNONIACEAE			helmsii (Symon)Randell	X	X
Pandorea pandorana (Andrews)Steenis	X	X	Senna artemisioides (DC.)Randell subsp.		
			oligophylla (F.Muell.)Randell	X	X
BORAGINACEAE			Senna artemisioides subsp. helmsii		
Cynoglossum australe R.Br.		X	x oligophylla	X	
Halgania glabra J.M.Black	X	X	Senna artemisioides (DC.)Randell subsp.		
Halgania solanacea F.Muell. var. hirsuta ms	X	X	petiolaris Randell	X	X
Halgania sp.	X		Senna artemisioides (DC.)Randell subsp.		
Heliotropium asperrimum R.Br.	X	X	x sturtii (R.Br.)Randell	X	X
Heliotropium cunninghamii Benth.	X		Senna artemisioides (DC.)Randell subsp.		
Heliotropium epacrideum F.Muell.ex Benth.	X		aff. x sturtii (R.Br.)Randell		X
Heliotropium glabellum R.Br.	X		Senna artemisioides subsp. "unsorted"	X	X
Heliotropium inexplicitum Craven	X	X	Senna glutinosa subsp. "unsorted"	X	X
Senna glutinosa (DC.)Randell subsp.			Chenopodium saxatile Paul G.Wilson	X	
glutinosa	X		Dysphania glomulifera (Nees)Paul G.Wilson		
Senna pleurocarpa (F.Muell.)Randell	X	X	subsp. eremaea Paul G.Wilson	X	
Senna pleurocarpa (F.Muell.)Randell var.			Dysphania kalpari Paul G.Wilson	X	X
pleurocarpa	X	X	Dysphania plantaginella F.Muell.	X	
Senna sp.		X	Dysphania rhadinostachya (F.Muell.)		
Senna sp. Billabong (J.D. A'lonzo 721)		X	A.J.Scott subsp. rhadinostachya	X	X
Senna venusta (F.Muell.)Randell	X		Einadia nutans (R.Br.)A.J.Scott subsp.		
			eremaea Paul G.Wilson	X	X
CAMPANULACEAE			Enchylaena tomentosa R.Br. var. tomentosa	X	X

Wahlenbergia sp.	X		Eremophea spinosa (Ewart & O.B.Davies) Paul G.Wilson		X
Wahlenbergia tumidifructa P.J.Sm.in Jessop & Toelken	X	X	Maireana georgei (Diels)Paul G.Wilson	X	X
			Maireana integra (Paul G.Wilson) Paul G.Wilson	X	X
CAPPARACEAE			Maireana planifolia (F.Muell.)Paul G.Wilson	X	X
Cleome viscosa L.	X	X	Maireana aff. planifolia (F.Muell.) Paul G.Wilson	X	
CARYOPHYLLACEAE	XX		Maireana scleroptera (J.M.Black) Paul G.Wilson	X	X
Polycarpaea corymbosa (L.)Lam.	X		Maireana tomentosa Moq. subsp. tomentosa	X	
CASUARINACEAE			Maireana triptera (Benth.)Paul G.Wilson	X	
Allocasuarina decaisneana (F.Muell.) L.A.S.Johnson	X	X	Maireana villosa (Lindl.)Paul G.Wilson	X	X
			Malacocera tricornis (Benth.)R.H.Anderson		X
CENTROLEPIDACEAE	XX		Rhagodia eremaea Paul G.Wilson	X	X
Centrolepis eremica D.A.Cooke in Jessop & Toelken	X		Rhagodia parabolica R.Br.	X	
			Salsola kali L.		X
			Salsola kali subsp. austroafricana		X
CHENOPODIACEAE			Sclerolaena alata Paul G.Wilson	X	
Atriplex elachophylla F.Muell.	X	X	Sclerolaena convexula (R.H.Anderson) A.J.Scott	X	X
Atriplex semilunaris Aellen		X			
Atriplex vesicaria Heward ex Benth.	X	X	Sclerolaena cornishiana (F.Muell.)A.J.Scott	X	X
Chenopodium cristatum (F.Muell.)F.Muell.		X	Sclerolaena costata (R.H.Anderson) A.J.Scott		X
Chenopodium desertorum (J.M.Black) subsp anidiophyllum (Aellen)Paul G.Wilson	X		Sclerolaena diacantha (Nees)Benth.	X	
Chenopodium melanocarpum J.M.Black	X	X	Sclerolaena densiflora (W.Fitzg.)A.J.Scott		X
Chenopodium melanocarpum (J.M.Black) forma leucocarpum (Aellen)Paul G.Wilson	X		Sclerolaena eriacantha (F.Muell.)Ulbr.	X	X
			Sclerolaena fusiformis Paul G.Wilson		X
Chenopodium nitrariaceum (F.Muell.) F.Muell.ex Benth.	X		Sclerolaena johnsonii (Ising)A.J.Scott	X	
			Sclerolaena lanicuspis (F.Muell.)Benth.		X
Dissocarpus paradoxus (R.Br.) F.Muell.ex Ulbr.in Engl.& Prantl		X	Sclerolaena obliquicuspis (R.H.Anderson) Ulbr.in Engl.& Prantl		X
Dicrastylis brunnea Munir		X	Sclerolaena parviflora (R.H.Anderson) A.J.Scott	X	X
Dicrastylis doranii F.Muell.		X			
Dicrastylis exsuccosa (F.Muell.)Druce forma lachnophylla Munir	X	X	Sclerolaena patenticuspis (R.H.Anderson) Ulbr.in Engl.& Prantl		X
Dicrastylis gilesii var. "unsorted"		X	Sclerolaena symoniana (Ising)A.J.Scott	X	
Dicrastylis gilesii F.Muell.	X	X	Sclerostegia tenuis (Benth.)Paul G.Wilson	X	
Dicrastylis gilesii F.Muell. forma bagotensis Munir	X		CHLOANTHACEAE		

Dicrastylis gilesii F.Muell. forma gilesii	X	X	Dicrastylis beveridgei F.Muell. var. lanata		
Dicrastylis gilesii F.Muell. var. laxa Munir	X		Munir	X	X
CONSERVATION STATUS: P1			Newcastelia bracteosa F.Muell.		X
Newcastelia cephalantha F.Muell.		X	DROSERACEAE	XX	
Newcastelia hexarrhena F.Muell.		X	Drosera burmanni M.Vahl.	X	
Newcastelia spodiotricha F.Muell.	X	X	Drosera indica L.	X	
Pityrodia loxocarpa (F.Muell.)Druce	X	X			
			ELATINACEAE		
CLUSIACEAE	XX		Elatine gratioloides A.Cunn.	X	X
Hypericum gramineum G.Forst.	X				
Hypericum japonicum Thunb.	X		EUPHORBIACEAE		
			Euphorbia australis Boiss.	X	X
COLCHICACEAE	XX		Euphorbia biconvexa Domin		X
Wurmbea deserticola T.Macfarlane	X		Euphorbia boophthona C.A.Gardner	X	
			Euphorbia drummondii Boiss.	X	X
CONVOLVULACEAE			Euphorbia parvicaruncula D.C.Hassall		X
Bonamia rosea (F.Muell.)Hallier	X	X	Euphorbia sp.		X
Evolvulus alsinoides L. var. villosicalyx			Euphorbia tannensis subsp. eremophila		
Ooststr.	X		(A.Cunn.)Hassall	X	X
			Phyllanthus lacunarius F. Muell	X	
COPRINACEAE	XX		Phyllanthus lacunellus Airy Shaw	X	
Coprinus sp.	X		Phyllanthus sp.	X	X
			Poranthera microphylla Brongn.	X	
CRASSULACEAE	XX				
Crassula sieberiana (Schult.& Schult.f.)			GERANIACEAE		
Druce subsp. tetramera Toelken	X		Erodium aureum Carolin		X
			Erodium crinitum Carolin		X
CUCURBITACEAE		XX	Erodium cygnorum Nees	X	
Mukia maderaspatana (L.)M.Roem.		X	Erodium cygnorum Nees subsp. cygnorum		X
			Erodium cygnorum Nees subsp.		
CUPRESSACEAE			glandulosum		X
			Carolin		
Callitris glaucophylla Joy Thomps.&					
L.A.S.Johnson	X	X	GOODENIACEAE		
			Brunonia australis Smith ex R.Br.	X	X
CYPERACEAE			Dampiera cinerea Ewart & O.B.Davies	X	X
Bulbostylis turbinata S.T.Blake	X		Dampiera dentata Rajput	X	X
Cyperus bulbosus M.Vahl.	X	X	Dampiera roycei Rajput	X	
Cyperus centralis K.L.Wilson	X		Dampiera sp.	X	
Cyperus cunninghamii (C.B.Clarke)			Goodenia centralis Carolin		X
C.A.Gardner subsp. cunninghamii	X		Goodenia cycloptera R.Br.in Sturt	X	
Cyperus difformis L.	X		Goodenia gibbosa Carolin	X	
Cyperus iria L.	X		Goodenia glandulosa K.Krause in Engl.	X	X
Cyperus rigidellus (Benth.)J.M.Black	X		Goodenia grandiflora Sims	X	
Cyperus vaginatus R.Br.	X		Goodenia iyouta Carolin		X
Fimbristylis dichotoma M.Vahl.	X	X	Goodenia mueckeana F.Muell.		X
Fuirena nudiflora S.T.Blake	X		Goodenia pinnatifida Schltdl.	X	
CONSERVATION STATUS: P1			Goodenia ramelii F.Muell.	X	
Isolepis congrua Nees in Lehm.	X		Goodenia schwerinensis Carolin	X	
Lipocarpha microcephala (R.Br.)Kunth	X		TYPE STATUS: HOL *		
Schoenus centralis Latz	X		Goodenia sp.		X

CONSERVATION STATUS: P1			Goodenia triodiophila Carolin	X	X
			Goodenia vilmoriniae F.Muell.	X	
DASYPOGONACEAE	XX		Lechenaultia lutescens D.A.Morrison & Carolin	X	
Lomandra leucocephala (R.Br.)Ewart subsp. robusta A.T.Lee	X		Lechenaultia striata F.Muell.		X
			Scaevola amblyanthera F.Muell.		X
Scaevola amblyanthera F.Muell. var. centralis Carolin	X	X	Lysiana murrayi (F.Muell.& Tate)Tiegh.		X
Scaevola collaris F.Muell.	X		LYTHRACEAE		XX
Scaevola parvifolia F.Muell.ex Benth. subsp. parvifolia	X		Lythrum paradoxum Koehne		X
Scaevola spinescens R.Br.	X	X	MALVACEAE		
Velleia connata F.Muell.	X	X	Abutilon fraseri (Hook.)Hook.ex Walp.	X	
			Abutilon leucopetalum (F.Muell.) F.Muell. ex Benth.		X
GYROSTEMONACEAE					
Codonocarpus cotinifolius (Desf.)F.Muell.	X		Alyogyne huegelii (Endl.)Fryxell		X
Gyrostemon ramulosus Desf.		X	Alyogyne pinoniana (Gaudich.)Fryxell	X	
			Gossypium sturtianum J.H.Willis var. sturtianum	X	
HALORAGACEAE					
Glischrocaryon aureum (Lindl.)Orchard var. angustifolium (Nees)Orchard	X		Hibiscus arenicola A.S.Mitch.	X	
			Hibiscus burtonii Bailey		X
Haloragis gossei F.Muell.	X	X	Hibiscus solanifolius F.Muell.	X	X
Haloragis odontocarpa F.Muell.	X		Hibiscus sp.		X
Haloragis uncatipila Orchard		X	Hibiscus sturtii Hook. var. truncatus Fryxell	X	X
			Lawrencia sp. "small fruits" (Symon 2338) W.R. Barker ms	X	X
ISOETACEAE	XX				
Isoetes muelleri A.Braun	X		Malvastrum americanum (L.)Torr.in Emory		X
			Sida cardiophylla F.Muell.		X
JUNCAGINACEAE			Sida phaeotricha F.Muell.	X	
Triglochin centrocarpum Hook.	X		Sida sp.		X
Triglochin sp. A Perth Flora (A.S.George 4100)		X	MARSELIACEAE (Ferns)		
			Marsilea exarata A.Braun		X
LAMIACEAE			Marsilea hirsuta R.Br.	X	
Plectranthus intraterraneus S.T.Blake	X		Marsilea sp.	X	
Prostanthera centralis B.J.Conn	X				
CONSERVATION STATUS: P3			MIMOSCAEAE		
Prostanthera sericea (J.M.Black)B.J.Conn		X	Acacia abrupta Maiden & Blakely	X	X
Prostanthera striatiflora F.Muell.	X	X	Acacia acradenia F.Muell.	X	
Prostanthera wilkieana F.Muell.		X	Acacia acuminata Benth sbsp acuminata ms	X	
Teucrium grandiusculum F.Muell.& Tate		X	Acacia acuminata Benth. subsp. burkittii (F.Muell.ex Benth.)Tindale & Kodela ms		X
LOBELIACEAE			Acacia adsurgens Maiden & Blakely	X	
Isotoma petraea F.Muell.	X	X	Acacia aneura forma. aneura (podded)		X
Lobelia heterophylla Labill.		X	Acacia aneura var latifolia f. latifolia	X	
			Acacia aneura var. aneura / intermedia ms	X	X

LOGANIACEAE		XX	Acacia aneura F.Muell.ex Benth.	X	X
Logania centralis B.J.Conn		X	Acacia aneura F.Muell.ex Benth. var. aneura	X	X
			Acacia aneura F.Muell.ex Benth. var.		
LORANTHACEAE			conifera Randell		X
Amyema fitzgeraldii (Blakely)Danser		X	Acacia aneura F.Muell.ex Benth. var. crebra		
Amyema gibberula (Tate)Danser			Pedley ms	X	
var. gibberula	X	X	Acacia aneura (long-quad)		X
Amyema miquelii (Lehm.ex Miq.)Tiegh.	X	X	Acacia auricoma Maslin	X	
Amyema preissii (Miq.)Tiegh.		X	CONSERVATION STATUS: P3		
Amyema sanguinea (F.Muell.)Danser var.			Acacia ayersiana Maconochie		X
sanguinea	X	X	Acacia basedowii Maiden	X	
Amyema sp.	X		Acacia bivenosa DC.	X	
Lysiana exocarpi (Behr)Tiegh sbsp exocarpi		X			
Acacia coriacea DC. subsp. sericophylla			Eremophila gilesii F.Muell. subsp. gilesii ms	X	X
(F.Muell.)R.S.Cowan Maslin	X		Eremophila glabra (R.Br.)Ostenf. subsp.		
Acacia calcicola Forde & Ising		X	glabra ms	X	X
Acacia cuthbertsonii Luehm. cuthbertsonii	X	X	Eremophila goodwinii F.Muell. subsp.		
Acacia dictyophleba F.Muell.	X	X	goodwinii	X	
Acacia estrophiolata F.Muell.	X	X	Eremophila hughesii F.Muell. subsp.		
Acacia helmsiana Maiden		X	hughesii	X	
Acacia hilliana Maiden in Ewart &			Eremophila latrobei subsp. "unsorted"		X
O.B.Davies	X		Eremophila latrobei F.Muell.	X	X
Acacia inaequilatera Domin		X	Eremophila latrobei F.Muell. subsp. latrobei	X	X
Acacia kempeana F.Muell.	X	X	Eremophila linearis Chinnock		X
Acacia ligulata A.Cunn.ex Benth.	X	X	Eremophila longifolia (R.Br.)F.Muell.	X	X
Acacia macdonnelliensis subsp.			Eremophila pachomai Chinnock ms	X	X
teretifolia Maslin	X	X	Eremophila platythamnos Diels subsp.		
Acacia ? macdonnelliensis Maconochie	X		exotrachys (Kraenzlin)Chinnock ms		X
Acacia maitlandii F.Muell.	X	X	Eremophila sp.	X	
Acacia minutifolia F.Muell.	X		Eremophila willsii subsp. "unsorted"	X	
Acacia minyura Randell	X	X	Eremophila willsii F.Muell. subsp. integrifolia		
Acacia monticola J.M.Black	X	X	(Ewart)Chinnock ms	X	X
Acacia murrayana F.Muell.ex Benth.	X		Eremophila willsii F. Muell. subsp. willsii	X	
Acacia nyssophylla F.Muell.		X	Myoporum montanum R.Br.		X
Acacia aff. olgana (P125)		X			
Acacia oswaldii (Narrow phyllode variant)		X	MYRTACEAE		
Acacia pachyacra Maiden & Blakely	X	X	Baeckea polystemonea F.Muell.	X	
Acacia paraneura Randell	X	X	Calytrix carinata Craven	X	
Acacia prainii Maiden	X	X	Corymbia aparrerinja K.D.Hill &		
Acacia pruinocarpa Tindale	X	X	L.A.S.Johnson	X	
Acacia ramulosa (podded)		X	Corymbia candida subsp. dipsodes K.D.Hill		
Acacia rhodophloia Maslin	X		& L.A.S.Johnson		X
Acacia sp.	X		Corymbia chippendalei (D.J.Carr &		

Acacia spondylophylla F.Muell.	X		S.G.M.Carr) K.D.Hill & L.A.S.Johnson	X	X
Acacia stowardii Maiden	X		Corymbia eremaea subsp. oligocarpa		
Acacia ? stowardii Maiden	X		(Blakely & Jacobs)K.D.Hill & L.A.S.Johnson	X	X
Acacia strongylophylla F.Muell.	X		Corymbia eremaea (D.J.Carr & S.G.M.Carr)		
Acacia subtessarogona Tindale & Maslin	X		K.D.Hill & L.A.S.Johnson subsp. eremaea		X
Acacia tetragonophylla F.Muell.	X	X	Corymbia aff. ferriticola	X	
Acacia validinervia Maiden & Blakely	X	X	Corymbia ferriticola (Brooker & Edgecombe)		
Acacia victoriae Benth.in T.Mitch.		X	K.D.Hill & L.A.S.Johnson	X	
			Corymbia ferriticola (Brooker & Edgecombe)		
MOLLUGINACEAE	XX		K.D.Hill & L.A.S.Johnson subsp. sitiens		X
Mollugo cerviana (L.)Ser.	X		Corymbia lenziana (D.J.Carr & S.G.M.Carr)		
			K.D.Hill & L.A.S.Johnson	X	X
MORACEAE			Corymbia opaca (D.J.Carr & S.G.M.Carr)		
Ficus platypoda (Miq.)A.Cunn.ex Miq.			K.D.Hill & L.A.S.Johnson	X	X
var. minor Benth.	X	X	Corymbia punkapitiensis K.D.Hill		
			& L.A.S.Johnson TYPE STATUS: ISO	X	
MYOPORACEAE			Corymbia terminalis (F.Muell)K.D.Hill		
Eremophila elderi F.Muell.	X		& L.A.S.Johnson		X
Eremophila battii F.Muell.		X	Eucalyptus camaldulensis Dehnh.	X	
Eremophila clarkei A.F.Oldfield & F.Muell.		X	Eucalyptus concinna Maiden & Blakely		X
Eremophila forrestii F.Muel. sbsp.			Eucalyptus eremicola Boomsma		X
forrestii ms	X	X	Eucalyptus gamophylla F.Muell.	X	X
Eremophila gibsonii F.Muell.	X	X	Eucalyptus gillenii Ewart & L.Kerr	X	
Eucalyptus glomerosa Brooker & Hopper		X	Indigofera helmsii Peter G.Wilson		X
Eucalyptus intertexta R.T.Baker		X	Isotropis centralis Maconochie	X	X
Eucalyptus kingsmillii Maiden & Blakely			Isotropis winneckei F.Muell.	X	
subsp. kingsmillii		X	CONSERVATION STATUS: P1		
Eucalyptus lucasii Blakely		X	Kennedia prorepens (F.Muell.)F.Muell.	X	X
Eucalyptus mannensis Boomsma	X	X	Leptosema chambersii F.Muell.	X	X
Eucalyptus mannensis Boomsma subsp.			Lotus cruentus Court	X	
mannensis	X		Mirbelia ramulosa (Benth.)C.A.Gardner	X	
Eucalyptus obtusa (Blakely)L.A.S.Johnson			Mirbelia viminalis (Benth.)C.A.Gardner	X	
& K.D.Hill ms	X	X	Muelleranthus stipularis (J.M.Black)A.T.Lee	X	
Eucalyptus oldfieldii F.Muell.		X	Swainsona acuticarinata (A.T.Lee)		
Eucalyptus oxymitra Blakely	X	X	Joy Thomps.		X
Eucalyptus sessilis (Maiden)Blakely	X		Swainsona affinis (A.T.Lee)Joy Thomps.	X	X
Eucalyptus socialis F.Muell.ex Miq.	X	X	Swainsona formosa (G.Don)Joy Thomps.		X
Eucalyptus sp.		X	Swainsona leeana J.Z.Weber		X
Eucalyptus sparsa Boomsma		X	Swainsona microphylla A.Gray	X	X
CONSERVATION STATUS: P3			Swainsona oroboides F.Muell.ex Benth.		X
Eucalyptus striaticalyx W.Fitzg.		X	Swainsona phacoides Benth.in T.Mitch.	X	

Eucalyptus trivalvis Blakely	X	X	Swainsona tenuis E.Pritz.	X	X
Eucalyptus victrix L.A.S.Johnson & K.D.Hill	X	X	Swainsona unifoliolata F.Muell.		
Melaleuca dissitiflora F.Muell.	X	X	TYPE STATUS: ISO		X
Melaleuca glomerata F.Muell.		X	Swainsona villosa J.M.Black	X	
Melaleuca fulgens R.Br. subsp. fulgens	X		Templetonia egena (F.Muell.)Benth.	X	
Melaleuca uncinata R.Br.		X	Tephrosia sphaerospora F.Muell.		X
Micromyrtus flaviflora (F.Muell.)F.Muell. ex J.M.Black	X		Tephrosia supina Domin	X	
Micromyrtus hymenonema (F.Muell.) C.A.Gardner	X		PITTOSPORACEAE		
Thryptomene maisonneuvei F.Muell.	X	X	Pittosporum phylliraeoides DC. var. microcarpa S.Moore	X	X
NYCTAGINACEAE		XX	PLANTAGINACEAE		XX
Boerhavia burbidgeana Hewson		X	Plantago drummondii Decne.		X
Boerhavia coccinea Mill.		X	Plantago sp.		X
Boerhavia repleta Hewson		X			
Boerhavia schomburgkiana Oliv.		X	POACEAE		
Boerhavia sp.		X	Amphipogon caricinus F.Muell.	X	
			Aristida capillifolia Henrard		X
PAPILIONACEAE (FABACEAE)			Aristida contorta F.Muell.	X	X
Crotalaria cunninghamii R.Br.		X	Aristida holathera Domin var. holathera	X	X
Crotalaria eremaea F.Muell. subsp. strehlowii (E.Pritzel) A.T.Lee	X		Aristida inaequiglumis Domin	X	
			Aristida obscura Henrard	X	
Cullen australasicum (Schltdl.) J.W.Grimes ms	X		Astrebla pectinata (Lindl.)F.Muell.ex Benth.		X
			Austrodanthonia sp.		X
Cullen pallidum (N.T.Burb.)J.W.Grimes		X	Austrostipa scabra subsp. "unsorted"		X
Daviesia grahamii Ewart & Jean White		X	Bothriochloa ewartiana (Domin)C.E.Hubb.	X	
Gastrolobium brevipes Crisp	X		Cenchrus ciliaris L.		X
Gastrolobium sp.	X		Cenchrus echinatus L.	X	
Glycine canescens F.J.Herm.	X	X	Cymbopogon bombycinus (R.Br.)Domin		X
Glycine clandestina Willd.	X		Cymbopogon obtectus S.T.Blake	X	X
Gompholobium polyzygum F.Muell.		X	Dactyloctenium radulans (R.Br.)P.Beauv.	X	X
Indigofera australis Willd.		X	Dichanthium sericeum (R.Br.)A.Camus		X
Indigofera brevidens Benth.in T.Mitch.	X		Dichanthium sericeum (R.Br.)A.Camus		
Indigofera georgei E.Pritz.	X		subsp. humilius (J.M.Black)B.K.Simon		X
Dichanthium sericeum (R.Br.)A.Camus			Triodia scariosa N.T.Burb.		X
subsp. sericeum		X	Triodia schinzii (Henrard)Lazarides	X	X
Digitaria ammophila (F.Muell.)Hughes	X		Triodia spicata N.T.Burb.	X	
Digitaria brownii (Roem.& Schult.)Hughes	X	X	Tripogon loliiformis (F.Muell.)C.E.Hubb.	X	X
Enneapogon caerulescens (Gaudich.) N.T.Burb.		X	Triraphis mollis R.Br.	X	X
Enneapogon caerulescens (Gaudich.) N.T.Burb. var. caerulescens		X	Urochloa piligera (F.Muell.ex Benth.) R.D.Webster		X
Enneapogon cylindricus N.T.Burb.		X	PODAXACEAE		XX
Enneapogon intermedius N.T.Burb.	X		Podaxis pistillaris (L.:Pers.) Morse		X
Enneapogon polyphyllus (Domin)N.T.Burb.	X	X			

Enteropogon acicularis (Lindl.)Lazarides	X	X	POLYGALACEAE	XX	
Eragrostis cumingii Steud.	X		Comesperma viscidulum F.Muell.	X	
Eragrostis dielsii Pilg.ex Diels & E.Pritz.	X	X	CONSERVATION STATUS: P2		
Eragrostis eriopoda Benth.	X	X			
Eragrostis exigua Lazarides ms	X		PORTULACACEAE		XX
Eragrostis falcata (Gaudich.)Steud.	X		Calandrinia sp.		X
Eragrostis laniflora Benth.	X	X			
Eragrostis leptocarpa Benth.	X		PROTEACEAE		
Eragrostis parviflora (R.Br.)Trin.	X		Grevillea berryana Ewart & Jean White	X	
Eragrostis sp.	X		Grevillea eriostachya Lindl.	X	X
Eragrostis setifolia Nees		X	Grevillea juncifolia Hook. subsp. juncifolia	X	X
Eragrostis speciosa (Roem.& Schult.)Steud.	X		Grevillea pterosperma F.Muell.	X	
Eragrostis xerophila Domin		X	Grevillea stenobotrya F.Muell.		X
Eriachne aristidea F.Muell.	X	X	Grevillea sp.Rawlinson Range		
Eriachne mucronata R.Br.	X	X	(J.M.Bechervaise & J.Kelso 125)	X	
Eriachne mucronata (arid form) R. Br.	X		CONSERVATION STATUS: P1		
Eulalia aurea (Bory)Kunth	X	X	Grevillea stenobotrya F.Muell.	X	
Iseilema membranaceum (Lindl.)Domin		X	Grevillea striata R.Br.	X	
Neurachne lanigera S.T.Blake		X	Grevillea wickhamii Meisn. subsp. aprica		
CONSERVATION STATUS: P1			McGill.	X	
Monachather paradoxus Steud.		X	Hakea chordophylla F.Muell.	X	
Panicum decompositum s.str.	X	X	Hakea lorea (R.Br.)R.Br. subsp. suberea		
Paractaenum refractum (F.Muell.) R.D.Webster		X	(S.Moore) W.R.Barker ms Hakea minyma Maconochie	X X	X
Paraneurachne muelleri (Hack.)S.T.Blake	X	X	Hakea rhombales F.Muell.	X	
Paspalidium basicladum Hughes		X	Hakea sp.	X	
Paspalidium clementii (Domin)C.E.Hubb.	X	X			
Paspalidium constrictum (Domin)C.E.Hubb.	X		RHAMNACEAE		
Paspalidium reflexum R.D.Webster		X	Stenanthemum petraeum Rye	X	X
Perotis rara R.Br.	X				
Setaria dielsii R.A.W.Herrm.in Rosen		X	RUBIACEAE	XX	
Themeda avenacea (F.Muell.) Hack.			Pomax sp.desert(A.S.George 11968)	X	
ex Maiden & Betche		X	Psydrax suaveolens (S.Moore)		
Themeda triandra Forssk.	X	X	S.T.Reynolds ms	X	
Thyridolepis mitchelliana (Nees)S.T.Blake	X		Synaptantha tillaeacea (F.Muell.) Hook.f.		
Tragus australianus S.T.Blake	X	X	var. tillaeacea	X	
Triodia basedowii E.Pritz.	X	X			
Triodia epactia S.W.L.Jacobs		X	SAPINDACEAE		
Triodia helmsii (C.E.Hubb.)Lazarides		X	Diplopeltis stuartii F.Muell. var. stuartii	X	
Triodia irritans R.Br.		X	Dodonaea viscosa Jacq. subsp.		
Triodia melvillei (C.E.Hubb.)Lazarides	X	X	angustissima (DC.) J.G.West	X	X
Triodia pungens R.Br.	X	X			
Dodonaea viscosa Jacq. subsp. mucronata			Commersonia melanopetala F.Muell.	X	
J.G.West	X	X	Keraudrenia integrifolia Steud.	X	X
			Keraudrenia nephrosperma (F.Muell.)Benth.		X
SANTALACEAE			Rulingia kempeana		

			(F.Muell.)F.Muell.ex		
Anthobolus leptomerioides F.Muell.	X			X	
			J.M.Black		
Santalum acuminatum (R.Br.)A.DC.	X	X	Rulingia loxophylla F.Muell.	X	X
Santalum lanceolatum R.Br.	X	X	Rulingia luteiflora E.Pritz.	X	
			Rulingia sp.	X	
SCLERODERMATACEAE (Fungus)	XX				
Pisolithus tinctorius (Mich.: Pers.)			STYLIDIACEAE	XX	
Coker & Couch	X		Stylidium inaequipetalum J.M.Black	X	
SCROPHULARIACEAE		XX	THYMELIACEAE		XX
Stemodia sp.		X	Pimelea ammocharis F.Muell.		X
			Pimelea trichostachya Lindl.		X
SOLANACEAE					
Anthotroche pannosa Endl.		X	TILIACEAE	XX	
Duboisia hopwoodii (F.Muell.)F.Muell.	X	X	Triumfetta maconochieana Halford	X	
Nicotiana benthamiana Domin	X				
Nicotiana excelsior (J.M.Black)J.M.Black	X		TULOSTOMATACEAE	XX	
Nicotiana occidentalis H.-M.Wheeler subsp.			Tulostoma sp.	X	
obliqua N.T.Burb.	X	X			
Nicotiana rosulata (S.Moore)Domin subsp.			TYPHACEAE	XX	
rosulata		X	Typha domingensis Pers.	X	
Nicotiana rosulata (S.Moore)Domin subsp.					
ingulba (J.M.Black) P.Horton	X		URTICACEAE	XX	
Nicotiana simulans N.T.Burb.		X	Parietaria cardiostegia Greuter	X	
Nicotiana velutina H.-M.Wheeler		X			
Solanum centrale J.M.Black	X	X	VERBENACEAE	XX	
Solanum chippendalei Symon	X	X	Clerodendrum floribundum R.Br.	X	
Solanum cleistogamum Symon	X	X	Clerodendrum floribundum R.Br. var.		
Solanum coactiliferum J.M.Black	X	X	coriaceum	X	
			Moldenke		
Solanum ellipticum R.Br.	X	X			
Solanum ellipticum sens. lat. R. Br.		X	VIOLACEAE	XX	
Solanum gilesii Symon	X		Hybanthus aurantiacus (F.Muell.ex Benth.)		
Solanum lasiophyllum Dunal ex Poir.in Lam.	X	X		X	
			F.Muell.		
Solanum orbiculatum Dunal ex Poir. subsp.					
macrophyllum Symon	X		ZYGOPHYLLACEAE		
Solanum orbiculatum Poir. subsp.			Tribulus astrocarpus F.Muell.		X
orbiculatum		X	Tribulus eichlerianus K.L.Wilson ms	X	
Solanum petrophilum F.Muell.	X	X	Tribulus macrocarpus F.Muell.ex Benth.	X	
Solanum sturtianum F.Muell.	X	X	Tribulus occidentalis R.Br.in Sturt		X
			Tribulus sp.		X
STACKHOUSIACEAE			Tribulus terrestris L.	X	X
Macgregoria racemigera F.Muell.		X	Zygophyllum compressum J.M.Black	X	
Stackhousia megaloptera F.Muell.	X	X	Zygophyllum eichleri R.M.Barker		X
Stackhousia sp.		X	Zygophyllum eremaeum (Diels)Ostenf.		X
			Zygophyllum iodocarpum F.Muell.	X	X
STERCULIACEAE			Zygophyllum simile H.Eichler		X
Brachychiton gregorii F.Muell.	X	X	Zygophyllum tesquorum J.M.Black		X

Notes: N = taxon occurs in the northern ranges
S = taxon occurs in the southern ranges
XX = family recorded only in region indicated

9.2 Appendix 2: Reptiles and frogs recorded in WA Central Ranges

Note: for various reasons, different sources give different names, sources used and how they vary are indicated at the end of each section.

Frogs: (from Cogger (1979) and Tyler et.al. (1984))

** Cyclorana australis*
 # Cyclorana platycephalus water-holding frog
 # C. maini
 # Limnodynastes spenceri
Neobatrachus centralis trilling frog
N. sutor shoemaker frog
** N. wilsmorei*
Notaden nichollsi desert spadefoot toad
#Kankanophryne occidentalis
orange-crowned toadlet
 # Litoria gilleni ?? centralian tree frog
 # L. rubella desert tree frog

Notes:
* = names found in Tyler et.al (1984), but not in Cogger (1979).
# = names found in Cogger but not in Tyler etal

Reptiles (from Cogger (1979) and Storr etal (1981, 1983, 1986, 1990)

Lizards:

1. Geckos

 # Crenadactylis ocellatus clawless gecko
 # Diplodactylis ciliaris spiny-tailed gecko
D. conspicillatus fat-tailed diplodactylis
D. elderi jewelled gecko
 # D. galeatus ??
 # D. intermedius ?? eastern spiny-tailed gecko
D. pulcher
 # D. squarrosus
D. stenodactylus
D. strophurus ??
 # D. taeniata ??
 # D. tessellatus
 # Gehyra pilbara pilbara dtella
 # G. punctata spotted dtella
** G. purpurascens*
G. variegata tree dtella
Heteronotia binoei bynoe's gecko
 # H. spelea desert cave gecko
 # Lucasium damaeum bearded gecko
 # Nephrurus asper
N. laevissimus
N. levis
N. vertebralis (*unconfirmed, Warburton)
 # Oedura marmorata marbled velvet gecko
Rhynchoedura ornata beaked gecko

2. Legless lizards

Delma australis
 # D. borea
D. nasuta
 # D. tincta
 # Lialis burtonis Burton's snake-lizard
Pygopus nigriceps hooded scaly-foot

Notes:
* = names found in Storr et.al. (1990) but not Cogger (1979)
# = names found in Cogger but not in Storr etal

3. Dragons and monitors

*# Amphibolurus [= * Ctenophorus]*
*A. [*C.] caudicinctus* ring-tailed dragon
*# A. [*C.] clayei*
**C. inermis*
*# A. [*C.] isolepis* military dragon
 # A. minor dwarf beardeddragon
 # A. mitchelli
NB [* *Pogona minor* combines: *# A. minor, # A. mitchellii* and *A. minimus*]
 # A. nuchalis central netted dragon
 # A. pictus painted dragon
*# A. [*C.] reticulatus* western netted dragon
 # A. rufescens
 # A. scutulatus lozenge-marked dragon
 # Caimanops amphiboluroides
Diporiphora lalliae
D. winneckei
*Lophognathus [= *Gemmatophora]*
*# L. [*G] longirostris*
Moloch horridus thorny devil
Tympanocryptis cephalus
 # T. intima
T. lineata
 # T. tetraporophora
Varanus acanthurus ridge-tailedmonitor
 # V. brevicauda
V. eremius
V. giganteus perentie
V. gilleni pygmy mulga monitor
V. gouldii Gould's goanna / sand monitor
V. tristis

Notes:
* = names found in Storr et.al. (1983) but not Cogger (1979)
# = names found in Cogger but not in Storr etal

4. Skinks

Carlia triacantha
 # Cryptoblepharus boutonii
C. plagiocephalus
Ctenotus alacer
C. ariadnae
C. brooksi
C. calurus
C. collettii
C. dux
C. grandis
** C. hanloni*
C. helenae
C. leonhardii
C. pantherinus
C. piankai
C. quattuordecimlineatus
 # C. saxatilis

C. schomburgkii
 # C. tanamiensis
C. uber
Egernia depressa
E. inornata desert skink
E. kintorei great desert skink
 # E. margaretae
 # E. slateri
 # E. stokesii gidgee skink
E. striata
Lerista bipes
L. desertorum
** L. ips*
 # L. frosti
 # L. labialis
L. muelleri
Menetia greyi
Morethia boulengeri
** M. ruficauda*
 # M. taeniopleura fire-tailed skink
 # Notoscincus ornatus
** Omolepida branchialis*
 # Proablepharus reginae
*# Sphenomorphus [= * Eremiascincus ?]*
S. [E.] fasciolatus narrow-banded sand swimmer
S.[E.] richardsonii broad-banded sand swimmer
 # Tiliqua branchialis
T. multifasciata centralian blue-tongued lizard
 # T. occipitalis western blue-tongued lizard

Notes:
* = names found in Storr et.al. (1981) but not Cogger (1979)
# = names found in Cogger but not in Storr etal

Snakes:
Acanthophis pyrrhus desert death adder
Aspidites ramsayi woma python
Demansia psammophis yellow-faced whip-snake
 # Denisonia punctata little spotted snake
 # Furina diadema red-naped snake
** F. ornata* moon snake
 # Liasis childreni childrens python
 # Morelia spilotes carpet or diamond python
** M. stimsonii* Stimson's python
 # Neelaps bimaculatus western black-naped snake
Pseudachis australis mulga or king-brown snake
Pseudonaja modesta ringed brown snake
P. nuchalis western brown snake or gwardar
** Ramphotyphlops endoterus* blind snake
 # Simoselaps [= Vermicalla]*
 # S. [V.] bertholdi* desert bandedsnake
 # S. [V.] fasciolatus* narrow-banded snake
 # S. [V.] semifasciatus* half-girdled snake or * southern shovel-nosed snake
 # Suta suta myall or curl snake
*Typhlina [= * Ramphotyphlops??]*
 # T. australis
 # T. bituberculata
T. endotera [R. endoterus* (see above)*]*
 # T. nigroterminata
*Unechis [= * Rhinoplocephalus ?]*
 # U. [R.] monachus* hooded snake or * monk snake
 # Vermicella annulata bandy-bandy

Notes:
* = names found in Storr et.al. (1986) but not Cogger (1979)
# = names found in Cogger but not in Storr etal

9.3 Appendix 3: Mammals: Central Ranges species, distribution, status and abundance

(compiled from Burbidge & Fuller 1979, Burbidge et.al. 1988 and Strahan 1983 by Morse 1999)

Latin name	Common name	St	?	@	#	X	??	R	S
1. MONOTREME									
Tachyglosus aculeatus	short-beaked echidna							W	C
2. MARSUPIALS									
Dasyurus geoffroii	western quoll	3		@				N	R, S
Dasycercus cristicauda	mulgara	5						E	R, W
Pseudantechinus macdonnellensis	fat-tailed antechinus							E	C, W
Phascogale colura	red-tailed phascogale	2	?					E	C, L
Sminthopsis ooldea	Ooldea dunnart							E	C, N
S. longicaudata	long-tailed dunnart				#			B	R, S
S. psammophila	sandhill dunnart	2			#			E	R, S
S. crassicaudata	fat-tailed dunnart							B	C, W
S. macroura	stripe-faced dunnart							I	S, W
S. hirtipes	hairy-footed dunnart							E	S, W
Ningaui ridei	wongi ningaui							E	C,W
Antchinomys laniger	kultarr							E	R, S, W
Myrmecobius fasciatus	numbat			@				N	R, S, N
Notoryctes typhlops	marsupial mole	4						E	C, W
Isoodon auratus	golden bandicoot	3		@				N	C, L, N
Perameles eremiana	desert bandicoot	3				X		E	
Chaeropus escaudatus	pig-footed bandicoot					X		B	
Macrotis lagotis	greater bilby	5	?					I	R, S
M. leucura	lesser bilby			@					X
Trichosaurus vulpecula	brushtail possum		?					C	A, W
Bettongia penicillata	brush-tailed bettong	7		@				N	R, S,. L
B. lesueur	burrowing bettong	3		@				O	R, L
Lagorchestes conspicillatus	spectacled hair-wallaby			@				B	U, S, W
L. hirsutis	rufous hare-wallaby	1		@				E	R, S
L. asomatus	central hare-wallaby			@		X?		E	X or R, N
Onychogalea lunata	crescent nailtail wallaby	6				X		E	
Petrogale lateralis	black-footed rock-wallaby	5						E	R, S, W
Macropus robustus	walleroo, euro							W	A
M. rufus	malu. red kangaroo							W	A
2. PLACENTALS									
Bats									
Macroderma gigas	ghost bat	5						B	R, S
Tophozous georgianus	common sheathtail-bat							B	C, W
T. flaviventris	yellow-bellied sheathtail-bat							B	R, W
T. hilli	Hill's sheathtail-bat							E	U - C, W
Tadarida australis	white-striped mastiff-bat							B	U - C, W
Mormopterus planiceps	little mastiff-bat							B	C, W
Nyctophilus geoffroyi	lesser long-eared bat							W	A
Chalinolobus gouldii	Gould's wattled-bat							W	A
Nycticeius greyii	little broad-nosed bat							W	C
N. balstoni	western broad-nosed bat							W	C

Eptesicus pumilus	little cave eptesicus							B	A, W
E. vulturnus	little forest eptesicus							B	C, W
Mice and Rats									
Zyzomys pedunculatus	central rock-rat	1					??	E	R, S, N
Pseudomys australis	plains rat	5					??	B	U, S, N
P. desertor	desert mouse							E	R, S, N
P. hermannsburgensis	sandy inland mouse							B	C, W
P. fieldi	Alice Springs mouse	6					??	E	X or R, N
Leggadina forresti	Forrest's mouse							B	U, S, W
Leporillus conditor	greater stick-nest rat	3					??	O	R, L, N
L. apicalis	lesser stick-nest rat					X		B	
Notomys alexis	spinifex hopping-mouse							B	C, W
N. fuscus	dusky hopping-mouse	3					??	E	R, S, N
N. longicaudatus	long-tailed hopping mouse					X	??	E	X or R, N
Rattus villosissimus	long-haired rat		?					B	U, S, W
Mus musculus	house mouse							W	A
Other Species									
Oryctolagus cuniculus	rabbit							W	A
Canis familiaris dingo	dingo							W	C
Vulpes vulpes	fox							W	A
Felis catus	feral cat							W	A
Camelus dromedarius	one-humped camel							E	A, N-W

Notes:

St = Conservation status listed by ESP, ANZECC or ESAC:

1 - Endangered by ESP and ESAC, Priority A by ANZECC, 2 - Endangered by ESP and ESAC,
Priority B by ANZECC, 3 - Endangered by ESP and ESAC, 4 - Endangered by ESP, Priority B by ANZECC 5 - Vulnerable by ESP and ESAC, 6 - Endangered by ESP, 7 - Endangered by ESAC

? = sp. may occur in pockets - range and abundance reduced; occurred in the area in living memory.

@ = sp. once occurred in the area, now occurs only elsewhere.

=species may occur in area - poorly known or rare and scattered, insufficient infomation to rule it out.

?? = sp. not recorded in the area, but occurs, or once occurred, in nearby arid areas.

R = Range :

E = species endemic to the inland (range not, or only just, extending to the coast)
B = (bimodal) range includes significant coastal as well as inland areas
C = (Brushtail possum) range now mostly coastal - sub coastal, once included inland areas
I = range now mainly inland, once included coastal areas
N = range retracted, now narrow and limited in extent, or always limited
O = confined to off-shore islands, once included areas of inland
W= widely distributed throughout all or most of the country

S = Current status:

Abundance; A = abundant , C = common, U = uncommon, R = rare, X = presumed extinct
Pattern; S = sparse, very scattered and/or patchy throughout range,
L = localised into small areas or specific habitat
W = for bimodals and inland endemics - broad inland range
N = for bimodals and inland endemics - narrow inland range

9.4 Appendix 4: Gibson Desert Bird sightings from the 2001 Birds Australia survey

(supplied by Andrew Silcocks, Birds Australia - The Atlas of Australian Birds).

Species Number	Common name	Scientific name	No of sightings
11	Brown Quail	Coturnix ypsilophora	1
211	Grey Teal	Anas gracilis	2
215	Hardhead	Aythya australis	2
61	Australasian Grebe	Tachybaptus novaehollandiae	7
62	Hoary-headed Grebe	Poliocephalus poliocephalus	3
100	Little Pied Cormorant	Phalacrocorax melanoleucos	2
97	Little Black Cormorant	Phalacrocorax sulcirostris	1
188	White-faced Heron	Egretta novaehollandiae	5
189	White-necked Heron	Ardea pacifica	3
187	Great Egret	Ardea alba	2
180	Straw-necked Ibis	Threskiornis spinicollis	3
232	Black-shouldered Kite	Elanus notatus	3
231	Black-breasted Buzzard	Hamirostra melanosternon	2
228	Whistling Kite	Haliastur sphenurus	3
218	Spotted Harrier	Circus assimilis	7
221	Brown Goshawk	Accipiter fasciatus	2
222	Collared Sparrowhawk	Accipiter cirrhocephalus	3
224	Wedge-tailed Eagle	Aquila audax	1
225	Little Eagle	Hieraaetus morphnoides	3
239	Brown Falcon	Falco berigora	14
235	Australian Hobby	Falco longipennis	5
237	Peregrine Falcon	Falco peregrinus	1
240	Nankeen Kestrel	Falco cenchroides	26
59	Eurasian Coot	Fulica atra	4
176	Australian Bustard	Ardeotis australis	4
18	Little Button-quail	Turnix velox	20
146	Black-winged Stilt	Himantopus himantopus	1
143	Red-capped Plover	Charadrius ruficapillus	1
144	Black-fronted Dotterel	Elseyornis melanops	5
132	Red-kneed Dotterel	Erythrogonys cinctus	2
135	Banded Lapwing	Vanellus tricolor	1
173	Australian Pratincole	Stiltia isabella	1
34	Common Bronzewing	Phaps chalcoptera	1
43	Crested Pigeon	Ocyphaps lophotes	3
31	Diamond Dove	Geopelia cuneata	40
273	Galah	Cacatua roseicapilla	1
270	Major Mitchell's Cockatoo	Cacatua leadbeateri	1
274	Cockatiel	Nymphicus hollandicus	3
294	Australian Ringneck	Barnardius zonarius	6
296	Mulga Parrot	Psephotus varius	3
310	Budgerigar	Melopsittacus undulatus	92
304	Bourke's Parrot	Neosephotus bourkii	2
337	Pallid Cuckoo	Cuculus pallidus	51
342	Horsfield's Bronze-Cuckoo	Chrysococcyx basalis	21
249	Barn Owl	Tyto alba	1
313	Tawny Frogmouth	Podargus strigoides	2
331	Spotted Nightjar	Eurostopodus argus	4
317	Australian Owlet-nightjar	Aegotheles cristatus	1
325	Red-backed Kingfisher	Todiramphus pyrrhopygia	7
532	Splendid Fairy-wren	Malurus splendens	2
536	Variegated Fairy-wren	Malurus lamberti	36
535	White-winged Fairy-wren	Malurus leucopterus	26
528	Rufous-crowned Emu-wren	Stipiturus ruficeps	6

511	Dusky Grasswren	Amytornis purnelli	1
570	Red-browed Pardalote	Pardalotus rubricatus	3
497	Redthroat	Pyrrholaemus brunneus	11
465	Weebill	Smicrornis brevirostris	3
463	Western Gerygone	Gerygone fusca	3
476	Inland Thornbill	Acanthiza apicalis	5
481	Chestnut-rumped Thornbill	Acanthiza uropygialis	4
480	Slaty-backed Thornbill	Acanthiza robustirostris	1
466	Southern Whiteface	Aphelocephala leucopsis	1
469	Banded Whiteface	Aphelocephala nigricincta	4
640	Spiny-cheeked Honeyeater	Acanthagenys rufogularis	90
635	Yellow-throated Miner	Manorina flavigula	10
608	Singing Honeyeater	Lichenostomus virescens	81
621	Grey-headed Honeyeater	Lichenostomus keartlandi	6
623	Grey-fronted Honeyeater	Lichenostomus plumulus	3
625	White-plumed Honeyeater	Lichenostomus penicillatus	4
597	Brown Honeyeater	Lichmera indistincta	3
594	White-fronted Honeyeater	Phylidonyris albifrons	84
589	Black Honeyeater	Certhionyx niger	53
602	Pied Honeyeater	Certhionyx variegatus	63
449	Crimson Chat	Ephthianura tricolor	50
377	Jacky Winter	Microeca leucophaea	1
381	Red-capped Robin	Petroica goodenovii	17
385	Hooded Robin	Melanodryas cucullata	8
445	White-browed Babbler	Pomatostomus superciliosus	13
865	Chiming Wedgebill	Psophodes occidentalis	25
419	Crested Bellbird	Oreoica gutturalis	40
401	Rufous Whistler	Pachycephala rufiventris	25
408	Grey Shrike-thrush	Colluricincla harmonica	10
415	Magpie-Lark	Grallina cyanoleuca	1
361	Grey Fantail	Rhipidura fuliginosa	1
364	Willie Wagtail	Rhipidura leucophrys	75
424	Black-faced Cuckoo-Shrike	Coracina novaehollandiae	8
430	White-winged Triller	Lalage sueurii	8
544	Masked Woodswallow	Artamus personatus	13
546	Black-faced Woodswallow	Artamus cinereus	64
702	Grey Butcherbird	Cracticus torquatus	2
700	Pied Butcherbird	Cracticus nigrogularis	4
705	Australian Magpie	Gymnorhina tibicen	4
691	Little Crow	Corvus bennetti	6
692	Torresian Crow	Corvus orru	1
681	Western Bowerbird	Chlamydera guttata	1
647	Richard's Pipit	Anthus novaeseelandiae	7
653	Zebra Finch	Taeniopygia guttata	74
564	Mistletoebird	Dicaeum hirundinaceum	17
358	White-backed Swallow	Cheramoeca leucosternum	3
359	Tree Martin	Hirundo nigricans	1
360	Fairy Martin	Hirundo ariel	2
509	Rufous Songlark	Cincloramphus mathewsi	16
508	Brown Songlark	Cincloramphus cruralis	13