SITE NAME: **Purnululu National Park**

DATE OF INSCRIPTION: 5th July 2003

STATE PARTY: AUSTRALIA

CRITERIA: N (i)(iii)

DECISION OF THE WORLD HERITAGE COMMITTEE:
Excerpt from the Report of the 27th Session of the World Heritage Committee

Criterion (i): Earth's history and geological features The claim to outstanding universal geological value is made for the Bungle Bungle Range. The Bungle Bungles are, by far, the most outstanding example of cone karst in sandstones anywhere in the world and owe their existence and uniqueness to several interacting geological, biological, erosional and climatic phenomena. The sandstone karst of PNP is of great scientific importance in demonstrating so clearly the process of cone karst formation on sandstone - a phenomenon recognised by geomorphologists only over the past 25 years and still incompletely understood, despite recently renewed interest and research. The Bungle Bungle Ranges of PNP also display to an exceptional degree evidence of geomorphic processes of dissolution, weathering and erosion in the evolution of landforms under a savannah climatic regime within an ancient, stable sedimentary landscape. IUCN considers that the nominated site meets this criterion.

Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance Although PNP has been widely known in Australia only during the past 20 years and it remains relatively inaccessible, it has become recognised internationally for its exceptional natural beauty. The prime scenic attraction is the extraordinary array of banded, beehive-shaped cone towers comprising the Bungle Bungle Range. These have become emblematic of the park and are internationally renowned among Australia's natural attractions. The dramatically sculptured structures, unrivalled in their scale, extent, grandeur and diversity of forms anywhere in the world, undergo remarkable seasonal variation in appearance, including striking colour transition following rain. The intricate maze of towers is accentuated by sinuous, narrow, sheer-sided gorges lined with majestic Livistona fan palms. These and the soaring cliffs up to 250 m high are cut by seasonal waterfalls and pools, creating the major tourist attractions in the park, with evocative names such as Echidna Chasm, and Frog Hole, Piccaninny and Cathedral Gorges. The diversity of landforms and ecosystems elsewhere in the park are representative of the larger region, and lack a unique aesthetic quality, but provide a sympathetic visual buffer for the massif. The powerful aesthetic experience of the Bungle Bungles has aroused huge interest among the public, and the ranges figure prominently in national and international advertising of Australia's tourist attractions, matching the prominence of the Uluru-Kata Tjuta National Park. Photographers and travel writers include the Bungle Bungles among the world's natural wonders, some describing them as Australia's equivalent of the Grand Canyon.

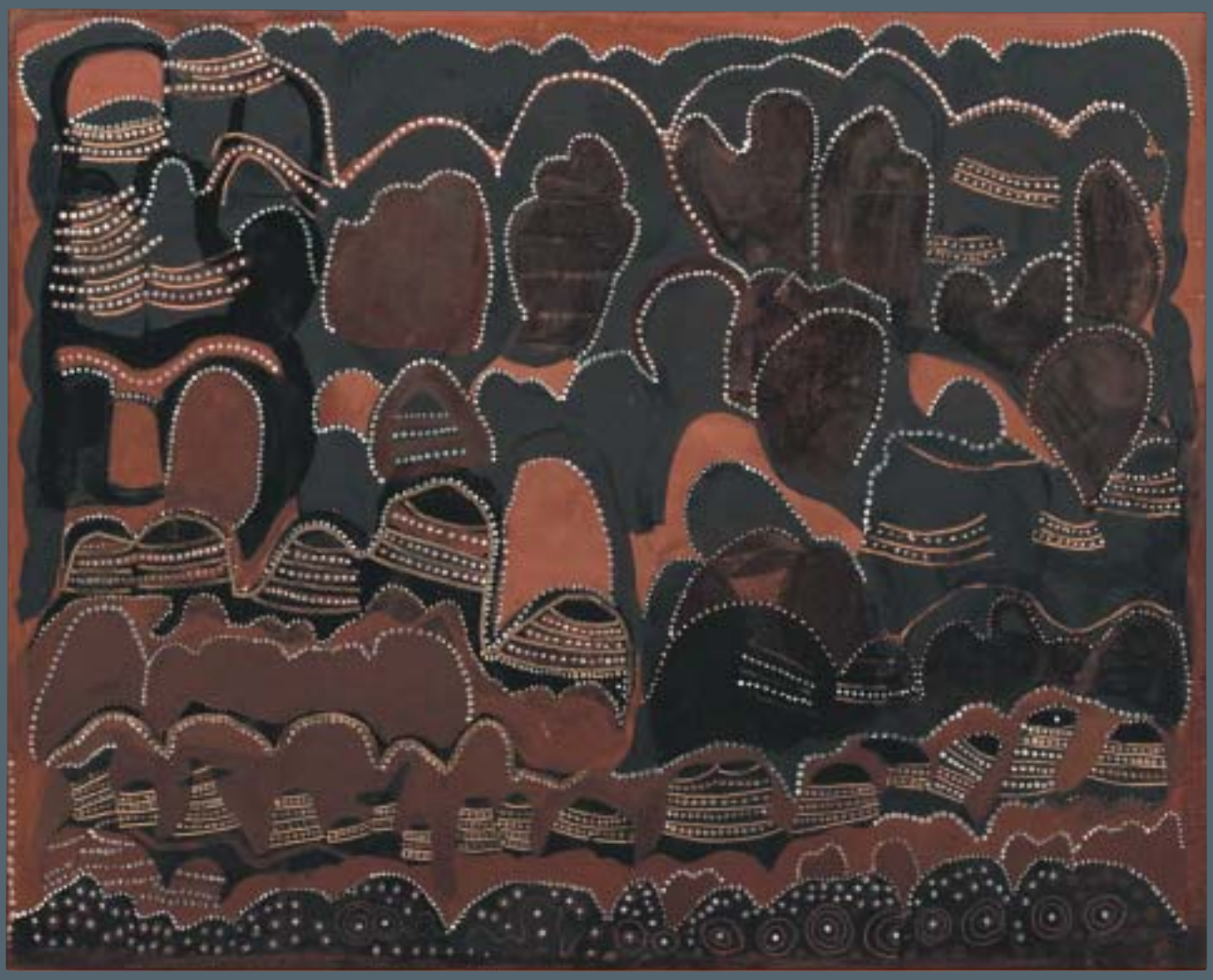
BRIEF DESCRIPTIONS
The 239,723 ha Purnululu National Park is located in the State of Western Australia. It contains the deeply dissected Bungle Bungle Range composed of Devonian-age quartz sandstone eroded over a period of 20 million years into a series of beehive-shaped towers or cones, whose steeply sloping surfaces are distinctly marked by regular horizontal bands of dark-grey cyanobacterial crust (single-celled photosynthetic organisms). These outstanding examples of cone karst owe their existence and uniqueness to several interacting geological, biological, erosional and climatic phenomena.

1.b State, Province or Region: Western Australia

1.d Exact location: S17 30 00.0 E128 30 00.0

Nomination of Purnululu National Park

by the Government of Australia for
Inscription on the World Heritage List



Environment Australia 2002

Cover image

Jack Britten. Kija people, c. 1921

Jack Britten. *Purnululu (Bull Creek Country)*, 1988.

National Gallery of Australia, Canberra. Reproduced courtesy of the Warmun Art Centre.

The spectacular sandstone canyons commonly called the Bungle Bungles, in the East Kimberley. This particular area is the site of a meeting between two ancestral devil figures, one of which lives in a cave in the region.

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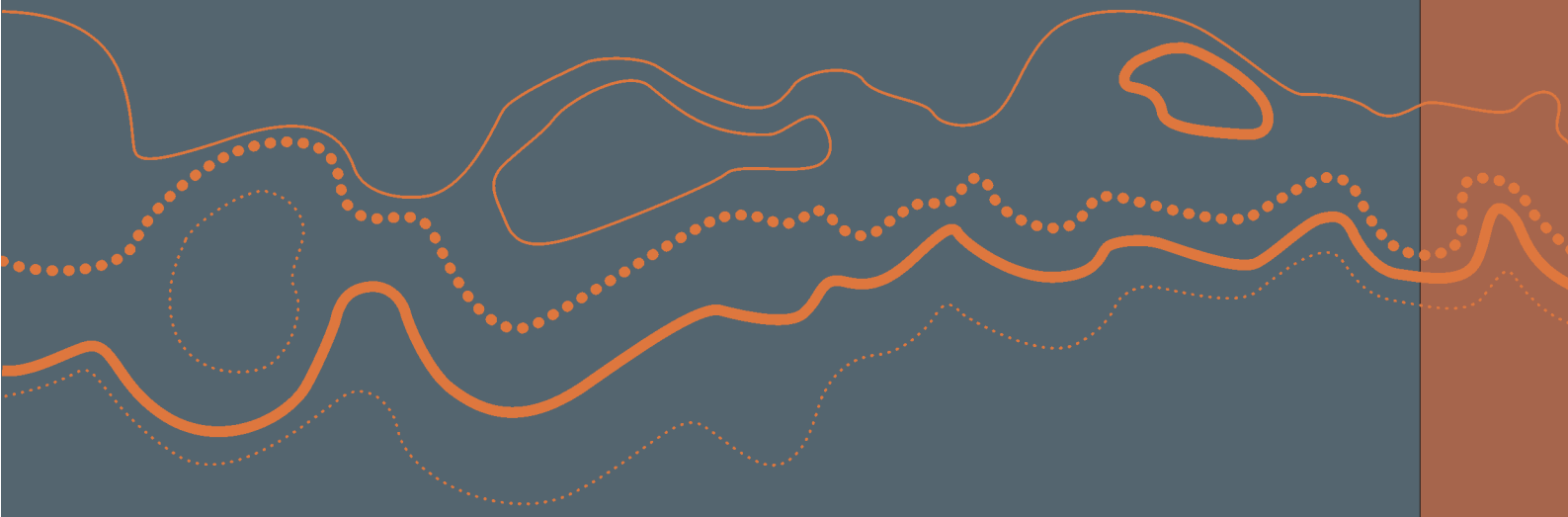
Identification of the property



Parallel joints and fractures splinter the Bungle Bungles near Piccaninny Creek. Photograph: Steve Strike.

1.1 Country

Australia

1.2 State

Western Australia

1.3 Name of the property

Purnululu National Park

1.4 Geographic location of property

Purnululu National Park is located in the East Kimberley Region of the State of Western Australia, in north-western Australia, approximately 300 kilometres by road south of the regional town of Kununurra. The geographic centre of the Park is approximately latitude 17°30′ south and longitude 128°30′ east (Figure 1).

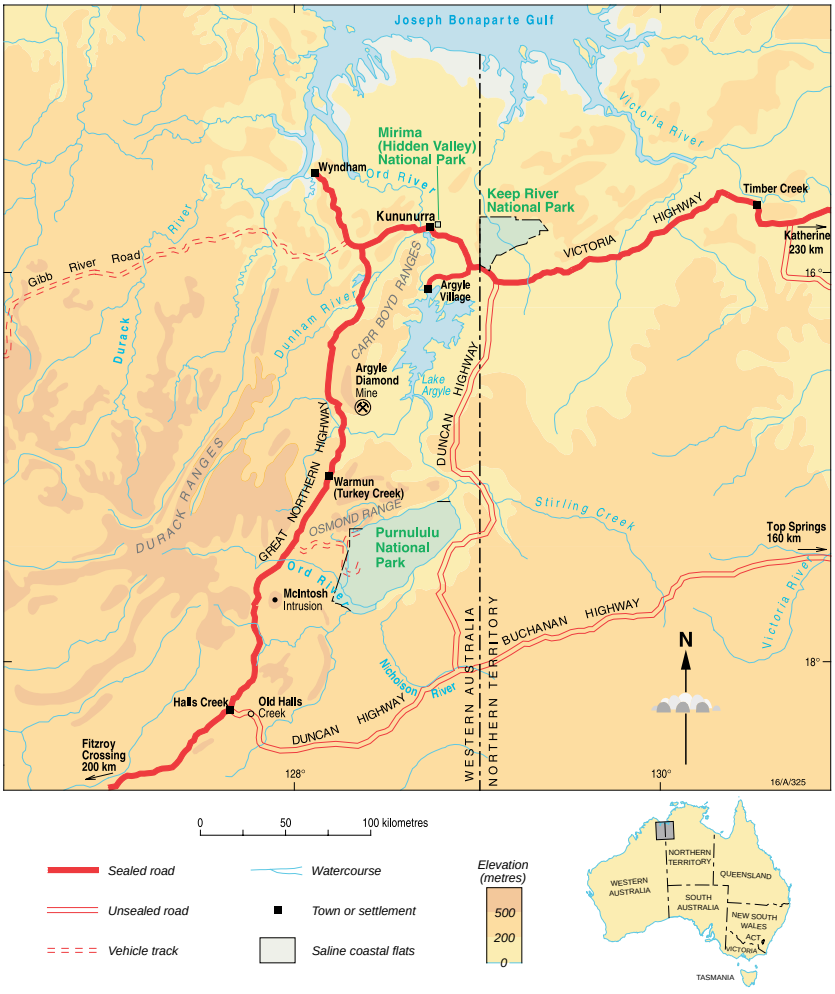


Figure 1: Location of Purnululu National Park. Source: Hoatson and others 1997 (with permission)

1.5 Area proposed for inscription

Purnululu National Park (239 723 hectares) is the proposed area for inscription on the World Heritage List. The adjacent Purnululu Conservation Reserve (79 602 hectares) has nationally significant natural and cultural values and will be managed as a buffer zone to protect and enhance the outstanding values of the Park. These reserves were created on 27th March 1987 by the Western Australian Government. The Ord River forms the southern and eastern boundary of the Park, draining Bellburn Creek and Piccaninny Creek to the south and Red Rock Creek, Osmond Creek and Buchanan Creek to the north. The spectacular gorges, banded domes and towers of the Bungle Bungle Range (approximately 45 000 hectares), are located wholly within Purnululu National Park (Figure 2). The geographical coordinates of the Property are:

17°15'00"–17°46'00" S

128°15'00"–128°55'00" E

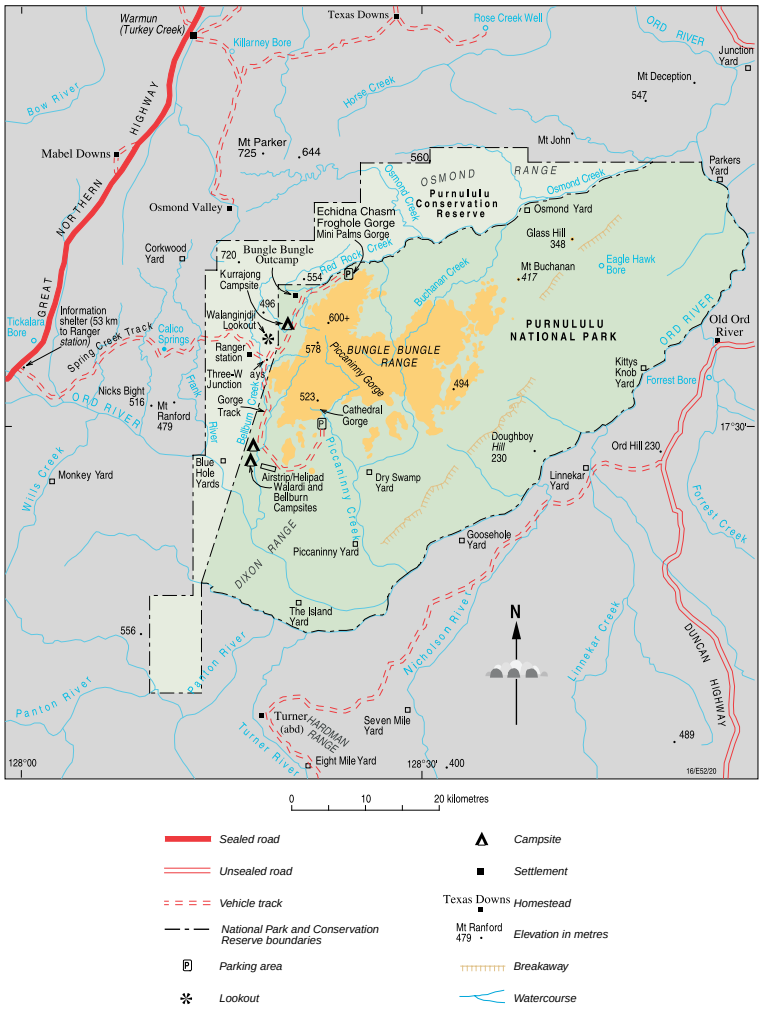


Figure 2: Purnululu National Park. Source: Hoatson and others 1997 (with permission)

Chapter 2
Justification for inscription

Beehive clumps are one of the more distinctive aspects of the range. Photograph: Brendan Read.

2.1 Statement of significance

Purnululu National Park has outstanding universal natural and cultural values.

The landscape has exceptional natural values. Twenty million years of weathering has produced the eroded sandstone towers and banded beehive structures of the Bungle Bungle Range. Dark bands, formed by cyanobacteria, winding horizontally around the domes, contrast with the lighter sandstone. The crusts, which help stabilise and protect the ancient and fragile sandstone towers, are present on a massive scale.

Purnululu sits between the hot dry deserts of Western Australia's arid zone to the south and the better watered monsoonal areas to the north. This transitional zone possesses unique natural and cultural values. A rich mixture of species, some of them endemic, on the edge of their ranges are found here, as is a remarkably diverse range of spinifex species — the spiny grass genus (*Triodia* spp) that dominates Australia's arid zone. The cyanobacterial (single cell photosynthetic organisms) bands crossing the rock surfaces of the Bungle Bungle Range, are adapted to the transitional nature of this area's environment.

In addition to the geomorphic and biological importance of the Park's natural features, the myriad sandstone towers of the Bungle Bungle Range are exceptionally beautiful and inspirational. The orange and grey horizontal banding of the cyanobacteria crust on the towers highlights their aesthetic features.

Aboriginal people have lived in the East Kimberley Region for at least the last 20 000 years. The Park provides exceptional testimony to this hunter-gatherer cultural tradition, particularly its riverine features. Aboriginal people have adapted to this resource rich environment moving between the uplands in the wet season and along the river in the dry, while using intermediate lands in all seasons. Fire has been, and continues to be, an important tool in Aboriginal management of this environment.

Ngarrangkarni is the continuing guiding principle in the living traditions and beliefs of Purnululu's traditional owners. This outstanding example of the Indigenous Australian religious philosophy (popularly known as the 'Dreaming' or the 'Law') has been handed down through countless generations and is still in force today.

The cultural landscape is also significant because its people and traditions have survived to the present despite the impact of colonisation. The culture of the traditional owners of the Park is outstanding in revealing its resilience at a time when such cultures have everywhere become vulnerable under the impact of irreversible change.

The Purnululu National Park, when included on the World Heritage List, will enhance the representativeness of the List and also complement other World Heritage properties in Australia, especially Uluṟu–Kata Tjuṯa National Park and Kakadu National Park.

2.2 Criteria under which inscription is proposed

Purnululu National Park is nominated for inclusion on the World Heritage List for its outstanding universal value in relation to natural criteria (i), (ii) and (iii) in paragraph 44 (a) of the Operational Guidelines (1999) and cultural criteria (iii), (v) and (vi) in paragraph 24 (a).

Under the categories of natural heritage set out in Article 2 of the World Heritage Convention, Purnululu National Park is a site representing:

> *'natural features consisting of physical and biological formations, or groups of such formations, that are of outstanding universal value from the aesthetic or scientific point of view'; and*
>
> *'natural sites, or precisely delineated natural areas, of outstanding universal value from the point of view of science, conservation or natural beauty'.*

Under the categories of cultural heritage set out in Article 1 of the World Heritage Convention, Purnululu National Park is a cultural landscape representing the combined works of nature and man. Purnululu National Park is an organically evolved landscape and also an associative cultural landscape (paragraph 39 iii of the Operational Guidelines 2000).

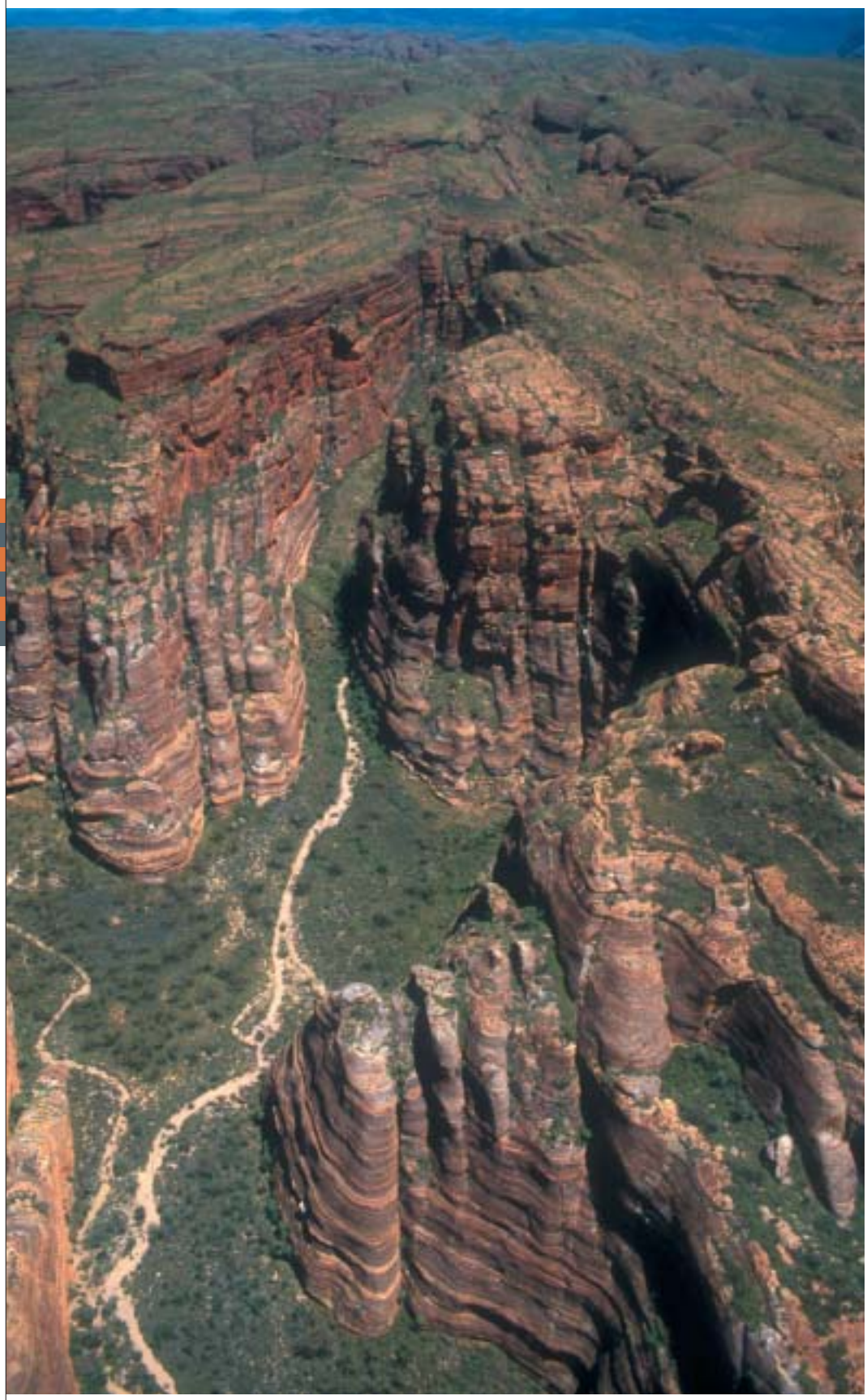
Natural values of Purnululu National Park

Natural criterion (i)

outstanding example representing significant geomorphic or physiographic features

Purnululu National Park, including the Bungle Bungle Range, demonstrates a long record of geological processes and landscape evolution. The Bungle Bungle Range is a plateau, partly bounded by towering cliffs and cut by numerous steep gorges, which is surrounded by an extensive sand plain. Sandstone towers characterise the north-eastern and south-western parts of the Range. Deep gorges are prominent in a dissected summit area in the north-west. High cliffs of the western escarpment mark the western edge of the Range. The towers and cliffs rise to a maximum height of about 250 metres above the surrounding sand plain (Hoatson and others 1997, p. 46).

The Ord River, on the southern and eastern boundaries of the Park, along with several creeks (Bellburn, Piccaninny, Red Rock, Osmond and Buchanan) create a riverine ecosystem that is a vital resource and refuge for people and other species.



Dissected and jointed sandstone in places create deep gorges through the range. Photograph: Tom Keating.

The sandstone towers of the Bungle Bungle Range, provide an outstanding example of the geomorphic process of weathering by wind, rain and flowing water. The biological crusts that wind in dark bands across their surface are essential to the formation of the towers. The crusts, formed by cyanobacteria (single cell photosynthetic organisms), are present on a massive scale and serve to stabilise and protect the ancient sandstone formations.

The towers have been formed over millions of years from sandstone and conglomerate. They were laid down as the intertidal sands and gravel that formed a bay on the shores of the Ord Basin about 360 million years ago (the Paleo-Tethys Ocean, which existed during the Devonian period) (Veevers 2000, p. 275). Much older rocks (of Cambrian age — 550 to 500 million years) encircled these sediments leaving today the limestone that forms a prominent wall on the plain west of the Bungle Bungle Range. Even older rocks (from around 600 million to 1880 million years or more ago) form the hills and ridges that lie beyond the Park in sections of the Conservation Zone and beyond the Zone itself (Hoatson and others 1997, p. 32). The Kimberley region's core is made up of rifted Archean crustal fragments that accreted onto Proterozoic Australia 1865–1850 million years ago (Veevers 2000, p. 132).

The sand and gravel were progressively buried by younger sediments (no longer present) and became compacted to form sandstone and conglomerate (Hoatson and others 1997, p. 42). Around 300 million years ago (Carboniferous), the east Kimberley was uplifted probably by stress caused when the supercontinents of Gondwanaland and Laurussia collided, (Veevers 2000, p. 283). A period of prolonged erosion followed and several kilometres thickness of rock was removed as erosion continued until about 20 million years ago. At this stage, the landscape resembled a low-level undulating plain (Hoatson and others 1997, pp. 42–44).

The last 20 million years (mid Miocene) has seen another dramatic uplift of land in this part of northern Australia, this time caused by convergence of the Indo-Australian Plate and the Pacific Plates, which forms the spine of New Guinea (Veevers 2000, pp. 33, 93). This uplift has led to the Ord River and its tributaries cutting down through the old land surface and carving out the towers, gorges and cliffs of the Bungle Bungle Range. Jointing in the sandstones and conglomerates has been important in forming these features. Water has flowed through the joints to form the gorges and towers we see today (Hoatson and others 1997, p. 44).

The near vertical cliffs and steep sided banded beehives of the Bungle Bungle Range are composed of extremely fragile sandstone that is relatively stable because the individual grains in the sandstone touch and interlock with one another (Hoatson and others 1997, p. 50).

Young (1986), however, describes the thin 'case-hardened skins' occurring on most outcrops. Some of these skins found in Piccaninny Gorge appear to be desert varnish formed during the last major arid phase, which ended 10 000–15 000 years ago. Other skins are forming now where surface holes are being filled with kaolinitic clays. These skins stabilise the rock surface but, once broken, individual sand grains easily disintegrate. Young (1986) notes that:

> there are remarkably few outcrops of the typically white fresh sandstone, and most faces from which surfaces skins have been removed are coated with black or red algae. Algal coatings provide some protection from surface wash, but almost certainly contribute to the chemical breakdown of the rock.

The algal coatings noted by Young are cyanobacteria that form thin biological crusts (biocrusts) giving the distinctive appearance of dark grey horizontal bands that can be traced for kilometres around the beehive landforms. The cyanobacterial bands are up to several metres wide, yet only a few millimetres thick, and alternate with orange bands of iron oxide that also protects the friable sandstone. The cyanobacteria bands at Purnululu National Park contain at least five different species (Hoatson and others 1997, p. 53).

Cyanobacteria are single-celled organisms that represent some of the oldest life forms on Earth. These organisms have been found as fossils in rocks elsewhere in Western Australia that are believed to be up to 3500 million years old. These sometimes nitrogen-fixing and photosynthesising bacteria can also occur in colonies, mats, crusts, stromatolites and mixed species communities, or as symbiotic organisms within fungi in lichens. On the west coast of Western Australia, Shark Bay's stromatolite population is an outstanding representation of these organisms.

While cyanobacteria are well known, what is truly remarkable is the massive scale of the banding. Hundreds of kilometres of bands are stabilising and protecting tens of square kilometres of surface area of friable sandstone in the Bungle Bungle Range (Figure 2).

Somewhere between 300 and 180 million years ago a meteorite apparently struck the Bungle Bungle Range, forming the Piccaninny Circular Structure. The eroded remains of a crater and rocks ejected by the impact forms a structure more than seven kilometres across, which lies in the central part of the Range and has had a considerable effect on the local landforms and drainage. At the time, the sandstone and conglomerate that form the Range were buried beneath younger rocks several kilometres thick (Hoatson and others 1997, pp. 53, 55)

While sandstone towers and cliffs are known from other parts of the world, including some regions within Australia, the spectacular features of the Bungle Bungle Range are unrivalled in terms of their extent, size, variety of shapes and extensive array of cyanobacterial banding. Together, these features provide an outstanding example of geomorphic features contributing to our growing knowledge and understanding of the Earth's history.

Natural criterion (ii)

outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial ecosystems and communities of plants and animals

Purnululu National Park lies in a transition zone between the arid desert environments of central Australia to its south and, to the north, the monsoon savanna environments of northern Australia. The biological features of the Park show adaptations to the aridity of the neighbouring desert environments and also to the rainfall-rich zone of the monsoon region. Of particular importance in this respect are:

- the cyanobacteria of the sandstone towers;
- the presence of an exceptionally diverse range of spinifex (*Triodia* spp) species;
- southerly occurrences of particular monsoonal savanna plant and animal species;
- northerly distributions of certain arid zone species of plants and animals; and
- some significant endemic species.

Cyanobacteria

A simple life form is essential to the complex structure of the Bungle Bungle range. The beehive formations are made up of a microstructure of interlocking individual sand grains covered by banded biocrusts of different species of single-celled cyanobacteria. These biocrusts are a product of the transitional nature of the landscape being adapted both to the arid and to the wetter features of the landscape. The long term stability of the Bungle Bungle Range relies on these ecological and biological processes.

The dark grey bands with their coating of blue-green algae (cyanobacteria) are a dull grey in the dry, but become shiny and almost black immediately after rain. Photograph: Tom Keating.

The cyanobacteria stabilise the outer layers of the sandstone towers, in the form of banded skins, and repair exposed or damaged surfaces of the beehive formations. These banded skins are formed by ecological and biogeochemical processes sustained by the communities of cyanobacteria species within the biocrusts. These microbial communities, made up of at least five different cyanobacteria species, represent some of the most ancient life forms and simple ecosystems on Earth.

Triodia species – spinifex

The Purnululu National Park in east Kimberley is a centre of endemism for this widely spread and distinctively Australian arid land grass species. Spinifex-dominated communities occupy the major part of arid Australia and until recently have been the most maligned and least researched of all Central Australian plant communities. They are however extremely well adapted to the desert environment and play an important role in the general ecology of our deserts as well as being an essential item for survival in the technology of Australian hunter-gatherers. (Latz 1995, p. 290).

The *Triodia* species of the Park are particularly interesting, especially for their diversity. The genus *Triodia* (commonly known as spinifex), comprises Australian endemics that are as characteristically Australian as Eucalyptus and Acacia (Lazarides, 1997). On the basis of mapping across Australia, Griffin (pers. comm.) found that Purnululu National Park had the highest number of *Triodia* spp (13 in 1 x 1.5 degrees) of any cell in Australia.

The Purnululu region is a centre of endemism for these widely spread and distinctively Australian arid land grass species. Woinarski et al. (1992) found 12 *Triodia* species in and around Purnululu during their wildlife and vegetation survey. *Triodia bunglensis* is known only from Purnululu National Park (Lazarides, 1997).

Spinifex thrive in the dry bed of Piccaninny Creek. Photograph: Steven Nowakowski.

TABLE 1: Spinifex species found in Purnululu National Park and surrounding areas

Triodia bitextura	*Triodia microstachya*
Triodia bynoei	*Triodia procera*
Triodia bunglensis	*Triodia pungens*
Triodia burbidgeana	*Triodia spicata*
Triodia epactia	*Triodia stenostachya*
Triodia intermedia	*Triodia wiseana*
Triodia inutilis	

The pale straw yellow of Spinifex in the dry season is a distinctive feature of the area.
Photograph: Stephan Miechel.

A unique ecological niche

There are several other features that show the transitional nature of this landscape. The deep gorges and contrasting geology and soil types offer many microenvironments that support the most southerly extension of some monsoon savanna plant and animal species. At the base of the cool moist gorges, tropical palm species such as the livistona thrive, so that a hidden world is revealed. Similarly, the sand plains and sandstone plateau support a rich diversity of arid zone plants.

Woinarski et al. (1992) recorded 619 species of vascular plants and 298 species of vertebrates (149 bird, 81 reptile, 41 mammal, 15 fish, 12 frog) in their wildlife and vegetation survey of Purnululu National Park and surrounding areas. A detailed description of the broad range of savanna and arid plants and animals species and typical vegetation communities is provided in Hoatson and others (1997).

Open woodlands and grasslands are the dominant vegetation in the East Kimberley Region. However, the great diversity of landforms within Purnululu National Park, and its location in a transitional climatic zone, support a range of distinct vegetation communities, ranging from desert shrubs, such as Acacia and Grevillia, along the exposed plateaus of the Bungle Bungle Range, to the rainforest communities along the Osmond Creek valley. This riverine environment supports a denser canopy of trees with ferns and orchids in its understorey, while spinifex dominates the grasslands of the ridges. The differing landscape throughout the Park, and the seasonal changes from wetter summers to dry winters, support many varieties of Australia's unique eucalypts, including *Eucalyptus collina*, (silverleaf bloodwood) and *Eucalyptus aspera*, (rough-leaf range gum). Species endemic to the region include the Sandstone Grevillia (*Grevillia miniata*), which is restricted to the Kimberley Region and the Rock Grevillia (*Grevillia psilantha*), which is found only within Purnululu National Park.

These varying plant communities provide habitats for an equally broad range of animals. Among the many bird species recorded in the Park, is the rare and endangered grey falcon (*Falco Hypoleucos*). The grasslands in the Park are an ideal habitat for this CITES (Convention on International Trade in Endangered Species) listed vulnerable bird, whose population may be as few as 1000 mature individuals (http://www.cites.org/eng/resources/fauna.shtml). Purnululu's location in a transitional climatic zone also makes it an important place for migratory birds throughout the year, with birds appearing from the north during the wet season, and the south during the dry.

The Park also supports a wide variety of mammal and reptile species, many identified at the limit of their range. Here, they interact with other species they would rarely encounter outside such a unique environment. Animals characteristic of arid terrains, such as skinks (*Scincidiae*), short eared rock wallabies (*Petrogale brachyotis*), and monitor lizards (*Varanus dumerilii*) are found on the plateaus of the Bungle Bungle Range, while animals typically found in wetter environments, such as the pale field rat (*Rattus tunneyi*), the large-footed mouse-eared bat (*Myotis adversus*) and a number of varieties of frogs, can be found in the sheltered gorges below (Hoatson and others 1997, pp. 23–27).

Natural criterion (iii)

a superlative natural phenomenon

While sandstone karst towers are not uncommon in the world, the scale and grandeur of the sandstone formations of Purnululu is unparalleled.

The Purnululu area, in the Middle Ord Region, has evidence of at least 20 000 years of Aboriginal occupation and 120 years of non-Aboriginal occupation, however, the Bungle Bungle Range has only become widely known since its first widespread media promotion in Australia in 1983.

Since that time many thousands of people, throughout Australia and internationally, have been inspired by the exceptional natural beauty and unique appeal of the Bungle Bungle's myriad sandstone towers. The orange and grey horizontal banding of the cyanobacterial crusts on the towers highlights their aesthetic features, especially when the crust changes colour to a shiny dark green following rain. Their scale is truly majestic and their seasonal variation provides a stunning array of vistas and colours.

The geologist, Edward Hardman, first reported on the "strange and fantastic forms" of the Bungle Bungle Range in 1885. Hoatson and others (1997) record the responses of contemporary visitors, including prominent artists and photographers, who have remarked on the exceptional natural beauty of the Range.

Cultural values of Purnululu National Park

cultural criterion (iii)

exceptional testimony to a cultural tradition which is living

The cultural landscape of Purnululu National Park is an exceptional example of hunting–and–gathering culture embodying religious, social, aesthetic and economic dimensions of this tradition.

The Kimberley region provides a significant chapter in the story of human occupation of the world's largest island continent. Hunting–and–gathering has characterised 99% of the period of hominid evolution, and the overwhelming majority of time that fully modern humans (*Homo sapiens*) have been present on Earth. Hypothesised migration to Australia was probably through Timor or New Guinea, which was joined to Australia from about 120 000 till 8000 years ago, or as Flood (1997, p. 5) notes, 'throughout most of Australia's human history'. Of the few hunter-gatherer societies that survive in the modern era, most are found in Australia — the last continent populated by hunter-gatherers to experience and survive colonisation.

Of 721 properties inscribed on the World Heritage List only two are representative of contemporary hunter-gatherer societies and both are in Australia. Kakadu National Park is in the monsoonal north of the continent and Uluṟu-Kata Tjuṯa National Park is within the desert region in the continent's centre.

The living culture of the people whose traditional lands include Purnululu National Park extends this representation in the following ways:

(a) it is located in an area transitional between Australia's arid interior and the wetter, northern monsoonal areas, and based on adaptations to both arid and monsoonal environments and shows how people adapt to areas of significant environmental diversity;

(b) it is a riverine culture with a marked vibrancy and diversity in its political economy, languages, food sources, participation in trade networks and in the religious relationships that link *ngarrangkarni*, land and people; and

(c) it has survived despite the impacts of colonisation — see criterion (v).

The traditional owners of the Middle Ord Region, which includes Purnululu National Park, assert a connection to country extending back to the time when the features of the landscape were first formed. Results of archaeological research indicate a long and continuous occupation of this part of northern Australia, extending back tens of thousands of years. Radiocarbon dating from archaeological excavations at Lake Argyle on the Ord River, less than 100 kilometres downstream from Purnululu National Park, demonstrate occupation of the Ord Valley for at least 20 000 years (Dortch 1977, p. 109). Within Purnululu National Park itself, there are many hundreds of archaeological sites, including rock art sites, artefact scatters, stone quarry sites, burial sites and sites dating to the contact period. This living tradition has an ancient past.

Connections to country

The major river system, whose main course was named the Ord River by English-speakers, forms the southern and eastern boundaries of Purnululu National Park and provides a major focus of the riverine environment in the Middle Ord Region. As well as using the ecosystems of the uplands and sand plains, Aboriginal people orient themselves, their proprietary interests and their use rights, as well as the cosmology in which these interests and rights are embedded, in relation to the Ord, its tributaries and the features defined by these watercourses.

Traditional owners relate themselves and their families to places along the river. All of its local features are known and recognised — narrow gorges and large pools of water, rockholes or soaks in its upper reaches or tributaries where the flow is seasonal or intermittent, places where it flows over flat slabs of rock, and places where it fans out and forms a sandy bed. All have names, as do all the confluences (*palmuntum* or 'junction'), and rocks, trees, and other features of each. In the past the social and economic activities of the people of this region were given outline and substance by the tributaries, junctions, headwaters, and outflows of rivers in the middle Ord region. The connections continue today.

People and place are connected in personal identity. The name of a geographical feature may be given to a traditional owner as a personal name. The term *narraku* refers to the relationship that is created by a shared name, linking an individual to the geographical feature. A *narraku* relationship also exists between two people who share a name.

Nyitparriya, a sandstone outlier of the Bungle Bungle Range in the north-west corner of Purnululu National Park, is significant to the traditional owners as a *narraku* site and for the rock art and engravings in the rockshelters and overhangs that are located around its base. Photograph taken at Nyitparriya in the early 1990s.

In addition to the major river system, two other ecosystems occur within the area of Purnululu National Park and shape the seasonal patterns of traditional life: the sand plains, which occur predominantly to the south and east of the Bungle Bungle Range, and the uplands — including the Bungle Bungle Range. The sand plain areas as well as the margins of the uplands have economic and spiritual importance, showing abundant evidence of occupation and use. Areas of economic and mythological significance, including sandstone overhangs with rock art, hand stencils, and/or axe and seed/ochre grinding marks are found at frequent intervals along the base of the hills in the Bungle Bungle Range.

People used places in the uplands seasonally. Many sites are associated with water sources. During periods of heavy rain, the run-off forms large, temporary pools of water around its margins. This run-off sustains a fringe woodland community dominated by *Eucalyptus collina*. This fringe was generally occupied and used by small groups of people for limited periods during and immediately after the heavy rains, when water is widely distributed throughout the landscape.

Red Rock Creek, the northern boundary of Purnululu National Park, flows west into the Osmond before reaching the Ord River. Photograph taken 2000.

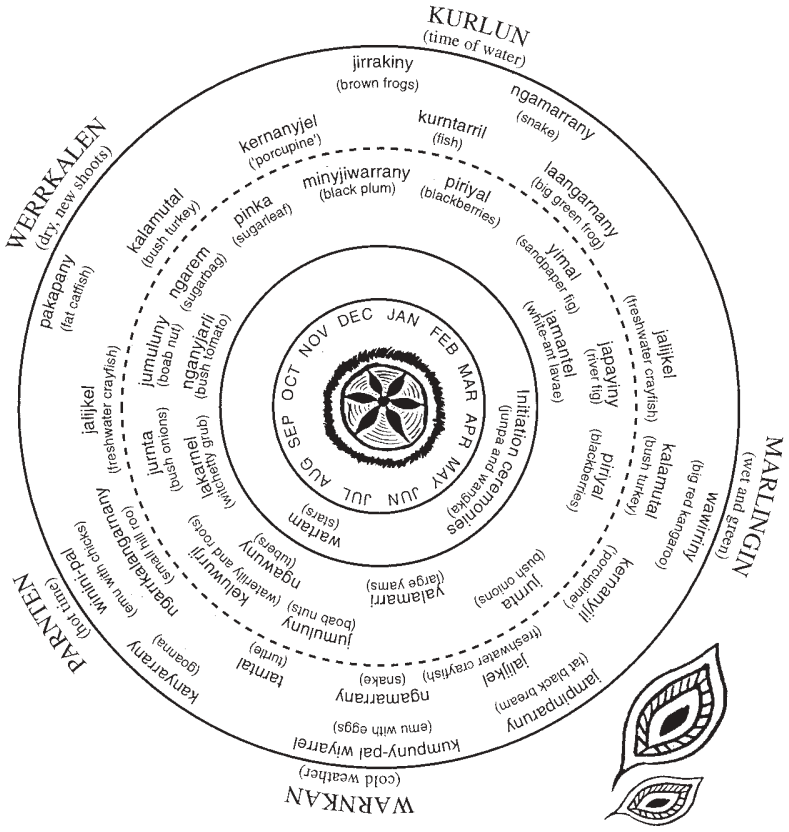
Aboriginal people used the top of the Bungle Bungle Range. Accounts tell of small numbers of people living on the plateau for short periods or provide evidence of technologies and strategies that allowed access to plateau areas to obtain resources there: people constructed and used 'ladders', *parrkurrany*, consisting of a pole with notches, and when they climbed to the top of the Range they would use stones to mark their trail.

Land: ownership, management and use

In Purnululu, people are connected to place through the laws of land ownership and use. Women as well as men are owners of land and are responsible for managing resources. Their relationship to land is determined by *ngarrangkarni* (Kaberry 1939, cf. Maddock 2001). A senior man is head of each local group and he is responsible for organising the group's economic activities, including trading relations, settling disputes between people within his group or territory, arranging and participating in religious ritual and protecting the area from territorial expansion by others. He and his group share responsibility for the safety of all persons who are on their land. Thus the need to seek appropriate permission before entering another group's land.

While people moved across the landscape according to the seasons, use of the Purnululu region was not simply one of 'dry season–downstream, wet season–upstream'. Use and management of the land was seen as a single process, in which both men and women were engaged (cf. Young 2001, p. 28). Aboriginal people maintained ecosystem diversity through the careful use of fire, which in conjunction with topography and climatic features such as wind and temperature, produced a mosaic of vegetation systems. The desire for variety in the diet was also a factor in people's movement throughout the year.

People related to their natural environment according to the patterns of seasonal change. Through the annual cycle, their use of places in the landscape, their utilisation of resources and their economic life altered in response. This is graphically shown in the following diagram.



The cycle of these seasons and their characteristics, including animal and plant foods designed by Josie Farrer. (Kimberley Resource Centre 1996).

Languages of the Middle Ord Region

People's connection to place is mediated by language. Four Indigenous languages are spoken in the Middle Ord Region: Kija, Miriwoong, Malngin and Jaru. Kija and Miriwoong are members of the Jarrakan language family associated with the western and northern areas of the Park. Malngin and Jaru languages are members of the Pama-Nyungan language family connected to the eastern and southern parts of the Park. Pama-Nyungan languages flank the southern and eastern margins of the Kimberley and are spoken by people throughout the adjacent desert regions including the Anangu of Uluru-Kata Tjuta.

The distribution of these two distinct language families mirrors the transition between arid desert and monsoonal savanna environments and reflects major social, religious and cultural differences between the two groups.

The term *ngarrangkarni* is used and/or understood by speakers of Aboriginal languages throughout the east Kimberley and adjacent areas. The languages came into the country in *ngarrangkarni* time as a result of the deeds of the *ngarrangkarni* beings evidenced by named physical features — in this case Mt Glass, Mt Buchanan and a small hill located near the north-east margin of the Bungle Bungle Range. The boundary between Kija and Miriwoong is described as the result of an encounter between *Warnampany* (a Miriwoong language 'mountain') and *Rawulili* (a Kija 'mountain').

Winan: exchange network

People in the Purnululu region have a vibrant economic life, shaped by the nature of their region. People throughout Purnululu trade with their countrymen from other parts of the Kimberley and further afield. A widespread exchange network exists throughout the Kimberley and the location of this riverine culture between arid and monsoonal zones, allowed it to be a major node in the trading network. The network, called *winan*, covers the 600 kilometres from the west to east Kimberley. It connects in turn to the exchange systems of the Western Desert, which lies to the south and south-east of the east Kimberley (Akerman 1998, p. 41) and to the *merbok* exchange network of the Port Keats and Daly River region to the north-east (Stanner 1934).

Ritual continues to play a role in *winan* exchanges, which include objects used in ceremonies. Local exchanges in the past appear to have been in economic commodities: tools, weapons and raw materials, as well as foodstuffs (mostly prepared for long-term storage). Accounts of *winan* recorded at places where people used to gather — for example at Ngirriyiny on the Ord River — include the number of people who were there, where they came from, what they brought with them, and how the trading was conducted (along with accounts of the harvest in which they had been invited to participate). The accounts invite comparisons with large-scale barter and exchange in various places throughout the world.

Rock art

People recorded their connection to place and to the past through art in a continuing and developing tradition. The rock art recorded from the Purnululu National Park further illustrates the connection between use and management of the area, and the continuity between past and present.

The rock art of the East Kimberley is yet to receive the research attention given to other World Heritage properties, such as Kakadu National Park. However, as recently as 1988, a three month survey of archaeological sites on the northern and western margins of the Bungle Bungle Range recorded over two hundred separate sites within the boundaries of Purnululu National Park. The paintings depict a range of animals including crocodiles, turtles, fish, kangaroos and emus as well as human stick and snake-like figures. The predominance of species such as crocodile, turtle and fish as graphic elements in the galleries recorded at the foot of the Bungle Bungle Range reinforce the continuing significance of riverine resources in their lives. People put their personal marks on the rock walls. The sites often include stencils, mostly in red ochre, of hands and in at least one instance feet, including those of children as well as implements such as boomerangs and spear throwers.

Kaberry (1939, p. 206), for example, records "rock-paintings of animals including kangaroo, crocodile, emu, rainbow-snake, and other species" at Forrest River, west of Wyndham (or to the north-west of the Park), and observes that it was painted or touched up principally by senior men as part of a process to ensure the increase of the species painted. The people of the Forrest River region, in common with the traditional owners of the middle Ord, attribute the power to create rain to *Kaleruny*, the rainbow snake (Elkin 1930) rather than the Wandjina of the north-west Kimberley. Thus it is not surprising that the rock art recorded from the Purnululu National Park and Conservation Reserve does not fall within the Wandjina or the Bradshaw traditions of the north-western Kimberley, but displays striking similarities to the art that Kaberry briefly reports on from Forrest River.

Handstencils are a common element of the rock art galleries in rockshelters and overhangs throughout the Purnululu National Park. Other motifs such as the faint outline of a large crocodile drawn in red ochre in this gallery indicate the importance of riverine resources to the peoples of this region. Photograph: R Muhlen-Schulte 1987.

The larger galleries offer evidence of recurrent and prolonged use; numerous stencils mainly of hands, grindstones, remnants of hearths and dense scatters of stone artefacts attest to the importance of these areas as occupation sites. Some of the shelters document the arrival of Europeans into the region. At one shelter the rock art includes a painting of boots with spurs, at another there are engravings of trucks and heads with hats. A metal rasp, tobacco tins and tools of glass at a third shelter point to continued occupation of the Park well after contact.

Cultural criterion (v)

outstanding example of a traditional human settlement or land-use which is representative of a culture, especially when it has become vulnerable under the impact of irreversible change.

People of the region have survived despite the prolonged and negative pressures of colonisation and attempts to alienate them from their land. Through their exceptional efforts they have ensured that their hunter-gatherer culture has survived to the present day. Their resilience is truly remarkable.

The east Kimberley was one of the last regions of Australia to experience colonisation. The first settlers arrived in the Middle Ord Region in the mid 1880s, some 120 years ago. As the senior members of the families who are now the traditional owners of Purnululu National Park were born from about 1920 onward, a rare record of continuity is provided by oral accounts of their immediate antecedents and their own life histories.

Shirley Drill, a senior Purnululu traditional owner has been lobbying the Western Australian Government for Aboriginal joint management arrangements at Purnululu National Park, and to grant tenure to land around the old Bungle Bungle outstation where her uncle established Kawarre outstation in 1983. Photograph taken at Jalminypany on the Ord River 2000.

Historical accounts of the entry of non-Aboriginal people to the Middle Ord Region begin in July 1879 when Alexander Forrest, a government surveyor, and his party reached the upper middle reaches of the Ord River. Glowing reports of verdant grass plains that stretched from the Ord River to the horizon immediately south of the Bungle Bungle Range created a paper land rush in the first half of the 1880s, and the Kimberley was divided into a series of leases of from 50 000 to 300 000 hectares depending upon proximity to major river systems. The discovery of gold at Old Halls Creek in 1885 and the impact of the subsequent influx of thousands of men seeking their fortunes in gold mining, profoundly changed the way in which the traditional owners lived their lives.

Numerous instances of violence against the local Aboriginal people are described in oral history accounts (see for example Ross 1989). Introduced diseases such as measles, smallpox, leprosy and influenza took a heavy toll — as they did in other parts of Australia.

According to Broughton (1965, pp. 34, 35, 61–63), the period following the discovery of gold to 1908 was marked by lawlessness, atrocities against local Aboriginal people, spearing of cattle, and generally hostile relationships between the intruders and local people.

Government measures introduced to ameliorate the suffering of Aboriginal people in the east Kimberley included the issuing of rations from 1901 and the provision of refuges in particular localities from 1910. These measures were also intended to provide incentives to stop raids on pastoralists' cattle and to draw Aboriginal people into centres away from their traditional lands (Ross 1989, p. 32). Government intervention was limited in its success and occasional instances of violence against the Aboriginal people continued to occur until the middle of the 1920s. Other factors contributed to help communities survive, including the fact that some pastoralists were sympathetic to the needs of Aboriginal people and ran their stations as refuges.

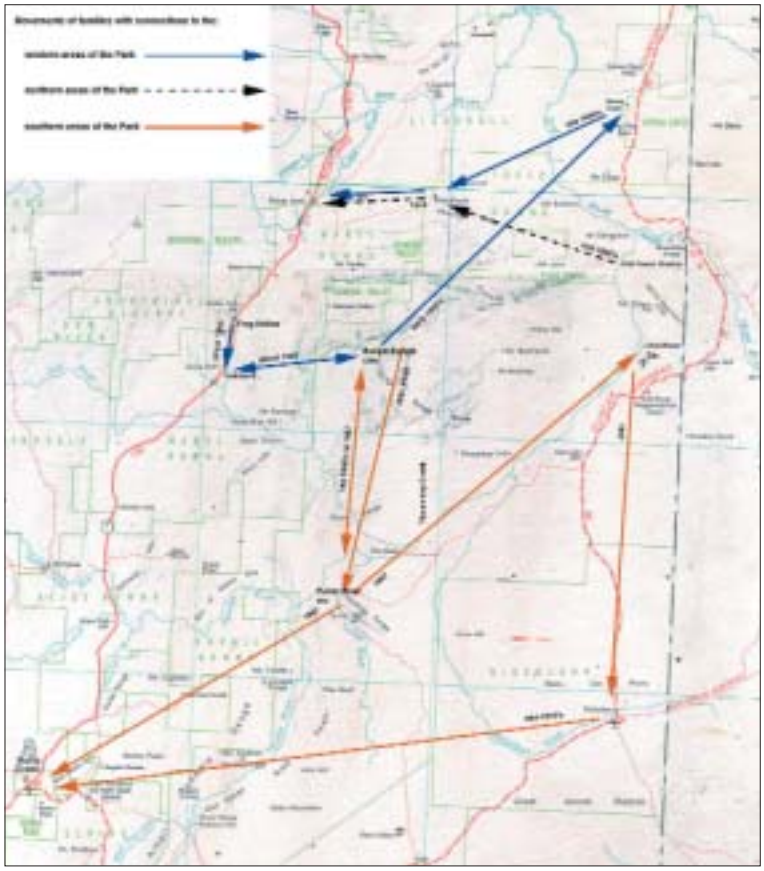
The majority of Aboriginal people in the east Kimberley did not settle on pastoral stations until the early 1920s and some people remained in the bush long after that time (Ross 1989, p. 36). Aboriginal knowledge and understanding of the land and their unpaid labour contributed to the economic viability of pastoralism. Throughout the first half of the 20th century Aboriginal workers and their dependents in the pastoral industry received only rations for their labour (Ross 1989, p. 37).

By the late 1920s, when the first ethnography of the East Kimberley Region was attempted by Elkin, the size of the local Aboriginal population had declined significantly. In the 40 years following the 1880s, when non-Aboriginal people first entered the East Kimberley, Elkin estimated that "Djaru, Malngin and Mirun [Miriwoong] have certainly decreased by over fifty per cent." (Elkin 1932, p. 297)

In addition to this major decrease in the numbers of people, the pastoral occupation of traditional lands, the associated heavy stocking of areas around rivers and waterholes, and the destruction of native plants and animals by the introduced stock and removal of habitat, had a radical impact on the ways local Aboriginal people lived their lives (Bungle Bungle Working Group 1986, p. 30).

Despite these tremendous losses, traditional knowledge continued to be passed on and the elements of customary society were maintained (Ross 1989, p. 31). Kaberry (1938, p. 272) wrote in the 1930s of the continuing importance of country to Aboriginal people throughout the east Kimberley, most of whom she observed were engaged on cattle stations, and that for the period October to March "when his holidays arrive he returns if possible to his horde country, though it is 80 or 100 miles away and water is scarce". The stories of these times and events have been incorporated into social life and have the continuing message that European settlement was achieved at their forebears' expense (Ross 1989, p. 31).

Following the introduction of the Pastoral Award in 1968, which provided for wages for Aboriginal workers in the pastoral industry, Aboriginal people were compelled to leave the stations. They settled in camps on the fringe of Halls Creek or joined the Aboriginal families that had walked off Texas Downs station at the old Police Reserve at Turkey Creek, a small area of reserve land in a sea of pastoral leases that stretched between Halls Creek and the newly created town of Kununurra, living in humpies constructed from tree trunks and branches and pieces of corrugated iron or in old rusted car and truck bodies. Life in the fringe camps on the margins of Halls Creek, Wyndham and Kununurra, and on the Turkey Creek Reserve during the next 10 years was frustrating and difficult for many of those who had been forced to move from pastoral stations, in part because they were no longer able to access their country readily — in some cases pastoralists chained and locked gates to prevent access — and in part because they were having to face new social problems such as alcohol abuse and associated violence and malnutrition.



Map of the middle reaches of the Ord Valley showing the chronology and movements of families with connections to the Punululu National Park and Conservation Reserve from about 1910 through to the walk-off by Aboriginal families from Texas Downs Station in 1973.

Hector Chunda, a senior traditional owner, reflected the frustrations of many of the people living at Turkey Creek at still not being able to access their country when he stated:

> *'Kartiya' ought to let us (onto land). We locked up here. We can't able to walk over there. Just like we in a jail house (Ross 1989, p. 109).*

In the 1970s, senior traditional owners approached government authorities to help them return to their country and establish out-stations (camping sites on traditional country). This continued throughout the next decade. The 'discovery' of the Bungle Bungle Range by television and other media in 1983 sparked significant public and tourist interest and resulted in calls to open the area to tourism. In response, the Western Australian Government established the Bungle Bungle Working Group to make recommendations on the future status and management of the region. Discussions between the traditional owners and governments continue in a slow but positive direction with negotiations focussing on implementing joint management in Purnululu National Park, reviewing the Park management plan, living area leases within the Park, and enhancement of employment opportunities for traditional owners, all currently in progress.

While the connection between traditional owners and their country has been maintained under the impact of irreversible change, inscription on the List of World Heritage provides a stimulus to negotiation that will ensure that this outstanding example of traditional land-use is maintained for future generations of traditional owners and all humanity.

Cultural criterion (vi)

directly or tangibly associated with living traditions, and with beliefs, of outstanding universal significance

Purnululu National Park is directly and tangibly associated with the living religious tradition and beliefs of *ngarrangkarni*, an outstanding example of the Indigenous Australian religious philosophy popularly referred to as the 'Dreaming' or the 'Law'. While the philosophy and conceptual foundations are similar to the *tjukurpa* of Uluṟu-Kata Tjuṯa, it is demonstrably different in form and vision, with a different ecological and cultural wellspring. The differences are manifest in the very different artistic representations for which the Purnululu region is renowned.

The traditional owners explain that the landscape was formed by *ngarrangkarni*. The term is complex, referring simultaneously to ancestral beings, to the creation period and events long past, and to the laws, ceremonies and rituals introduced by those beings. Traditional owners today see those beings and events as rocks, hills, and other landscape features in the hundreds of named sites of the Park. This reveals the continuing presence and power of *ngarrangkarni*, and provides a marker in the landscape for the religious beliefs that underpin the social, economic, and aesthetic qualities of contemporary life.

In the same way that there are many manifestations of Dreamings and many dreaming sites within Uluṟu-Kata Tjuṯa National Park but no separate Dreaming or isolated account of the creation of the massif Uluṟu itself, there are many *ngarrangkarni* within Purnululu National Park and many *ngarrangkarni* sites. *Ngarrangkarni* gave water to the land and shaped the country. Water was put in the country by the rainbow snake, *Kaleruny*, in rockholes, pools, and springs at the base of hills, waterfalls in the high reaches of streams, and in permanent trickles from porous rocks. While giving them water, the rainbow snake, *Kaleruny*, also gave people their languages. Traditional owners look at gaps cut in ranges of mountains and see the marks left by fish jumping through in the formative time of the world. Waterfalls and rapids, preventing fish from travelling further upstream, are seen as crocodiles turned into stone in the upper reaches of rivers. A frog was successful in retrieving water, stolen by a crane and carried away in a coolamon, to form permanent waterholes. People explain the features of the Purnululu region through narrative rather than definition, "that is, about what happened at a place rather than what the place 'is' essentially" (Merlan 2000, p. 21).

Similarly, paintings by the traditional owners of the Middle Ord Region are usually maps of their own country, or of country to which they are related, giving them the authority to depict it. Paintings may also illustrate a story, whether of *ngarrangkarni*, or of distant or recent history. As such they may include figurative elements as well as stylised representations of country. The painting by Jack Britten (Bull Creek Country) is an outstanding depiction of the Purnululu landscape showing the links he has with that country. The painting shows the site of a meeting between two ancestral devil-figures, one of which lives in a cave in the region.

After the forced departure from the pastoral stations, families from the surrounding pastoral leases congregated in the small reserve at Turkey Creek, and the discontent and frustration at not being able to have access to their country provided the backdrop in the mid-1970s for the genesis of the *Keriyil-keriyil*, a public ceremony or *junpa*, and the subsequent emergence of the Turkey Creek artists.

> *The flowing forms and visual textures which appear in the paintings of Rover Thomas, Paddy Jaminji and other Turkey Creek artists give a new and vibrant perspective to the nature of Aboriginal perception and depiction of country. Both plan and profile treatments of landscapes as intuitive forms create 'maps' of the geographic and historical topography of the Kimberley. While these paintings are perhaps more easily approached by the non-Aboriginal observer, they are still imbued with the presence and mystery of the Narungani (sic.), or creative past, and the power beings who inhabited it and who can still be invoked through ritual. The physical landscape is a palimpsest of history and human interaction (Rover Thomas and others 1994, p. 3).*

Morphy (1998, p. 142) notes, the paintings of the region "crystallised out of the recent history of the eastern Kimberleys and are part of the continual process of establishing the relationships between people and land. Relationships are passed on in new forms, old forms take on new meanings, established myths find new expressions and the sources of influence are sometimes wider than they were before".

Hector Chunda (seated at right) and Henry Wambi, both well-known 'Turkey Creek' artists. Photograph taken at Wurrerranginy Community, Frog Hollow 2001.

The works of several prominent artists who are traditional owners of Purnululu National Park and the Conservation Reserve are held in major museums and galleries including the National Gallery of Australia, the Museum of Australia, Parliament House, the National Gallery of Victoria, the Art Gallery of South Australia, the Art Gallery of Western Australia, the Queensland Art Gallery, the Museum and Art Gallery of the Northern Territory, and the Berndt Museum of Anthropology at the University of Western Australia as well as private collections such as those of Holmes a Court, the Kelton Foundation in Santa Monica, California, and Sammlung Essl in Vienna, Austria.

The works of these artists are tangible manifestations of the continuing significance that their countries have for them and their families. While the art from Purnululu is a particular expression of the relationship to this country, it has global universal significance. Artists from the region have "moved from a local to a global frame" (Morphy 1998, p. 37), and their artistic expression of the connections between land, myth and history is now recognised as providing a unique contribution to the development of international art movements and informing the ongoing effort to best express the connection between humanity and land; between people and place; between the artist and his or her world.

Purnululu: A cultural landscape

Under the categories of cultural heritage set out in Article 1 of the World Heritage Convention, Purnululu National Park is a cultural landscape representing the combined works of nature and man. The Park is viewed by the State Party as an organically evolved continuing landscape (Operational Guidelines, paragraph 39 ii) and an associative cultural landscape (Operational Guidelines, 39 iii).

The information presented against the cultural criteria (above), informs the recognition of the landscape of the Park as "one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time (Operational Guidelines, paragraph 39 ii)".

The information also verifies the statement that Purnululu National Park is an 'associative cultural landscape' by virtue of the "powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent." (Operational Guidelines, paragraph 39 ii).

Despite enormous historical difficulties, the traditional owners of Purnululu have continued to care for and manage their country, ensuring that the landscape plays a central role in the development of their contemporary society and culture, and ensuring that *ngarrangkarni* continues to remain the central organising principle of their social development. While this society and its cultural forms can trace their antecedents back over some 20 000 years, the owners of Purnululu today are still engaged in controlling the development of their hunter-gatherer society, dynamically adapting it to new forms in interaction with the majority society and its technology. This is most strongly evident in the maintenance of connection between people and country and in the ongoing development of artistic forms from rock art to ceremonial boards to internationally recognised artistic art forms.

Traditionally oriented Aboriginal hunter-gatherer cultures, such as the traditional owners of Purnululu, consistently value the spiritual and emotional aspects of living with particular environments in addition to the physical dimensions, regarding both as central to the survival of the society. Religious beliefs, places of spiritual significance, stories and paintings associating ancestral beings with the landscape, kinship connections and language identification are all essential to the connection between people and place in Purnululu, providing traditional owners then, as now, with a guide to living and being.

The future management of the Purnululu National Park will be consistent with developing understanding of the management of a cultural landscape as used in other Australian properties, particularly Uluṟu-Kata Tjuṯa National Park. This complements the approach of Parks Canada (2000):

> *An Aboriginal cultural landscape is a place valued by an Aboriginal group (or groups) because of their long and complex relationship with that land. It expresses their unity with the natural and spiritual environment. It embodies their traditional knowledge of spirits, places, land uses, and ecology.*

Rover Thomas
Kukatja, Wangkajunga People, Australia 1926–98
Rover Thomas. *All that big rain coming from top side*, 1991
National Gallery of Australia, Canberra. Reproduced courtesy of the Warmun Art Centre

> All that big rain coming from top side — one, two, three, four, five, six channels. That water fall came over the rock, see that rock. Across-that [is] road way. But people top way, they [are] falling down from top, from that thing now. Some of them gone inside way, in that rock you know, in that cliff [people have sought shelter in a cave].
>
> That [is] the big cliff going to road you know-where [the] people going to [the] rock you know, flat rock. That is *ngarrangkarni*-Dreamtime [at] Texas. Waterfalls used [to be there] people come down there, living there, [Hunting] killing crocodile, barramundi, catfish-everything. Camping area that way-see that road going up there-that's where they're living, living area you know-every holiday in Texas, in Texas country — people would visit waterfall.
>
> Rover Thomas 1991

The painting depicts a waterfall on Texas Downs Station in East Kimberley where Rover Thomas once worked as a stockman.

2.3 Comparative analysis of similar sites

Cultural values

The World Heritage List currently has 11 properties inscribed in the category of 'continuing cultural landscapes'. One of those is Uluṟu-Kata Tjuṯa National Park, while the majority comprise agricultural landscapes. The category associative cultural landscape has been applied seven times for inscription. Again Uluṟu-Kata Tjuṯa National Park is represented. No other cultural landscapes represent the living cultural traditions of hunter-gatherer societies. Despite their major significance to the evolution of human interaction with nature, only two sites are inscribed that recognise the living cultural traditions of hunter-gatherer society, and both are in Australia (Beazley, 2000).

A comparative assessment of the cultural values of Purnululu National Park and the cultural values of Australia's World Heritage listed Kakadu and Uluṟu-Kata Tjuṯa National Parks, in response to cultural criterion (iii) above, has been made by ICOMOS, in its 1994 evaluation of the World Heritage re-nomination of Uluṟu-Kata Tjuṯa National Park. The evaluation noted several major differences between the two regions, pointing out that while the Kakadu and Uluṟu-Kata Tjuṯa National Parks originate in a related cultural tradition, they exemplify cultural adaptations to opposite poles of an ecological continuum. The cultural landscape of Purnululu National Park originates in a related cultural tradition but represents an adaptation to an intermediate point on this ecological continuum. Different to the cultures of the tropics and the desert, Purnululu uniquely represents thousands of years of hunter-gatherer adaptation to a riverine and upland eco-system.

A number of social and cultural features of the traditional owners of the upper and middle reaches of the Ord River suggest parallels with peoples of other riverine environments despite differences in physiography and climate. For example, regional economies with extensive trade networks and seasonal abundance, with local variation in food resources that require specialised organisation of labour for harvesting, processing and storage, are characteristic of all these environments.

The Sahaptin-speakers of Eastern Oregon and Washington live where the Columbia River "cuts a deep gash through the Miocene basalts of the Columbia Plateau. The river forms the spine of their land, the core of their habitat, and thus profoundly shapes their lives" (Hunn 1990, p. 3). The Indians (Hunn 1990, pp. 89–91) occupy an area of great seasonal extremes. An interesting strategy characterised the Klikitat Indians of south-central Washington Cascades and their Chinookan neighbours who developed effective strategies of ecological coexistence.

The Western Penan live in the upland plateaus of central Borneo (Brosius 1999, pp. 312–316), an area of wide valleys, steep ridges and mountains. The many rivers, along with local ridges, form the template around which Penan organise ecological and environmental information. Rivers and related features are named and ecological information is commonly encoded in place names.

The Batak of Palawan Island in the Philippines (Eder 1999, pp. 294–297) comprise eight local groups, each identified with a particular river and its watershed. A chain of mountains runs the length of Palawan Island; in the interior rivers tend to be short and the drainage relatively steep, but riverine resources figure prominently in Batak subsistence.

While these accounts of riverine hunter-gatherer peoples provide some basis for comparison with the cultural landscape of Purnululu National Park, they and other river people live in well-watered areas. It has been suggested (A. Kearns pers. comm.) that similar environments may exist in the Sahel of West Africa, Turkana in East Africa and southeastern Ethiopia. On the basis of latitude and apparently similar topographic features, it is possible that parallels may exist in areas of north-eastern Brazil or central-western Rajasthan. It appears, however, that there are no hunter-gatherer analogues of the Purnululu region.

Natural values

Wray (1997) prepared a global review of literature on weathering in 26 quartz sandstone landforms around the world. These sites were located in Europe (5 sites), North America (2 sites), South America (5 sites), North Africa (4 sites), Southern Africa (3 sites), Asia (1 site) and Australia (6 sites). Wray (1997) found that the most widespread sandstone tower karst in the world is found in northern Australia, particularly in the Arnhem Land Plateau in the Northern Territory. He stated that the Bungle Bungle Range is "an extremely impressive and extensive example of tower karst".

Karst landforms are more commonly associated with limestone and weathering processes. The majority of karst landforms already inscribed on the World Heritage List are found in limestone landscapes. The nine World Heritage Sites inscribed specifically for their Cave and Karst Features are listed in Table 2.

TABLE 2: World Heritage Sites in Karst Formations

Property	*Country*	*Inscribed*	*Criteria*
Puerto-Princesa Subterranean River National Park	Philippines	1999	N(iii),(iv)
Gunung Mulu	Malaysia	2000	N(i),(ii),(iii),(iv)
Desembarco del Granma National Park and System of Marine Terraces of Cabo Cruz	Cuba	1999	N(i),(iii)
Carlsbad Caverns National Park	USA	1995	N(i),(iii)
Mammoth Cave National Park	USA	1981	N(i),(iii),(iv)
Plitvice Lakes National Park	Croatia	1979/2000	N(ii),(iii)
Caves of Aggtelek and Slovak Karst	Hungary/Slovakia	1995/2000	N(i)
Skocjan Caves	Slovenia	1986	N(ii),(iii)
Ha Long Bay	Viet Nam	1994/2000	N(i),(iii)

Some of the most prominent non-limestone weathered landforms on the World Heritage List include:

Property	*Country*	*Inscribed*	*Criteria*
Canaima National Park	Venezuela	1994	N(i),(ii),(iii),(iv)
Grand Canyon National Park	USA	1979	N(i),(ii),(iii),(iv)
Wulingyuan Scenic and Historic Interest Area	China	1992	C(iii)

While these three properties have very different geologic settings to Purnululu they have some similarities for comparison. Most importantly they are the most prominent sandstone karsts on the World Heritage List. The deeply excavated Grand Canyon gorge records the geological history of the Earth over the past two billion years, an approximately 120 million years longer geologic record than the oldest Proterozoic rocks found at the surface only 300 metres from the Ranger Station at Purnululu.

The spectacular flat-topped table mountains, or tepui, formations of Canaima National Park represent a resistant plateau with sheer cliffs and waterfalls. However, this area in southern Venezuela experiences up to 7500 millimetres of annual rainfall clearly different to the 500–700 millimetres rainfall at Purnululu. The Wulingyuan Scenic and Historic Interest Area covers 26 000 hectares and includes more than 3000 narrow sandstone pillars and peaks, many over 200 metres high, with deep ravines, gorges and examples of natural bridges. This World Heritage area is possibly most comparable to the Bungle Bungle Range as an example of a 'ruiniform landscape' although this area in China's Hunan Province is much wetter and younger than Purnululu.

Sandstone tower karst is widespread in northern Australia. There are some well-known examples including Hidden Valley on the outskirts of Kununurra, Western Australia, the Ruined City in Arnhem Land, Watarrka National Park and Keep River National Park, both in the Northern Territory. Each of these northern Australian examples represent the general weathering processes producing tower karsts in sandstone. However, there are some striking differences that contribute to the outstanding universal value and spectacular nature of the Bungle Bungle Range. For example, the beehive formations have very steep foot slopes similar to highly dissected tower karst in the Ruined City in Arnhem Land but have distinctive convex to ovoid summits (Young 1986) in contrast to flat-topped tower karst in the Ruined City. This type of convexity is also seen in the remote Monolith Valley in the Budawang Ranges in southern New South Wales, Australia, but at a very small scale when compared with the spectacular Bungle Bungle Range.

One of the most striking features of the Bungle Bungle Range beehive formations, the grey and orange horizontal banding, does not seem to be featured in the descriptions of the other sandstone tower karst sites around the world. Biological crusts and their weathering actions are well known on sandstone, particularly on quarried sandstone surfaces in the built environment (Vials 2001). The stabilising and colonising functions of soil biological crusts are also well documented in banded vegetation arid environments (Eldridge and others 2001). However, the unusual extent and stabilising property of the horizontal banding in the Bungle Bungle Range is one of the most distinctive features of the property, when looked at on a global scale.

The role of the cyanobacteria in forming the biocrusted bands at Purnululu is comparable with the formation of stromatolites by cyanobacteria at Shark Bay World Heritage Area in Western Australia. Indeed, fossil stromatolites occur in the Osmond Range in the Purnululu Conservation Reserve to the north of the Bungle Bungle Range. The most significant difference is that the stromatolites at Shark Bay are formed by cyanobacteria in shallow marine environments while the banded biocrusts on the Bungle Bungle Range beehive formations are formed by cyanobacteria in a transitional arid/monsoon environment. As cyanobacteria are some of the oldest forms of life on Earth, these banded biocrusts are likely to represent some of the Earth's earliest life forms to colonise arid environments.

In summary, the Bungle Bungle Range in Purnululu National Park appears to be distinctively spectacular and different in terms of geological processes and landform evolution in comparison with similar sandstone tower karst sites around the world.

2.4 Authenticity and integrity

Purnululu National Park has a high degree of authenticity and integrity. The integrity of the Park has been sustained through measures taken to address impacts on its natural values. The impacts are predominantly the result of pastoral activities although tourism also has the potential to affect values. Overgrazing during the period that the area was a pastoral property has had significant effects on plant and animal populations in sections of what is now the Park. The impacts of overgrazing were concentrated in the sand plain and grassland country and along the margins of the Ord River. The rest of the region, particularly the range areas that were not suitable for depasturing stock, suffered significantly less disturbance.

Since the 1960s, major programs have been implemented to address the impacts of pastoralism. They have improved the prospect for long term recovery of vegetation cover, a prospect that was facilitated by the declaration of the National Park in 1987. A management plan for the Park was completed in 1995 (*Purnululu National Park Management Plan 1995–2005*) and this also contains provisions to manage potential impacts of tourism. The management plan also provides for requiring an ongoing revegetation program. The Conservation Commission has decided to review the management plan jointly with representatives of the traditional owners. The revision will ensure that arrangements for the Park are geared towards the management of the outstanding universal values of the Park and its buffer zone, and meet the wishes of the traditional owners for an enhanced level of involvement and engagement in the management of the property.

The Aboriginal traditional owners continue their practice of the traditions that maintain the cultural landscape despite the extensive and disruptive impacts that followed European colonisation. While this has been challenging, they have managed to do so despite being unable to live within the boundaries of the Park. They view their ongoing maintenance of this landscape as testament to their cultural survival.

Arrangements for traditional owners to reside in the Park and to manage it jointly will greatly facilitate the traditional owners' ability to maintain the cultural landscape. The Aboriginal traditional owners continue their practice of the traditions that maintain the cultural landscape despite the extensive and disruptive impacts that followed European colonisation. Whilst it has been difficult for the Aboriginal traditional owners to maintain the Park's cultural landscape, they have, nonetheless, managed to do so even while they were forced to live in neighbouring areas. They view their ongoing maintenance of this landscape as testament to their cultural survival.

Chapter 3
Description

Beehive shaped sandstone towers present an intricate maze from the air. Photograph: Nick Rains.

3.1 Description of property

Purnululu National Park has a typically dry monsoonal climate characterised by two distinct seasons: hot, wet summers (the wet season) and warm, dry winters (the dry season). The average daytime maximum temperature during the dry season (April–October) is approximately 35°C, ranging from 29.1°C in July to 38.3°C in October. The temperature remains relatively hot at night although frosts may occur during the cooler months of June, July and August. After October, the temperature rise is accompanied by an increase in humidity, cloud cover and thunderstorms. From December to March, temperatures remain very high and conditions are made more uncomfortable with high humidity.

The mean annual rainfall is about 600 millimetres, which falls during the wet season. Eighty five percent of the total rainfall comes between December and March. Most of the rain is localised by thunderstorms. Cyclones do not usually reach this far inland, although associated depressions sometimes bring heavy rain. Rainfall is intense and erratic, typically occurring in isolated events.

The major river running through Purnululu National Park is the Ord. Although the area receives rainfall of around 600 millimetres, the evaporation rate is very high, at more than 2000 millimetres per year and runoff is rapid. Consequently, there is very little permanent surface water in the area. All rivers contain running water for periods and many have underflow, but none flow continuously during the dry season. Throughout the dry, however, permanent and seasonal pools of water exist where groundwater flows from permeable and jointed rocks. In the narrow valleys and gorges of the Bungle Bungle Range, seasonal and some permanent pools are present. Pools and springs provide important refuge areas.

Purnululu National Park is located in the transition zone between the savanna and arid environments of tropical Australia. It is a cultural and natural landscape where people and the plants and animals have adapted to low fertility soils, a short intense wet season and a long dry season. The striking diversity of landforms in and surrounding the Park have resulted in a wide range of microenvironments that support plants and animals from both the moist savanna and arid lands of Australia. This transition zone is also reflected in the four languages that were spoken throughout this region: Kija, Miriwoong, Malngin and Jaru. Kija and Miriwoong, attributed by linguists to the Jarrakan family on the basis of similarities in grammar and vocabulary, are connected to the western and northern parts of the Park respectively, and Malngin and Jaru, members of the Pama-Nyungan family, to the east and the south (McGregor 1988, p. 97). Pama-Nyungan languages flank the southern and eastern margins of the Kimberley and are spoken by people throughout the desert regions of the adjacent Pilbara and Northern Territory including the Aṉangu of Uluṟu-Kata Tjuṯa.

Queenie McKenzie. *Gija country*, 1995. National Gallery of Australia, Canberra.

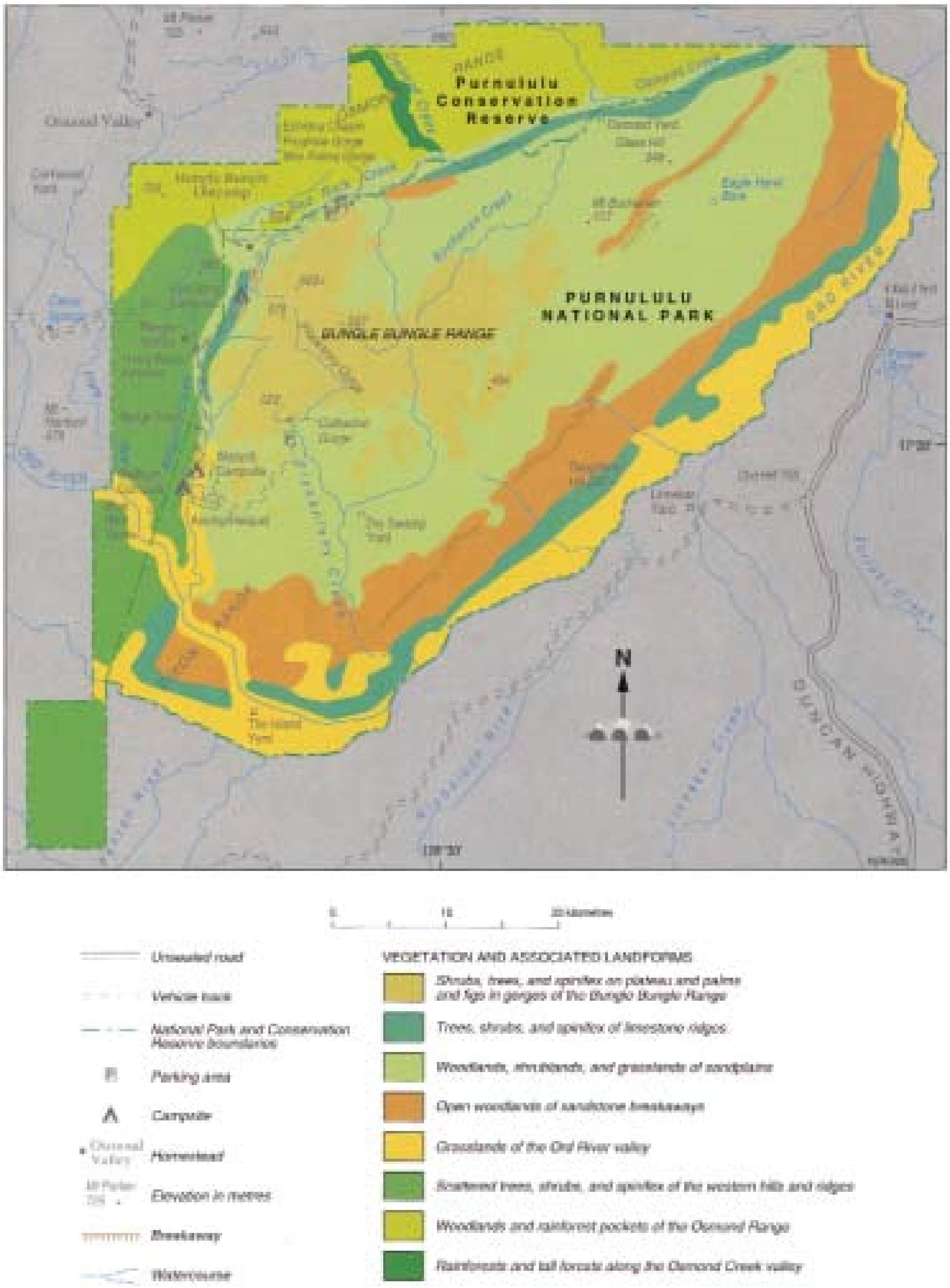
The Ord River forms the southern and eastern boundary of the Park, draining Bellburn Creek and Piccaninny Creek to the south and Red Rock Creek, Osmond Creek and Buchanan Creek to the north. These riverine ecosystems are vital resources and refuge areas for people and other species and continue to sustain the ongoing cultural and natural processes of the Park. Aboriginal use of the country has been primarily focused along the Ord River, Red Rock Creek and Osmond Creek. Living areas for traditional owners are to have been identified in these locations. Aboriginal people occupy and use natural resources across the whole landscape; their pattern of use depends upon social, economic and religious factors and the seasonal abundance of food resources at diverse sites.

While visitors will be naturally attracted to the spectacular Bungle Bungle Range, and the Park facilities and infrastructure that support that experience, Aboriginal people in the Park have different cultural and infrastructure needs. The different needs and common interests of all people in the Park will be the focus of future joint management arrangements as discussed in Chapter 4.

The diversity of vegetation and associated landforms is shown in Figure 3 (opposite). Each of these vegetation associations supports a range of generalist plant and animal species, as well as species more narrowly adapted to the soils, geology and microenvironment features. Aboriginal people sought out and used specific plants and animals throughout these landforms while pastoralists took advantage of the grasslands of the sand plains and Ord River Valley.

Access to the Park is from the west via the four-wheel drive Spring Creek track. There is also a rough track from the Osmond Valley to the north, but this is not open to the public. Historically, there was access across the Ord River from the east but this route is no longer open or feasible. The intense monsoonal rains of the wet season force closure of the Spring Creek access track and Park facilities, usually from December through March each year. Aerial tours are still possible, although reduced through lack of tourist numbers during the wet season.

The most striking natural attraction for most Europeans are the sandstone towers of the Bungle Bungle Range and the sense of remoteness and wonder gained from camping and walking in this spectacular landscape. Access to this experience is provided by three camping areas, about 50 kilometres of internal roads and seven walking tracks, ranging from short journeys of 30 minutes to two hours or overnight walks of 30 kilometres (Piccaninny Gorge). These features are clustered on the western side of the Park. There are also challenging opportunities for highly experienced walkers to take longer trips in the Park and Conservation Reserve. The majority of day visitors arrive by air to the airstrip and helipad near Bellburn Campsite. A commercial campsite has been established to cater for aerial visitors who are not carrying their own camping equipment. Flyovers of the Park follow a strict flight pattern determined by the national authority, CASA.


Purnululu Conservation Reserve
PURNULULU NATIONAL PARK
BUNGLE BUNGLE RANGE
Osmond Valley
ORD RIVER
DUNCAN HIGHWAY
N
Unsealed road
Vehicle track
National Park and Conservation Reserve boundaries
Parking area
Campsite
Homestead
Elevation in metres
Breakaway
Watercourse
VEGETATION AND ASSOCIATED LANDFORMS
Shrubs, trees, and spinifex on plateau and palms and figs in gorges of the Bungle Bungle Range
Trees, shrubs, and spinifex of limestone ridges
Woodlands, shrublands, and grasslands of sandplains
Open woodlands of sandstone breakaways
Grasslands of the Ord River valley
Scattered trees, shrubs, and spinifex of the western hills and ridges
Woodlands and rainforest pockets of the Osmond Range
Rainforests and tall forests along the Osmond Creek valley

3.2 History and development

Radiocarbon dating of archaeological sites indicates that Aboriginal people have lived in the Purnululu area for at least 20 000 years. Purnululu National Park contains many sites that display cultural and economic activities consistent with the long term use of the area as a continuing cultural landscape. Aboriginal occupation and social organisation in the east Kimberley was documented by Kaberry (1937, 1939) and subsequent other anthropological studies, particularly those done either by, or in conjunction with, the Purnululu Aboriginal Corporation.

The first colonists entered the Middle Ord Region about 120 years ago as explorers seeking mineral and pastoral resources. The first significant geological map of east Kimberley was produced by Edward Hardman in 1884. He described and sketched the 'strange and fantastic forms' which he assumed were the result of 'hard and soft' weathering having noted the differences between the 'yellow or reddish freestone' and the 'peculiarly hard fine-grained light grey grit' (Hardman, 1885 referred to by Hoatson and others 1997).

Cattlemen in southern Australia had also responded to the earlier expedition journal of Alexander Forrest who started travelling though the Kimberley in 1879. By June 1884 the first mob of 4000 cattle were brought onto the Ord River grasslands by Nathaniel Buchanan. In 1885, members of the Durack Family brought 6000 cattle onto what became Lissadell, Argyle and Rosewood Stations on the Ord River. By 1902, Hoatson et al. (1997) report that there were some 47 000 head of cattle on the Ord River Station. The introduction of so many cattle into the grasslands of the Ord River, landscapes that had never experienced hard-hoofed grazing animals, set in train the destructive process of massive landscape erosion. In 1967 the Ord River Station was resumed by the Western Australian Government who established stock control, soil erosion control and revegetation programs.

Although the area was explored and sketched in 1884 by Hardman, it was not until about 1930 that Arthur Muggleton from the neighbouring Tickalara Station named the sandstone features, Bungle Bungle. This was either a linguistic corruption of the Aboriginal word, Purnululu, or perhaps a reference to the 'bundle bundle' grass. During the 1900s, Aboriginal people in the east Kimberley became increasingly involved in dry season work and had semi-permanent living areas on pastoral stations. However, they were free to fend for themselves during the wet seasons when pastoral station work was not available. They must have witnessed the increasing degradation of their country by overgrazing and the loss of many of their traditional food resources due to overgrazing by cattle and soil erosion (Rose 1985; Scarlett 1985).

In 1983, a television program and some popular print media articles alerted Australians and international tourists to the 'previously unknown' Bungle Bungle Range. By 1986, 2350 people visited the area by vehicle. In 1987 the Western Australian Government declared Purnululu National Park, including the Bungle Bungle Range, and the Purnululu Conservation Reserve. By 1996 the number of visitors arriving by the rough four-wheel drive Spring Creek Track had increased to 14 500 and approximately 40 000 people took scenic flights over the area.

Bungle Bungle palms (*Livistona – sp Victoria River*), relics of a wetter climate, line the entrance to Echidna Chasm. Photograph: Nick Rains.

3.3 Recent investigations and records

There are reference above to studies of the cultural values; but there have been only a few specific scientific investigations of the natural values of the Bungle Bungle Range and Purnululu National Park. Young (1986, 1987, 1988) has investigated the striking geomorphology of the beehive formations and undertaken some microscopy on the microstructure of the interlocking sand grains. Forbes and Kenneally (1986) conducted the first comprehensive botanical survey of the Bungle Bungle Range and Osmond Range. Woinarski et al. (1992) and a team of fauna and flora experts conducted a wildlife and vegetation survey of Purnululu National Park and adjacent areas. Although these studies were of limited duration, they have greatly added to an understanding of the regional and local significance of the Bungle Bungle Range and Purnululu National Park allowing the area to be compared to other areas in northern Australia.

A comprehensive synthesis of the current knowledge of the geology, landforms, human history, plants and animals of the Bungle Bungle Range has been prepared by Hoatson and others (1997), and accompanies this nomination.

A detailed description of the cultural values of the Park has been prepared by Kirkby and Williams (2001) for this nomination (available for inspection by ICOMOS).

Towering cliffs provide a natural amphitheatre complete with reflective pool at Cathedral Gorge. Photograph: Nick Rains.

3.4 Present state of conservation

The present state of conservation is a result of the historic pressures of pastoralism and overgrazing and the current pressures of tourism. The sand plain and grasslands around the Bungle Bungle Range and along the Ord River formed part of the Ord River Regeneration Reserve that preceded the declaration of the Purnululu National Park. This reserve was declared by the Western Australian Government in 1967 in order to overcome the massive soil erosion set in train by the overgrazing of cattle in the early 1900s. A primary driver was to minimise siltation of the newly constructed Lake Argyle. The sand plain and grasslands have started to regenerate and the Western Australian Government monitors photo points and controls feral stock numbers.

Forbes and Kenneally (1986) noted the presence of invasive exotic plant species on the black soil plains which had been badly degraded by overgrazing of cattle in the past. More than 25 000 cattle were removed from the area in 1985–86 following construction of a 90 kilometre stock fence along the Ord River frontage. Some 4000 donkeys were also removed from the area during the late 1980s. Ongoing requirements include the timely control of feral cattle numbers, donkeys and occasionally camels. There is a current study into the control of feral cats which are prevalent in the area. Domestic pets, such as cats and dogs, are not allowed to be brought into the Park by visitors in order to minimise the risk of escape and predation on native fauna, in line with national park regulations.

In summary, the declaration of the Ord River Regeneration Reserve in 1967 and the Purnululu National Park in 1987 have improved prospects for long term recovery of vegetation cover. Minimising future damage by feral animals will be essential for restoring and maintaining biodiversity in recovering ecosystems along the Ord River and other streams in Purnululu National Park. The implementation of an appropriate fire regime utilising aspects of traditional Aboriginal fire management as well as contemporary knowledge and skills will also lead to further ecosystem recovery on the sand plains and black soil plains.

The current pressures of tourism affecting the present conservation of the property are focussed on the friable sandstone gorges, not the more resilient black soil plains, sand plains and grasslands affected historically by cattle. Fortunately, the rapid increase in visitor numbers has coincided with the development of the Park and its infrastructure. Expansion of the camping grounds to more evenly distribute site impacts and hardening of the walkways to the more visited features has protected vulnerable vegetation, soil and sandstone landforms from over-use.

Site ecosystems and landforms affected by historic pressures of pastoralism (overgrazing by cattle) and current pressures of tourism (relatively uncontrolled access) have probably been stabilised and are actively recovering through land management interventions and the declaration of reserves. However, ecosystem recovery and the present state of conservation are very much dependent on the numbers of visitors and feral animals in the Park and surrounding areas. Maintaining the trajectory for ecosystem recovery is also dependent on increasing resources to effectively manage the Park and ameliorate pressures from increased tourist numbers.

3.5 Policies and programs promoting the property

The Middle Ord Region is in the Australian Heritage Commission's Register of the National Estate (http://www.ahc.gov.au/cgi-bin/register/site).

The *Purnululu National Park Management Plan 1995–2005* (presently under review by the Conservation Commission and the traditional owners) sets out the following specific goals for management of Purnululu National Park and the Conservation Reserve:

1. **Conservation**: Conserve, protect and restore areas of scenic beauty, natural landforms, ecosystems and areas of scientific or cultural importance.
2. **Aboriginal Use**: Provide for Aboriginal traditional owners to live in the Park and maintain their customs and practices, consistent with provisions of the *Native Title Act 1993*, the protection of the natural environment and the minimisation of conflict between uses.
3. **Recreation**: Provide opportunities and facilities for public recreation, consistent with the protection of the natural environment and minimisation of conflict between uses.
4. **Community Relations**: Promote awareness and appreciation of natural processes and the natural and cultural attributes of the Park.
5. **Safety**: Protect the lives and property of Park residents, neighbours and visitors to the Park.
6. **Research and Monitoring**: Develop and maintain knowledge regarding the biological, physical and cultural environments of the Park to aid future management.
7. **Commercial Use**: Ensure that the impacts of industrial and other commercial uses on conservation resources and values are strictly controlled.

Interpretive activities form part of the overall management strategy for the Park. There is a visitor Information, Education and Interpretation objective which is:

> to provide visitors with information which will enhance their safety, knowledge, appreciation and enjoyment of the natural and cultural resources of the Park and Region.

A website for Purnululu National Park can be found at: http://www.calm.wa.gov.au, under the National Parks and Other Places section.

Overall, there has not been an active promotional campaign for the Park to date by the managers. However the area is widely promoted by tour operators and similar organisations. This has been consistent with the management objective of maintaining low key public access along the four-wheel drive Spring Creek track. The four-wheel drive track reduces overall vehicle numbers, increases opportunities for more organised safari tourism and retains the feeling of wilderness experienced by many visitors. Promoting aerial access to the Purnululu airstrip for day visitors is also seen as a way of limiting numbers of overnight visitors and the demand for Park resources and infrastructure upgrades, particularly for the access road.

Chapter 4
Management

The water of Piccaninny Creek reflects the distinctive domes of the Bungle Bungles. Photograph: Stephan Miechel.

4.1 Ownership

Purnululu National Park and Purnululu Conservation Reserve are currently vested in the Conservation Commission of Western Australia. In effect they are owned by the Government of Western Australia and managed by the Department of Conservation and Land Management (CALM).

Amendments to the *Conservation and Land Management Act 1984* are currently under negotiation to allow Purnululu National Park and Purnululu Conservation Reserve to be vested with a Prescribed Body Corporate. This legal entity could hold native title on behalf of traditional owners. It would then allow for the conversion of the Park to conditional freehold. A perpetual or term lease could then be granted back to CALM to manage the property on behalf of the Purnululu Park Council, a body made up of representatives of the traditional owners and CALM.

Phyllis Thomas (Booljoon-ngali). Kija language, Warmun, WA
The Escape 2000. Natural pigments on canvas 180 x 150 cm
Museum & Art Gallery of the Northern Territory Telstra Collection

The painting is set in country called Riya near the Turner River south east of Purnululu (the Bungle Bungles). It depicts a true episode from the turn of the twentieth century involving Phyllis' uncle Mick, from Ord River Station. He was chased across the red soil plains by mounted white men with guns. After running for some time the old man came across a billabong. Seeking refuge, he jumped into the water just as one of the white men shot at him. Thinking quickly, Mick cut himself with his knife.When the white men saw his blood in the water they were convinced that he was dead and rode away. Mick emerged unharmed and lived on to tell his story.

The painting also refers to the artist's mother's uncle, who passed away recently while being flown to Wyndham by the Flying Doctor. The plane flew over the Bungle Bungles and Mt Glass, shown here with the plane in the lower part of the picture.The black line is a creek near where her uncle was chased long ago.

(Frances Koford for Jirrawun Aboriginal Arts)

The traditional owners wish to return to their country and establish viable, healthy communities on living area leases within the Park as agreed with the Western Australian Government. Access to infrastructure funding, employment and training opportunities and the development of appropriate economic initiatives will be required to meet the needs and aspirations of traditional owners. These development aspirations are an integral part of the ongoing involvement and support by the traditional owners for World Heritage listing and future Park management.

4.2 Legal status

The area proposed for inscription, Purnululu National Park is a class "A" reserve (number 39897) for the purpose of "National Park". It was vested in the then National Parks and Nature Conservation Authority (now the Conservation Commission) of Western Australia. The original vesting was gazetted on the 6th March 1987 and the status was upgraded to "A" class on the 13th September 1988.

Australia provides a high level of legal protection to its World Heritage Areas. Purnululu National Park, once it is inscribed on the World Heritage List, will become a declared World Heritage property protected under the provisions of the Australian Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC). Under certain conditions, the protection of the EPBC Act can also be applied to Purnululu National Park following its nomination but prior to its inscription on the World Heritage List.

Under the EPBC Act, any action, whether taken inside or outside the boundaries of a declared World Heritage property, which may have a significant impact on the World Heritage values of the property are prohibited. Where such an action is proposed, it must be referred to the Commonwealth Environment Minister to determine whether the action requires approval under the Act. If approval is required, the proposed action is rigorously assessed under the provisions of the Act.

The Act also requires that the Commonwealth use its best endeavours to ensure that a management plan for each declared World Heritage property is prepared and implemented. The Act requires that management plans be consistent with the World Heritage Convention and the Australian World Heritage Management Principles which promote a nationally consistent standard for management of Australian World Heritage areas.

The Commonwealth has proposed new heritage legislation enhancing the *Environment Protection and Biodiversity Conservation Act 1999* to establish a National Heritage List, which will comprise places of significance to the nation as a whole. These places will be identified through a rigorous assessment process, using criteria that establish a high threshold for national significance. Places on the National Heritage List will be protected to the extent of the Commonwealth's constitutional powers. The Purnululu Conservation Reserve will be considered for its national heritage significance.

4.3 Protective measures and implementation

The major threats to the conservation status of the area have been overgrazing by cattle and feral animals leading to massive soil erosion. More recently, threats to the environment included inappropriate fire regimes and uncontrolled visitor pressure.

As indicated in Section 3.4, the area was included in a much larger area known as the Ord River Regeneration Reserve which was created in 1967. The main objective for this reserve was to minimise the potential siltation of the water reservoirs for the then under development Ord River Irrigation Area. A great deal of destocking of cattle, removal of donkeys and attempts at revegetation were carried out on the river frontage areas, particularly to the east and south of the Ord River. Comparatively little work was done on the proposed inscription area until momentum gathered for its conversion to national park. From around 1985 onwards large numbers of cattle and donkeys (25 000 and 4000 respectively) have been removed from the subject area. Relatively small areas were treated mechanically to promote regeneration of native grass and shrub species. Control of donkeys, cattle and occasionally camels, is ongoing.

Feral cats are present in the area and are considered a threat to the presence of some species of birds, mammals and reptiles. There is ongoing research to determine the level of the threat and the applicability of control measures.

The removal of large numbers of feral grazing animals has allowed prolific regeneration and revegetation over much of the area. This, in turn, has increased the need to implement an appropriate fire regime.

In 1987, burning of strategic buffers commenced, representing the first application of aerial prescribed burning in the Kimberley. Subsequently there has been an ongoing program of protective burning in order to protect Park assets from the possibility of frequent large scale wildfires. Whilst wildfires can still be a problem in the area, protective burning has assisted in reducing their size and their control requirements, as well as assisting in the maintenance of mosaic landscape heterogeneity. There is an ongoing commitment to developing and applying an appropriate fire management regime for the area.

4.4 Management authority

The area is managed under the *Conservation and Land Management Act 1984*, by the Department of Conservation and Land Management (CALM). As described in Section 4.1, a change in ownership arrangements will provide for joint management of the area by traditional owners and CALM, as directed by the Purnululu Park Council.

The Aboriginal people referred to as 'traditional owners' in this nomination are the registered Native Title claimants under the Commonwealth *Native Title Act 1993* of an area that includes the area proposed for nomination. The traditional owners are engaged in negotiation over a range of management issues with the Western Australian Government. These include joint management of the Park, transfer of ownership of the Park to the traditional owners and the establishment of mechanisms to deliver improved long-term employment, economic, cultural and socially sustainable benefits to the traditional owners. The decision by the State Party to nominate the area for the World Heritage List has stimulated further negotiations and the support of traditional owners for the nomination and potential inscription will require continued progress in these negotiations.

4.5 Local and regional management contacts

The Department of Conservation and Land Management has its Kimberley Regional Office in Kununurra and contact details are given below. On ground management of the Park is carried out under the direction of the Senior Operation Officer (based in Kununurra) by rangers and other staff based at the Park.

Local Contact:
Ranger in Charge
Purnululu National Park
c/o Conservation and Land Management
PO Box 242
Kununurra WA 6743
Telephone: 08 9168 7300, Fax: 08 9168 7326
E-mail: calmpurn@wn.com

Regional Contact:
Regional Manager
Department of Conservation and Land Management
PO Box 242
Kununurra WA 6743
Telephone: 08 9168 4200, Fax: 08 9168 2179
E-mail: chrisd@calm.wa.gov.au

Traditional owners are represented by the Purnululu Aboriginal Corporation:

Chairperson
Purnululu Aboriginal Corporation
PO Box 440
Kununurra WA 6743
Telephone: 08 9168 7392, Fax: 08 9168 7317
E-mail: purnululu@purnululu.com.au

4.6 Agreed plans for conservation and tourism development

Tourism to remote areas of outstanding natural beauty and value brings with it both benefits and challenges.

An influx of tourists requires increased levels of land management to ensure that the environmental assets survive in all their beauty and majesty and that tourism remains both viable and sustainable. Such requirements usually lead to declaration of National Parks and Conservation Areas (both in the case of Purnululu), bringing with them increased levels of regulation and management to protect these important values.

A further benefit is the money tourists bring to the region and its consequent increases in employment in job-scarce remote areas, particularly for local Indigenous people. Tourist demand for items of Indigenous art and craft can also bring combined benefits of providing financial returns to individuals in remote communities and encouraging practice and continuation of traditional activities. In recent years, increased interest in Indigenous cultural tours has led to the articulation and the sharing of traditional Indigenous customs with tourists from other cultural backgrounds.

Management action in the Park is guided by the *Purnululu National Park Management Plan 1995–2005*. This Management Plan is currently under a mid-term review by the Conservation Commission of Western Australia and the traditional owners. The possibility of World Heritage Area Listing was not considered in the drafting of the original Management Plan and this will be taken into account in the mid-term review. Further consideration will be given to the indirect impacts of increased tourism pressures both within the Park and on surrounding areas, such as access roads and the nearby communities of Turkey Creek and Halls Creek.

4.7 Sources and levels of finance

Management operations in the area are financed from within the regional budget allocated to the Kimberley Region of the Department of Conservation and Land Management (CALM). In addition revenue is raised for the Park from the sale of entry passes, collection of camping fees and commercial concession fees.

Current levels of funding for Purnululu National Park (2000/2001 figures) are:

Budget:		$324 620
Made up of:	Revenue:	$204 309
	Consolidated Revenue Funds:	$120 311

CALM has estimated future levels of funding to meet the upgrading of access roads and facilities and increased staffing to operate the Park as a result of the increased profile from any World Heritage Area status. These estimates are in the order of $6 877 000 spread over the first three years following the World Heritage nomination.

A detailed estimate of the costs for the development and operations of the living area infrastructure at two or three sites for traditional owners is being prepared. However, it is likely to be at least in the order of $3 000 000 for establishment costs and $300 000–500 000 per year operational costs.

4.8 Sources of expertise and training

The Department of Conservation and Land Management (CALM) has well trained and accredited staff managing the area. In addition it has the capacity to draw on other departmental staff both regionally or from other areas of the state as required for specific needs. External (to the Department) expertise can also be called on if required.

The traditional owners will bring their own traditional ecological knowledge and land management expertise for management of the area.

4.9 Visitor facilities and statistics

Visitor facilities are provided in keeping with the general theme of the Park, which is one of a remote, unspoilt environment, where visitors may seek a wilderness experience if they wish, and all may enjoy the natural and cultural features of the area.

Facilities include a four-wheel drive access track and internal tracks, airstrip, two public camping areas and visitor facilities, a fly/drive camping area for licensed operators, walking trails and a visitor centre.

Visitor statistics show that the rate of increase in the number of visitors on the ground has slowed over the last three years. There are now around 18 000 ground based visitors per year.

Interest in viewing the Park from the air remains high, though statistics are not readily available.

4.10 Site management plan and objectives

The specific goals for conservation, Aboriginal use, recreation, community relations, safety, research and monitoring and commercial use are listed in Section 3.5. A copy of the Purnululu Management Plan is attached as Attachment B.

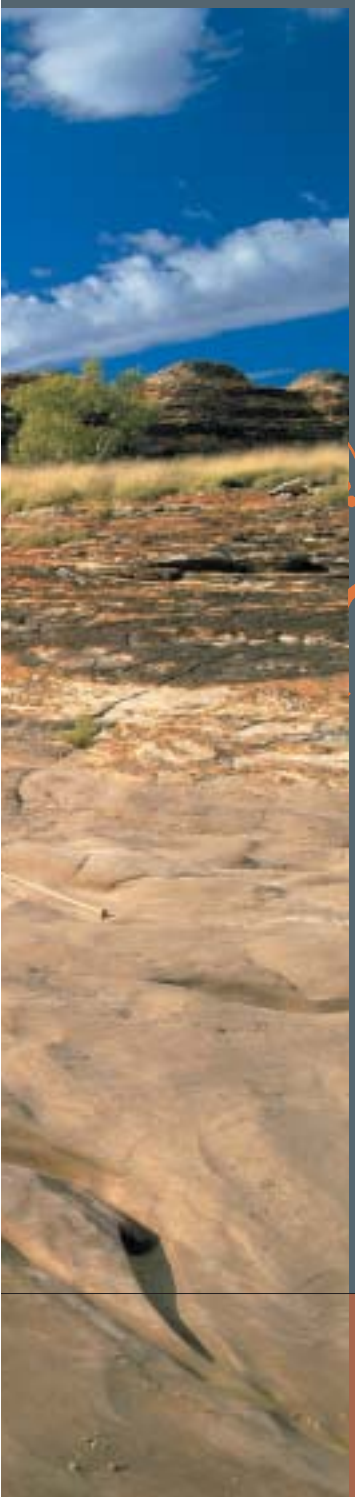
4.11 Staffing levels

Local staff levels are presently considered below optimum by CALM. Staff involved are as follows:

Ranger in Charge	(1)
Ranger	(1)
Visitor Centre Manager	(1 Seasonal)
Volunteers	(Several seasonal campground hosts)

In order to meet the demands of a possible World Heritage Listing and increased visitor pressure, it is expected that the following core staff will be needed in addition to seasonal volunteers and Aboriginal trainees:

National Park Rangers	(2)
Park Maintenance Workers	(2)
Aboriginal Heritage Officers	(2)



Chapter 5
Factors affecting the site

The domes of the Bungle Bungles frame the fluted creek bed of the lower Piccaninny Creek.
Photograph: Stephan Miechel.

5.1 Development pressures

The current Spring Creek access track is maintained to four-wheel drive standard rather than for conventional on-road vehicles for a number of reasons:

– in line with the Management Plan the road is "consistent with the wilderness nature of the Park";

– the standard of the track is an effective measure limiting the numbers of visitors using road access to more manageable levels — visitor pressure and infrastructure demands within the Park are, therefore, more manageable;

– this strategy favours local (regional) business and economy by ensuring many potential visitors consider the options of flying and/or taking guided safari type trips rather than self driving.

However, there is a constant call for the road to be upgraded to a standard accessible by on-road vehicles. Past surveys have showed an overwhelming support by the visiting public to maintain the philosophy of a four-wheel drive access track. The question of the standard of access to the Park will be reviewed as part of the mid-term review process for the current working plan, which expires in 2005.

Tourism interests have expressed a desire to develop an additional style of accommodation in the Park along the lines of a safari camp. Whilst there has been some previous consideration of this proposal there is no current activity towards its progress.

The traditional owners plan to develop three living areas within the Park.

5.2 Environmental pressures

Some of the walking tracks need redesign and repair to overcome wear and tear caused by the high volume of pedestrian traffic in specific areas. A programmed approach to walk track upgrading is being implemented.

There is an ongoing need to upgrade internal roads to ensure that their impact is minimised and that they are of an appropriate standard for visitor safety.

5.3 Natural disasters and preparedness

An emergency action plan has been prepared for the Park. In addition the fire management strategy for the area is to be updated and formalised. The management of visitor risks is focussed on avoiding flooded river crossings and rock injury through Park closure during the wet season and minimising the fire risks through prescribed burning early in the dry season.

5.4 Visitor and tourism pressures

The current campsites approach full capacity at peak times. However, there are no finalised plans nor are the resources currently available to develop or operate an additional campsite. There may be a case to limit visitor numbers at such times.

There is a need to increase the number of and upgrade the standard of visitor facilities in line with increasing numbers of visitors and their heightened expectations.

Accumulated impact of foot traffic on several of the tracks leading to major attractions is of concern. As indicated the track system is being assessed and upgrading will be implemented to minimise impacts.

The likely impact of increased visitation through the proposed establishment of a Regular Passenger Transport (RPT) aerial service has not been assessed.

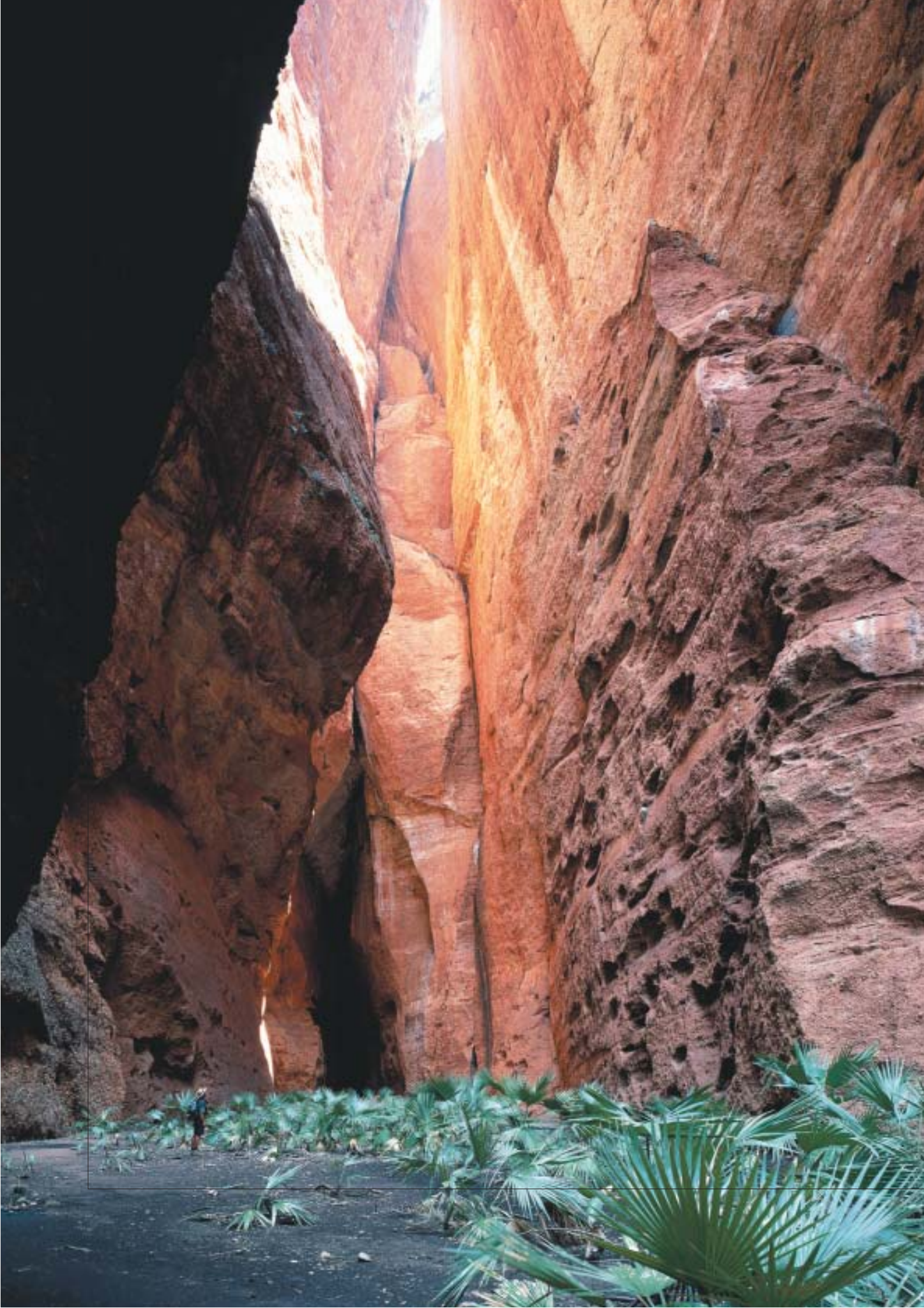
5.5 Number of inhabitants within the property

Current and anticipated levels of habitation within the Park are unlikely to pose significant management pressures.

5.6 Cultural areas

Where issues arise in relation to culturally sensitive areas, these issues are given high priority by CALM management.

There is a need and significant pressure to provide Aboriginal cultural information for the Park. This is a potential employment and training opportunity for Aboriginal people to interpret their culture for visitors.



Chapter 6
Monitoring

Stunted Bungle Bungle palms (*Livistona sp – Victoria River*) line the floor of the cool and sheltered Mini Palms Gorge. Photograph: Nick Rains.

6.1 Key indicators for measuring state of conservation

Under the Management Plan, key indicators will be developed as part of guidelines for research and monitoring by the Purnululu Park Council and the Consultative Advisory Committee. Neither of these groups has yet been established.

6.2 Administrative arrangements for monitoring property

It will be the responsibility of the Purnululu Park Council to direct monitoring efforts and allocate adequate resources for incorporating new monitoring knowledge into management actions.

6.3 Results of previous monitoring and reporting

A number of surveys have been carried out in the area and various reports (published and unpublished) are available. These are mentioned in the bibliography.

Snappy gums (*Eucalyptus brevifolia*) are a characteristic of the open woodlands surrounding the sandstone breakaways. Photograph: Stephan Miechel.

Bibliography and Information Sources

The alternating dark grey and orange horizontal banding is a distinctive feature of the sandstone beehives. Photograph: Carolyn Thomson-Dans/Department of Conservation and Land Management WA.

Akerman, K (1998). The original inhabitants. In *The Australian Geographic Book of the Kimberley*, revised edition. D McGonigal (ed.). Australian Geographic Pty Ltd.

Anderson, EN (2001). Maya Knowledge and "Science Wars". In *Journal of Ethnobiology*, vol. 20, no. 2, pp. 129–158.

Australian Heritage Commission's Register of the National Estate database (http://www.ahc.gov.au/cgi-bin/register/site).

Beazley, O (2000). Cultural Landscapes as World Heritage. University of Sydney Dissertation.

Brosius, JP (1999). The Western Penan of Borneo. In *The Cambridge Encyclopedia of Hunters and Gatherers*. RB Lee and R Daly (eds). Cambridge University Press.

Broughton, GW (1965). *Turn Again Home*. Angus and Robertson, Sydney.

Convention on International Trade in Endangered Species, http://www.cites.org/eng/resources/fauna.shtml

Dortch, CD (1977). Early and late stone industrial phase in Western Australia. In *Stone Tools as Cultural Markers: Change, evolution and complexity*. RVS Wright (ed.). Australian Institute of Aboriginal Studies, Canberra.

Eder, JF (1999). The Batak of Palawan Island, the Philippines. In *The Cambridge Encyclopedia of Hunters and Gatherers*. RB Lee and R Daly (eds). Cambridge University Press.

Eldridge, DJ; Lepage, M; Bryannah, MA and Ouedraogo, P (2001). Soil Biota in Banded Landscapes. In DJ Tongway, C Valentin and J Seghieri (eds). Banded Vegetation Patterning in Arid and Semiarid Environments: Ecological Processes and Consequences for Management, In *Ecological Studies*, vol. 149. Springer, New York.

Elkin, AP (1930). The Rainbow-serpent myth in North-West Australia. In *Oceania*, vol. 1, pp. 349–352.

Elkin, AP (1932). Social organization in the Kimberley Division, North-Western Australia. *Oceania*, vol. 2, no. 4, pp. 296–333.

Flood, J (1997). *Rock Art of the Dreamtime*. Angus and Robertson, Sydney.

Forbes, SJ and Kenneally, KF (1986). A botanical survey of Bungle Bungle and Osmond Range, south-eastern Kimberley, Western Australia. In *Western Australian Naturalist*, vol. 16, pp. 93–169.

Hoatson, D; Blake, D; Mory, A; Tyler, I; Pittavino, M; Allen, B and Kamprad, J (1997). *Bungle Bungle Range — Purnululu National Park, East Kimberley, Western Australia: a guide to the rocks, landforms, plants, animals, and human impact*. Australian Government Publishing Service, Canberra.

Hunn, ES (1990). *Nch' i-Wana "The Big River"; Mid-Columbia Indians and Their Land*. University of Washington Press, Seattle.

Kaberry, PM (1937). Subsections in the East and South Kimberley tribes of North West Australia. In *Oceania*, vol. 7, no. 4, pp. 436–458.

Kaberry, PM (1938). Totemism in East and South Kimberley, North-west Australia. *Oceania*, vol. 2, no. 4, pp. 265–288.

Kaberry, PM (1939). *Aboriginal Woman: sacred and profane*. George Routledge and Sons, London.

Kirkby, I and Williams, N (2001). *Purnululu National Park World Heritage Cultural Values Draft Final Text*, prepared for Environment Australia.

Latz, P (1995). *Bushfires and Bushtucker*. IAD Press, Alice Springs.

Lazarides, M (1997). A Revision of *Triodia* including *Plectrachne* (Eragrostideae, Triodiinae). In *Australian Systematic Botany*, vol. 10, pp. 381–489

Maddock, K (2001). Women, Religion, and the Meaning of the Sacred in Phyllis Kaberry's Australian Ethnography. In *Anthropological Forum*, vol. 11, no. 1, pp. 55–71.

McGregor, W (1988). A survey of the languages of the Kimberley region — report from the Kimberley Language Resource Centre. In *Australian Aboriginal Studies*, vol. 2, pp. 90–101.

Merlan, F (2000). Representing the Rainbow: Aboriginal Culture in an Interconnected World. In *Australian Aboriginal Studies*, vol. 2000/1&2, pp. 20–26.

Morphy, H (1999). Traditional and Modern Visual Art of Hunting and Gathering Peoples. In *The Cambridge Encyclopedia of Hunters and Gatherers*. RB Lee and R Daly (eds). Cambridge University Press.

Myers, FR (1982). Always Ask: Resource Use and Land Ownership Among Pintupi Aborigines of the Australian Western Desert. In *Resource Managers: North American and Australian Hunter-Gatherers, AAS Selected Symposium 67*, NM Williams and ES Hunn (eds). Boulder: Westview Press for the American Association for the Advancement of Science.

Neale, M; Kleinert, S (2000). *The Oxford Companion to Aboriginal Art and Culture*. Oxford University Press.

Parks Canada (2000). An Approach to Aboriginal Cultural Landscapes, http://parkscanada.pch.gc.ca/aborig/sitemap_e.htm.

Ross, H (1989). *Impact stories of the East Kimberley*. (East Kimberley Working Paper, no. 28). Centre for Resource and Environmental Studies, Australian National University.

Scarlett, NH (1985). *A preliminary account of the ethnobotany of the Kija people of Bungle Bungle outcamp*. (East Kimberley working paper, no. 6). Centre for Resource and Environmental Studies, Australian National University.

Stanner, WEH (1934). Ceremonial economics of the Mulluk Mulluk and Madngella Tribes of the Daly River, North Australia. In *Oceania*, vol. 4, nos 2 and 4.

Thomas, R with Akerman K; Christensen W and Caruana W (1994). *Roads Cross. The Paintings of Rover Thomas*. National Gallery of Australia, Canberra.

Veevers, JJ (ed.) (2000). *Billion-year Earth history of Australia and neighbours in Gondwanaland*. Gemoc Press, Sydney.

Viles, H (1995). Ecological perspectives on rock surface weathering: Towards a conceptual model. In *Geomorphology*, vol. 13, pp. 21–35.

Woinarski, JCZ (ed.) (1992). *A Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin no. 6. Department of Conservation and Land Management, WA.

Wray, RAL (1997). A global review of solutional weathering forms on quartz sandstones. In *Earth Science Reviews*, vol. 42, pp. 137–160.

Young, RW (1986). Tower Karst in Sandstone: Bungle Bungle massif, northwestern Australia. In *Zeitschrift Fur Geomorphologie*, vol. 30, no. 2, pp. 189–202.

Young, RW (1987). Sandstone landforms of the tropical East Kimberley Region, Northwestern Australia. In *Journal of Geology*, vol. 95, pp. 205–218.

Young, RW (1988). Quartz etching and sandstone Karst: Examples from the East Kimberleys, Northwestern Australia. In *Zeitschrift Fur Geomorphologie*, vol. 32, no. 4, pp. 409–423.

Young, E (2001). Looking After Country is Men's and Women's Business: Institutional Support for Indigenous Land Management. In *Dialogue (Academy of the Social Sciences in Australia)*, vol. 20, no. 2, pp. 28–32.

Attachment A

Hoatson, DM and others (1997). *Bungle Bungle Range — Purnululu National Park, East Kimberley, Western Australia: a guide to the rocks, landforms, plants, animals, and human impact*. Australian Geological Survey Organisation, Canberra.

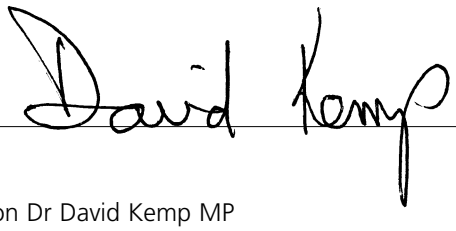
Attachment B

Purnululu National Park Management Plan 1995–2005, (1995). No. 33. WA Department of Conservation and Land Management for the National Parks and Nature Conservation Authority.

Attachment C

Proposed Boundaries of Nominated Area and Buffer Zone.

Signature of State Party



The Hon Dr David Kemp MP

Minister for the Environment and Heritage

Commonwealth of Australia

January 2002

Environment Australia

Department of the Environment and Heritage

Nomination of Purnululu National Park by the Government of Australia for Inscription on the World Heritage List

Supplementary Information

Kimberley Tourism Association

Being additional scientific and management information requested by IUCN/ICOMOS assessors and to be read in conjunction with Australia's Nomination of Purnululu National Park for Inscription on the World Heritage List.

September 2002

Table of Contents

Abstract

This document provides supplementary information in support of Australia's nomination of Purnululu National Park for inscription on the World Heritage List. The information was provided in response to requests made by the assessors during the ICOMOS and IUCN mission to evaluate the property in August 2002.

The document is intended to supplement rather than replace Australia's nomination. It provides further information on the outstanding cultural and natural values of a highly complex landscape.

This supplementary information includes a revised statement of significance that outlines the case for the outstanding universal value of Purnululu National Park under the criteria for which it has been nominated.

The additional information includes further evidence of the outstanding universal value of the property under Natural Criteria (i) (ii) and (iii).

Australia has also nominated Purnululu National Park as a cultural landscape under Cultural Criteria (iii), (iv) and (vi). The document provides additional information on Indigenous connections to country and how these connections have been maintained and expressed in the continuing cultural landscape of Purnululu National Park. This information includes newly available data on traditional land use patterns (Attachments 1 and 2).

Finally, the document includes an update of recent developments in management arrangements for the Park including the issue of joint management. A fuller description of how Australia's national legislation protects the World Heritage values of Australia's World Heritage Properties is also provided.

Statement of Significance

Purnululu National Park is of outstanding international significance for its natural and cultural values that exemplify important aspects of the evolutionary history of a continent, its biota and its traditional human societies.

The Purnululu karst formations are the outstanding international example of the operation of karst processes on uniform, horizontally stratified sandstone. The expression of these formative processes within the property is exceptional, reflecting the formation and evolution of a siliceous karst landscape over at least 20 million years. They are evidence of significant ongoing geomorphic processes of dissolution, weathering, and erosion in the evolution of landforms within ancient, stable sedimentary landscapes.

The outstanding universal natural values of Purnululu National Park include the unmatched examples of cone karst formations in sandstone. The globally significant features of the formation include their geomorphological maturity, the size and diversity of cone structures and their areal extent, the maintenance of horizontal stratification within the parent sediments and the extraordinary development of protective horizontal cyanobacterial banding on the surface of the karst structures.

Although widely known in Australia only in the past few decades, and still relatively inaccessible, Purnululu National Park is recognised internationally for its exceptional natural beauty. The extent, scale and the grandeur of the karst landforms of Purnululu National Park impart an aesthetic quality of outstanding universal value. This beauty derives particularly from the extraordinary arrays of banded 'beehive' cone structures of the karst landscape. The beehive structures are unrivalled in their extent, size and diversity of form. They undergo extraordinary seasonal variation in appearance, including striking colour transitions after rain. The setting for the karst landforms of Purnululu National Park, at the edge of a desert that extends across the ancient centre of the continent, contributes to their exceptional natural beauty and inspirational qualities. The outstanding aesthetic values of Purnululu National Park are recognised in a range of creative achievement and have inspired the internationally recognised Warmun (Turkey Creek) Indigenous art movement.

The natural ecosystems, flora and fauna of Purnululu National Park illustrate how the Australian biota has evolved and adapted to the conditions of increasing aridity and climatic variability that progressively influenced the continent following its separation from

Gondwana and its subsequent northward drift from far southern latitudes. The composition and diversity of the biota of Purnululu reflects the habitats of the complex karst landscape and the adjacent riverine and desert ecosystems and its transitional location between the tropical monsoon environments characteristic of the far north of the continent and the arid desert environments that extend across its interior. The diversity associated with this unusual combination of flora and fauna includes relict species, endemic species and species at the edge of their range.

Purnululu National Park is of outstanding universal value as a cultural landscape that illustrates the ongoing relationships of Australia's traditional human societies with the land. Aboriginal people have lived in the East Kimberley Region for at least the last 20 000 years. The Park provides exceptional testimony to this hunter-gatherer cultural tradition. Aboriginal people have adapted to this ecologically diverse and resource rich environment, moving between the uplands in the wet season and along the river in the dry, while using intermediate lands in all seasons. Fire has been, and continues to be, an important tool in Aboriginal management of this environment. Purnululu National Park shows how people have adapted to a diverse environment and to features of aridity and wetter areas.

Ngarrangkarni is the continuing guiding principle in the living traditions and beliefs of Purnululu's traditional owners. This outstanding example of Indigenous Australian religious philosophy (popularly known as the 'Dreaming' or the 'Law') has been handed down through countless generations and is still in force today.

The landscape is imbued with cultural traditions. The *narraku*, the relationship that is created by a shared name linking an individual to a geographical feature, and which is connected to personal identity, is part of the living tradition. Material testimony to this tradition is also abundant. It is to be found in hundreds of archaeological sites, including rock art sites, artifact scatter, stone quarry site, burial sites and sites dating to the contact period.

The cultural landscape is also significant because its people and traditions have survived to the present despite the impact of colonisation. The culture of the traditional owners of the Park is outstanding in revealing its resilience at a time when such cultures have everywhere become vulnerable under the impact of irreversible change.

The Purnululu National Park, when included on the World Heritage List, will enhance the representativeness of the List and also complement other World Heritage properties in

Australia, especially the arid Uluṟu–Kata Tjuṯa National Park and the monsoonal Kakadu National Park.

A summary table of the values for which Purnululu has been nominated for inscription on the World Heritage List is at Attachment 3.

Supplementary Information: Natural Criterion I – Geomorphic Processes

Outstanding example representing significant geomorphic of physiographic features

Outstanding universal value

The Bungle Bungle Range is an outstanding international example of siliceous tower karst, and the most outstanding global example of the cone expression of siliceous tower karst. The globally significant features of the formation include its geomorphological maturity, the range of size and diversity of cone structures and their areal extent, the maintenance of horizontal stratification within the parent sediments and the extraordinary development of protective horizontal cyanobacterial banding on the surface of the karst structures.

The Purnululu karst formations are the internationally outstanding example of the operation of karst processes on uniform, horizontally stratified sandstone, providing evidence of the significance of ongoing geomorphic processes of dissolution, weathering, and erosion in the evolution of landforms within ancient, stable sedimentary landscapes. This expression of karst formative processes within horizontal stratification is exceptional in its clarity, reflecting the formation and evolution of a siliceous landscape over at least 20 million years.

The mature landforms of the Bungle Bungle Range provide an internationally exceptional demonstration of the role of the structural and lithological features of the rock body in siliceous karst formation. The large cones at Purnululu have resulted from the long stability of the landscape, the lithology of the sandstone, with its complex interlocking silica grains and the relative uniformity of the rock with its paucity of vertical jointing.

The karst features of the Range are distinguished by both the quality and scale of their expression of the processes of karst formation. The limited structural discontinuities of the Purnululu sandstone exert a spatially variable, but generally minor influence in the development of the tower landscapes (Young 1987: 212). The symmetrical towers and arêtes, often separated by flat-floored embayments, demonstrate the importance of granular disintegration. Had the stone been more cohesive, and had weathering and erosion been concentrated along fissures leading to their enlargement, the shape of towers and ridges would have become more irregular until they merge into highly dissected ‘ruiniform’ terrain (cf Young 1987).

The cyanobacterial banding of the formations of the Bungler Bungle Range provides a strong connection between major stages in the Earth's evolutionary history and ongoing geological, biogeochemical and ecological processes. The cyanobacterial crusts of the Bungle Bungle Range, unique in the extent of their expression on such landforms, exemplify the significance of these ancient life-forms as colonisers and stabilisers of rocks and sediments. As colonisers protecting substrate from erosion, in fixing nitrogen for biological processes, and in initiating mineral precipitation, they are likely to have played a significant - if yet poorly explored - role in the evolution of the forms of the Earth's surface. Among the oldest known fossils are cyanobacterial from Archaean rocks of Western Australia, dated 3.5 billion years old. Morphologies in the group have remained much the same for billions of years. The oldest known rocks are only 3.8 billion years old. During the Archaean and Proterozoic era, photosynthesizing cyanobacteria generated an oxygen-rich atmosphere upon which later life-forms have relied, shaping the course of evolution and ecological change (Taylor and Taylor 1993).

Purnululu karst formations

The Bungle Bungle Range contains an extremely impressive and extensive example of the cone karst variant of tower karst. The dominant rounded hill landforms of Purnululu, often described as tower-karst, may be more precisely termed cone-karst because of their rounded peaks. They are at a relatively mature stage of the karst cycle. By virtue of both their form and extent, they are by far the most outstanding, if not unique, representation of this unusual landform in quartzite.

Many towers are beautifully symmetrical, rising from steep footslopes to convex summits. Towers are often grouped, according to size, with the largest standing 100 m and more above the adjacent plain. Towers on the southern flank are cut by labyrinthine systems of very narrow gullies. The area represents a highly mature landform, and contains isolated cones on the plain separated from the massif, and thought by Young to mark former positions of the retreating flanks (1987: 207-208).

The cone karst towers of Purnululu owe their distinctive form and appearance to a suite of interacting features and processes (Young 1986, 1987, 1988; Wray 1997a; Hoatson 1997). The karst cones are considered to owe their form to:

- having been formed over an exceptionally long period (20 million years or more)
- being formed in geologically stable horizontally-bedded rocks

- the liberation of sand grains by solution of the amorphous silica, followed by the removal of the sand by monsoonal rains
- being formed in structurally uniform massive rock in which solution along bedding planes and fissures joints has been relatively unimportant
- the moderation of erosional processes by the development of protective biogenic crusts and mineral skins
- the convex forms dispersing erosional forces
- the coherence of the weathered rock despite its friability.

Typical tower and pinnacle karst forms are characterised by relatively localised weathering and erosion processes along structural flaws. Most accounts of karst in sandstone or quartzite have emphasized the dominant role of the widening of joints and fissures by chemical etching and subsequent physical detachment of quartz grains. The Purnululu landforms reflect distinct sandstone karst processes, in which solution is not limited to the widening of fissures, but penetrates relatively uniform massive rock. In this process the extensive etching of quartz grains and the siliceous structures binding them produces very friable sandstone which is eroded into complex arrays of tower karst, exemplified by the Bungle Bungle Range of northwestern Australia (Young 1988: 410; 1986). Etching probably occurred in humid acidic environments, although some of it seems to have occurred where environments were seasonally alkaline. Although friable, the close interlocking of grains provides a degree of coherence to the rock allowing the formation of steeply sloping landforms.

Evidence that the Bungle Bungles formed in massive weathered rock is provided by exposures incised by the lowest stream channels. A bore sunk south of the massif has revealed that this extremely friable sandstone extends more than 100 m below the plain (Mory in Young 1987: 211-212). Evidence for deep weathering of the massive rock is found also in microscopic examination of samples from the Bungle Bungle Range which has revealed not only surface solutional etching of the component quartz grains, but also evidence of the dissolution of most, but not all, of the structures cementing the silica grains (Young 1986: 1988).

Despite their friability, the close interlocking of grains and high angles of internal friction allow the Bungle Bungle sandstones to stand in steep faces (Young 1988: 409). Convexity of the tower summits is explained by the low cohesion of the sandstones, and by the distribution of stresses on the slope. The towers are erosionally stable, minimizing concentration of erosive energy by dispersing runoff radially (Young 1987: 211). The entrainment of grains

from the rock slopes is retarded by the extensive alternating bands of cyanobacterial crusts, and the thin case-hardened mineral skins, which cover virtually all outcrops.

The characteristic and distinctly alternating bands throughout the Bungle Bungle Range (the 'beehive' formations) are representative of on-going landscape evolution through geomorphic processes. The banding is described and illustrated in Australia's Nomination of Purnululu National Park (Commonwealth of Australia 2002). The cyanobacteria of the bands may well have been implicated in some way in the solutional processes in the formation of the Bungle Bungles (Barker et al 1997), while the stabilising effects of the cyanobacterial crusts have supported and maintained the shape of the hills through protecting the underlying rock from erosional processes. The potential involvement of cyanobacteria in solutional processes is suggested by the nature of some surface etchings described by Young (1988). Other microbiota involved in karst processes have been demonstrated under different circumstances to either dissolve or deposit carbonates or sulphates. The striping effect is probably an ecological interaction between the geological properties of the sandstone, the iron, manganese and kaolin transported to the surface and the biogeochemical mediation of the cyanobacteria which contributes to the stability of the Bungle Bungle Range. The cyanobacterial skins on the Purnululu formations appear to be developed to a unique degree compared to other quartzitic karsts.

The cyanobacterial crusts of the Bungle Bungle Ranges reflect the role of these ancient life-forms as colonisers and stabilisers of rocks and sediments, and are notable also as components, with lichens, mosses fungi and other biota, of biogenic crusts on soils in arid landscapes (Eldridge et al 2001). Such biogenic crusts are a ubiquitous (often invisible) feature in desert landscapes. Within these complexes they play a vital role in protecting soil surfaces from wind and water erosion, and in arid and semi-arid environments the cyanobacterial component of lichen or algal crusts may be the largest source of fixed nitrogen to local systems. Colonising and stabilising effects of cyanobacteria colonies have also been reported on sandstone formations in the United States. Kurtz and Netoff (2001) report on the effect of cyanobacterial crusts in increasing the mechanical strength, and resistance to intense wind abrasion of friable sandstone in arid Utah.

International Context

There has been considerable attention paid to the geomorphology of the Bungle Bungle Range, in particular the processes of solutional weathering that have led to the striking landforms (Young 1986, 1987, 1988; Wray 1997a). These publications address the global

phenomena of the development of tower karst in sandstones and place the Bungle Bungles in a regional, national and international setting. Wray, noting their existence over a wide latitudinal and climatic range, undertook a global review of solutional weathering forms on quartz sandstones (1997). As indicated in Australia's Nomination of Purnululu National Park (Commonwealth of Australia 2002), sandstone karst formations are relatively poorly represented on the World Heritage List compared to limestone.

At the world level, most quartzite or sandstone karst is confined to solutional action along vertical joints or other fissures in massive quartzites, which may produce very deep shafts, sometimes with more horizontal cavities at the base level. This is the case at the Venezuelan Canaima National Park World Heritage property (Multiple authors 1976; Galan and Urbani 1989; Bernabei et al 1994; Urbani 1997). The Wulingyuan Scenic and Historic Interest Area in China is also characterised by a more extremely dissected 'ruiniform' morphology of towers and pinnacles, as distinct from the rounded cones of Purnululu. Listed under Natural Criterion iii, the site is dominated by a large number of sandstone pillars and peaks. Vertical joints are a major factor in the formation of these peaks and associated gullies. Other major occurrences are at Chimanimanie in Zimbabwe (Aucamp and Swart 1991; Truluck 1991; Martini 2000) and throughout large areas of Brazil (Neto 2000).

In central Africa, immense tablelands of low relief quartzitic karst have a multitude of rock shelters or other small caves that are of great cultural importance. The largest area is in the Central African Republic (Boulevert et Juberthie 2001) and one author (Mainguet 1972: 113) argues that within the African continent at least as many caves are to be found in quartzite as in limestone. The Ennedi region of Chad provides examples of large and often complex sandstone towers and domes of karstic origin (Wray 1997a: 142).

Australia, particularly tropical Australia, contains a number of other tower karst landforms in sandstone. Karst sandstone formations occur in the East Kimberley in addition to those of Purnululu. Karst towers are widely developed in sandstones in the Bonaparte Gulf Basin near Kununurra. These are less numerous and much less impressive than those of the Bungle Bungles (Young 1987: 208). The symmetrical towers of Keep River National Park and in Milligan Hills are not of a comparable scale to the expressions in Purnululu National Park. Other formations in the Burt Range, at Spirit Hill, Elephant Hill and in Hidden Valley are irregular, merging into a highly dissected 'ruiniform' morphology (Young 1987: 208).

A very significant expression of tower karst is found at the Ruined City of Arnhemland in the Northern Territory. The Ruined City includes highly dissected karst landscape of more

pronounced ‘ruiniform’ morphology and does not exhibit the mature cone tower form expressed in the Purnululu formations. Joint control of erosion in the Ruined City of Arnhemland is more important than it is in the Bungle Bungles (Young 1987: 216-217).

Sandstone karst in the Sydney Basin contains steep-walled pinnacle towers and beehive shaped sandstone towers. These structures reflect strong lithological control and the preferential erosion of joints (Wray 1997a: 143). The beehives present in northern Queensland are attributed to the disintegration of sandstone to a fine-grained and easily removed debris (Young 1987: 216-217). Both Sydney and Queensland examples are significantly less mature and much more irregular in form than the Purnululu karst formations.

Karst formation at Purnululu National Park

The geological and geomorphic history of the Bungle Bungles is a complex one. The Kimberley region is comprised of ancient rocks that have twice been uplifted, and subjected to intervening periods during which surface rocks were eroded away. However, in spite of the uplift, there has been little tectonic impact within the region, and so the current landscapes have resulted from a long period of relative stability. The sandstones of Purnululu have resulted from a very long period of structural stability during which the landscape evolved to its present form.

Research into karst processes in siliceous rocks is relatively new, and further study is required before there is a complete understanding of the phenomenon. White et al (1966) first demonstrated the occurrence of karst in quartzites and quartzitic sandstones. The term karst warrants clarification. Essentially, karst is a land system that has been shaped, at least largely, by chemical solution (Ford and Williams 1989: 1, 29, 43; Lowe and Waltham 2002: 22-23, 33). But as in virtually all geomorphic processes, solution rarely occurs in isolation from other processes. Thus, other forms of erosion and weathering, including mechanical removal of particles and biological action, often accompany it, and usually the two or more processes involved are well integrated. It is noted that many textbook discussions, and even some definitions of the term, assume or imply that karst and karstic processes are only found in limestone or other carbonate rocks. It is also common to emphasise the place of caves, even though there are many occurrences of karst in a wide range of rocks that do not include caves.

It is now widely recognised that both quartz and amorphous silica are soluble in water, particularly at high temperatures (Wray 1997b). Solution is generally slower than in many other rocks such as the carbonates, sulphates and salt. Amorphous silica, which often forms the 'cement' in siliceous sandstones, is more soluble than crystalline quartz, and it is this amorphous form that has been both dissolved and re-deposited at Purnululu (and many other sites), so liberating the sand grains for mechanical erosion. Solutional landforms on highly siliceous sandstones and quartzites are globally widespread and include pinnacles and towers, caves, corridors, grikes, solution basins and runnels (Wray 1997a: 137). The form of larger Karst features usually reflects the major structural features of the host rock, the jointing and bedding (Wray 1997a: 140).

The sandstone terrain of the East Kimberleys, which includes Purnululu, has been eroded under a tropical savanna climate from highly quartzose sediments that suffered intense antecedent leaching of silica. The diverse topography of the East Kimberley sandstones reflects contrasts in mass strength and modes of failure that were determined primarily by the degree of porosity of the rock at the onset of weathering in the Late Mesozoic or Early Tertiary (Young 1987: 205).

The formation of karstic features in quartzose rocks requires the mechanical removal of sand under vadose conditions, but solutional processes are nonetheless critical (Wray 1997a: 140). The formation of the Bungle Bungles has certainly involved erosion by the simple washing away of granules of silica grains from the sandstone surface, either by rain or by stream flow. However, erosion has been accompanied by karstic processes (Wray 1997a, 1997b; Young, 1986, 1987, 1988). Biological processes may also have been involved. The broad erosional processes that have contributed to the formation of the Bungle Bungles are described in Hoatson (1987).

Supplementary Information: Natural Criterion II – Biological Processes

Outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial ecosystems and communities of plants and animals

Outstanding Universal Value

Purnululu National Park, in the transition between the monsoon tropics and arid climatic zones, contains outstanding examples of ongoing ecological and biological processes by which a continent's unique biota has adapted to climatic change resulting from tectonic movement of the Australian plate over geological time.

The nominated property includes an outstanding, representative example of the responses of biota to the transition between Australia's northern and central biogeographical regions which extends across northern part of the continent. The flora and fauna also constitutes a significant example of the diversity of the Australian biota in a relatively low rainfall environment.

The diversity of the biota reflects the location of the property at the transition from arid to humid climatic zones, and also the range of microenvironments and habitats within the complex, deeply dissected topography of its dissected uplands and sandstone karst landscapes. The vegetation communities include examples of closed forest communities in the sheltered sandstone gorges, riverine vegetation, and open woodland, shrubland and grassland vegetation communities that extend from moist habitats typical of the East Kimberley Region to the north into drier habitats typical of the inland desert regions.

The vegetation represents a structural continuum from closed forest to grassland which is broadly representative of the response of the vegetation to the major environmental gradients across the continent associated with changing moisture availability. The biota includes a high diversity of plant and animal species, with at least 619 species of vascular plants and 298 species of vertebrates, with 149 bird species, 81 species of reptiles, 41 mammal species, 15 species of fish and 12 frog species recorded for the property and adjacent areas.

The biota of Purnululu National Park also represents an unusual combination of tropical and desert taxa associated with the transitional location in a zone of intermediate rainfall between monsoon environments of the north of the continent and the desert environments of inland areas. The mixing of mesic and arid communities and species within one place also reflects

the range of habitats provided by the complex terrain of the dissected uplands and karst landscapes, ranging from humid to semi-arid set within a relatively low rainfall environment. The biota includes species typical of both humid and arid environments, including many at the extreme limits of their range of distribution. Purnululu National Park includes the extreme southern (inland) penetration of closed forest and other mesic communities typical of the humid north of the continent, juxtaposed with a representation of arid-zone taxa at the most northerly extension of their range.

The natural ecosystems and biota of Purnululu National Park include significant examples of ongoing ecological and biological processes by which the Australian biota has responded to environmental change over evolutionary time. This particularly includes the increasing aridity and climatic variability that has influenced the continent progressively during its northward drift from far southern latitudes following its separation from Gondwana about 80 million years ago. Significant examples include relict species, endemic species and species in taxonomic complexes.

An exceptional diversity of the Spinifex grass *Triodia* which dominates the major part of arid Australia also occurs within Purnululu National Park. The 13 species recorded for the Purnululu region make this one of the two areas of highest diversity for *Triodia* currently known for the continent (the other is Kakadu National Park). Purnululu National Park is recognised as an important centre of endemism for *Triodia*. The mix of mesic, transitional and xeric species of *Triodia* within the property is thought likely to be a result of successive radiations and contractions of *Triodia* in response to major climatic change associated with recent glacial and interglacial periods.

In addition, the sandstone karst towers, particularly including the characteristic banded 'beehive' cones and dome structures, provide an exceptional representation of cyanobacteria banded biological crusts, discussed under natural criterion (i). These are integral to the formation and stability of the karst landscape and are thought to represent some of the oldest life forms on Earth. Other known examples include the fossil forms found in Western Australia believed to be 3500 million years old and representative of the earliest forms of life on earth, and also the living stromatolite forms which have persisted at Shark Bay World Heritage Area.

Significant representation of the diversity of the Australian biota

Purnululu National Park includes a significant representation of the outstanding diversity of the Australian biota. The diversity of flora and fauna within the nominated property is influenced particularly by the exceptionally wide range of environments contained within its complex landscape features, and also by the location of the property at the transition between the monsoon tropics and the arid zones of central Australia.

The variety and complexity of landforms within Purnululu National Park is a major factor contributing to its environmental heterogeneity. The landforms include the uplands of the Bungle Bungle Range, dominated by extensive sandstone upland areas and including many steep valleys, gorges and chasms. The sandstone upland areas rise to a maximum of 250 metres above the surrounding plains. The unusual cone form of mature sandstone tower karst occurs throughout the upland areas, particularly in the south-west and north-east and the characteristic arrays of domes also extend as outliers to the upland areas into surrounding plains, particularly to the south and east of the uplands. The western and northern margins of the Bungle Bungle Range are characterised by steep escarpments, sheer cliffs and overhangs. Limestone outcrops also occur on the western side of the uplands. Elements of riverine systems run through the property, and include the Ord River and associated flood plains of the Ord River Valley which extends along the south and east margins.

The uplands are dissected by gorges and chasms, many of which extend deeply into the upland areas. The narrow gorges provide sheltered sites that are important in providing permanently-moist environments. The permeable and jointed components of the sandstone substrates contribute to retention of water in the upland areas and some maintenance of groundwater flows during prolonged dry periods. The gorges and chasms also include some seasonal or permanent water pools fed by these retained groundwater flows.

The unusual environmental heterogeneity created by this complex terrain is further accentuated by a marked variation in the availability of surface water, both spatially and temporally. Pronounced seasonality of rainfall, high evaporation rates, rapid runoff, and very little retention of surface water are characteristic features of the climate and landscapes of Purnululu National Park. These features contribute to the unusually wide range of environments and habitats available within an area of relatively low rainfall.

The vegetation of Purnululu National Park and surrounding area constitutes a structural 'continuum' in response to the wide range of habitats. The environmental variation within the property encompasses a broad gradient from subhumid to semi-arid habitats (Gambold 1992). The structural response of the vegetation varies from closed forest at the wetter sites in sheltered valleys and gorges, to open forest stands in riparian areas, to open woodlands of decreasing stature and cover associated with the progressively drier environments of the elevated uplands areas, the slopes, river valleys and plains, and eventually to stunted shrublands and grasslands at the driest sites on the uplands and surrounding plains. This structural continuum from closed forest to arid grassland affords a representative example within one place of the broad structural response of the vegetation to environmental variation on the Australian continent, particularly the major gradient associated with changing rainfall distribution and moisture availability.

Vegetation communities have been defined for the Purnululu region variously on the basis of land systems, structure and floristics (Forbes and Kenneally 1986), and floristic composition (Menkhorst and Cowie 1992). At least 17 vegetation communities have been identified ranging from closed forest communities in the sheltered valleys and gorges of the Bungle Bungle Range and adjacent Osmand Creek valley, open forest and woodland communities, many dominated by *Eucalyptus* and *Melaleuca*, woodland and shrubland communities dominated by *Eucalyptus* and *Acacia* and with a wide range of shrub and grass understoreys that occur throughout the ridges, hills, slopes and also the sand plains of the lowland areas, and grasslands of tussock and spinifex grass communities which extend into the driest areas (Menkhorst and Cowie 1992, Hoatson et al. 1997).

The diverse plant communities of Purnululu National Park provide habitat for an exceptionally wide range of plant and animal species. The available biological survey records illustrate the high diversity of flora and fauna within Purnululu National Park Despite relatively limited survey effort, especially when compared with better-known places such as Kakadu National Park, the species richness of the flora of Purnululu National Park is considerable. It has been described as 'relatively rich' in comparison with other sites in monsoonal Australia, and 'especially unusual' given the low rainfall of the region (Menkhorst and Cowie 1992).

Plant taxa recorded in surveys of Purnululu National Park and surrounding area in 1989 included 616 plant species including 17 ferns and fern allies (Menkhorst and Cowie 1992). A more recent 'Landscope' expedition conducted in 1999 by the Western Australian Department of Conservation and Land Management identified an additional 40 plant species

not previously recorded for Purnululu National Park and adjacent areas (Edinger, Coate and How 1999). A current (September 2002) listing of herbarium records provided by the Western Australian Herbarium shows a total of 653 species of plants recorded for the area associated with Purnululu National Park. This most recent tally comprises 628 higher plant species including 597 native species, 17 species of ferns and fern allies, and 8 species of lower plants (bryophytes and algae) (Attachment 5). The diversity of particular components of the flora, for example the ferns, is regarded as especially significant for an area with mean annual rainfall of about 600 mm (Menkhorst and Cowie 1992).

The diversity of vertebrate fauna species recorded for the Purnululu region in the survey reported in Woinarski (ed) (1992) is relatively high and includes 149 bird species, 81 reptile species, 41 mammal species, 15 fish species and 12 frog species. The invertebrate fauna remains relatively little investigated to date, although 32 ant taxa were recorded during the 'Landscope' survey of 1999 (Edinger, Coate and How 1999).

Woinarski *et al* (1992) recorded 34 native mammal species for Purnululu National Park and adjacent area making this amongst the richer sites for native mammals recorded for lower rainfall areas in northern Australia. Purnululu National Park is also significant for its diverse representation of Australia's native reptile fauna with 79 species. For example, only two other known sites in northern Australia exhibit greater diversity of native reptile species. These include Kakadu National Park (118 species) which extends across a large area, and the Hamersley Range (84 species) which is more arid (300 mm rainfall). Two central Australian sites also have a higher diversity of reptiles, including Uluru-Kata Tjuta National Park (86 species) and West MacDonnell National Park (85 species) (Fisher and Woinarski 2002).

It should be emphasised that the species totals are likely to underestimate the biological diversity within the nominated property. There has been relatively limited biological survey of the area to date, including only limited systematic stratified sampling of the wide heterogeneity of environments within Purnululu National Park. For example, the major survey reported in Woinarski (1992) encompassed ten widely spread study sites in two seasons of one year. There is also a general paucity of data for wet seasons, largely because of practical and logistic difficulties of survey at this time. The marked seasonal fluctuations in expression of the annual flora and in activity patterns of some animal taxa mean that these components of the biota are likely to be substantially undersampled and thus under-represented in species lists (Menkhorst and Calvin 1992, Kevin Kenneally, WA Department of Conservation and Land Management, September 2002). For example, the list of

herpetofauna has been described as ‘undoubtedly incomplete’ (Gambold 1992). The absence of surveys of the invertebrate fauna is also significant.

Comparative studies show that Purnululu National Park and surrounding areas provides an exceptional example of a significant component of Australia’s biodiversity that is also representative of the extension of the northern monsoon biota into seasonally-arid inland environments that are subject to periodic drought. The diversity of flora within the property is unusually high for areas with relatively low rainfall (Menkhorst and Cowie 1992). The species richness of the fauna is broadly comparable to sites of higher biological diversity in northern Australia. The retention of permanently-moist habitats in the deep chasms and gorges of the Bungle Bungle Ranges within Purnululu National Park is believed to be a major factor contributing to the richness of the biota.

Transition between the tropical monsoon environments and arid desert environments

Purnululu National Park is located in a zone of intermediate rainfall between the ‘Torresian’ (northern tropical savanna) and ‘Eyrean’ (inland arid desert) biogeographic regions of Australia. The transitional location between monsoon environments typical of the north of the continent and the deserts that extend throughout the continent’s interior is significant in terms of its influence on the biota. It has contributed to an unusual combination of tropical and desert taxa within the property, as well as the high species richness discussed above. The property is significant for its representation of the biota of this transition zone which extends across the continent linking the northern monsoon and inland biogeographic regions of the continent.

The plant communities of Purnululu National Park include significant south-easterly extensions of closed forest riparian communities in north-west Australia. Important examples of closed to open forest communities occur in the sheltered sandstone gorges with permanent to semi-permanent watercourses within the property and surrounding area. The communities include tree, shrub and ground layer species at the southern margins of their distributions, including many species of ferns. Dominants of these communities include trees such as the palm *Livistona victoriae*, and also *Melaleuca leucadendra*, *Syzygium angophoroides* and *Ficus* species.

Although these Torresian communities are described as being at ‘the extreme inland penetration’ of their range in the Purnululu region (Forbes and Kenneally 1986), some

elements of the communities are known to extend further inland (J. Woinarski, Parks and Wildlife Commission of the Northern Territory, personal communication, September 2002). The expression of these Torresian communities at Purnululu National Park affords a significant and representative example of the attrition of these mesic communities as they approach the inland limits of their range. Permanently-moist habitats retained within the valleys and gorges of the uplands provide critical habitat for these communities and species, enabling them to persist in a semi-arid region by buffering them from the ravages of drought and also fire (Menkhorst and Cowie 1992). Examples of low closed forest, including vine forest thickets, also occur on the limestone outcrops in the northern and western parts of the Bungle Bungle Range. Dominants include the fig *Ficus opposita* and other species at the limits to their range including *Celtis philippinensis, Premna acuminata, Clerodendrum tomentosum* and *Vitex glabrata*. Plant taxa towards the limits of their distribution in Purnululu National Park include many of the species within these forest communities.

Communities and species typical of the drier areas including the arid deserts also occur widely in the upland areas of the Bungle Bunge Range. Communities variously dominated by *Eucalyptus*, *Acacia* or *Triodia* species are widespread on the drier exposed parts of the upland areas and ranges. These include a range of plant taxa at the northern limits of their range of distribution.

The representation of *Triodia* within Purnululu National Park affords a significant example illustrating the mixing of taxa from tropical environments and desert environments within the nominated property.

Triodia species recorded for the Purnululu region include 4 taxa with tropical distributions, 3 with sub-tropical distributions (one of which is endemic to the property), 4 with sub-tropical desert distributions, and 2 with desert distributions. The combination within one place of thirteen species of *Triodia* from these different climatic zones is highly unusual.

The vertebrate fauna of Purnululu National Park and surrounding areas has been described as including a mixture of widespread species, species typical of the tropical north and a minority of species characteristic of arid Australia (Woinarski et al. 1992). The overall vertebrates species composition of the Purnululu region has greater affinity with northern tropical environments despite the low rainfall and seasonally-arid climate of the property. Many vertebrate species with predominantly northern tropical distributions reach the southern limits of their range in the Purnululu region. These are largely confined to habitats associated with

the wetter gorges and valleys, and also occur in some parts of the riparian systems (Woinarski 1992).

Distribution of Triodia species recorded in Purnululu National Park

Species	Distribution
Triodia bitextura	Tropical
Triodia bunglensis	Sub-tropical (restricted to Purnululu)
Triodia burbidgeana	Tropical
Triodia bynoei	Sub-tropical
Triodia epactia	Sub-tropical desert
Triodia intermedia	Sub-tropical desert
Triodia inutilis	Sub-tropical desert
Triodia microstachya	Tropical
Triodia procera	Tropical
Triodia pungens	Desert
Triodia spicata	Desert
Triodia stenostachya	Sub-tropical
Triodia wiseana	Sub-tropical desert

Twenty-nine vertebrate taxa are regarded as reaching the southern limits of their distribution within the Purnululu region (Ric How, Western Australian Museum, personal communication, September 2002). These include 11 species of mammals (see also Woinarski *et al.* 1992), 16 species of reptiles and 2 species of amphibians. Gambold (1992) described the reptile fauna as including about 40% Torresian species and 25% Eyrean species. The bird fauna includes about 50 species (35%) with a northern (Torresian) distribution and 24 species (16%) with a southern (Eyrean) distribution. The remainder typically have widespread distributions (Woinarski 1992).

Bird taxa typical of closed forest communities that are significant for reaching the southern (inland) limits of their range of distribution in the Purnululu region include *Aviceda subcristata* (Pacific Baza), *Eudynamys scolopacea* (Common Koel), *Ixobrychus flavicollis* (Black Bittern), *Geopelia humeralis* (Bar-shouldered Dove), *Ramsayornis fasciatus* (Bar-breasted Honeyeater), *Neochmia phaeton* (Crimson Finch) and *Rhipidura rufiventris* (Northern Fantail).

Significant mammal species at Purnululu National Park
(from Western Australian Museum Mammal Database, September 2002)

Family	Species	Edge of range	Transitional
Dasyuridae	Planigale maculata	South	
	Pseudantechinus ningbing	South	Yes
	Sminthopsis virginiae	South	Yes
Muridae	Pseudomys delicatulus	South	
	Pseudomys desertor	North	Yes
	Pseudomys laborifex	South	
	Rattus tunneyi	South	
	Zyzomys argurus	South	
Vespertilionidae	Myotis moluccarum	South	Yes
	Nyctophilus arnhemensis	South	Yes
	Nyctophilus bifax daedalus	South	Yes
	Scotorepens sanborni	South	

Other bird taxa characteristic of the relatively tall Eucalypt open forests of wetter areas also reach their inland range limits in the Purnululu region. These include *Platycercus venustus* (Northern Rosella), *Philemon argenticeps* (Silver-crowned Friarbird), *Cracticus torquatus* (Grey Butcherbird), *Myiagra rubecula* (Leaden Flycatcher), *Coracina papuensis* (White-bellied Cuckoo-shrike) and *Poephila personata* (Masked Finch) (Woinarski 1992). Reptile species which reach the southern limits of their distribution in the Purnululu region include *Morelia spilota varietata* (Carpet Python) and a species of *Gehyra* (Gambold 1992).

The occurrence of *Myotis moluccarum* (Large-footed Mouse-eared Bat) within the Purnululu region is also regarded as significant. The distribution of this species is limited by aridity and also the lack of permanent water bodies. Its occurrence within the nominated property represents both an inland range extension of its distribution, and also an extension of its previously-known habitat (Woinarski et al. 1992).

The vertebrate fauna of the nominated property includes species that typically occur in the continent's desert environments. Significant examples of vertebrate taxa with arid zone distributions which reach their northern limit in the Purnululu region include one mammal species, *Pseudomys desertor* (Desert Mouse) (Woinarski et al 1992), desert birds including *Petroica goodenovii* (Red-capped Robin), *Eremiornis carteri* (Spinifex Bird), and *Lichenostomus keartlandi* (Grey-headed Honeyeater) (Woinarski 1992) and desert reptiles

including *Lerista bunglebungle* in the *Lerista desertorum* group, *Egernia slateri* (Nocturnal Burrowing Skink), *Proablepharus reginae* (Gambold 1992).

Significant reptile and amphibian species at Purnululu National Park
(from Western Australian Museum Reptile Database, September 2002)

Family	Species	Edge of range	Rare	Transitional
Reptiles				
Agamidae	Ctenophorus caudicinctus			Yes
	Diporiphora arnhemica			Yes
	Diporiphora bennettii	South		
	Diporiphora lalliae			Yes
	Diporiphora magna	South		
Colubridae	Dendrelaphis punctulata	South		
Gekkonidae	Gehyra nana	South		
	Gehyra pilbara			Yes
	Heteronotia planiceps	South		
	Oedura gracilis	South		
	Rhynchoedura ornata			Yes
	Strophurus ciliaris	South		
Scincidae	Carlia amax	South		
	Carlia munda	South		
	Cryptoblepharus megastictus	South		
	Ctenotus decaneurus	South		
	Ctenotus militaris			Yes
	Ctenotus piankai			Yes
Scincidae	Egernia slateri		Vulnerable (national)	Yes
	Eremiascincus richardsonii			Yes
	Glaphyromorphus isolepis	South		
	Lerista bunglebungle		Rare (Endemic)	
	Lerista greeri			Yes
	Lerista taeniata		Rare	Yes
	Notscincus ornatus	South		
	Proablepharus reginae			Yes
	Proablepharus tenuis	South		
Varanidae	Varanus glauerti	South		
	Varanus mitchelli	South		
Amphibians				
Hylidae	Litoria splendida	South		
	Litoria wotjulumensis	South		

Adaptation and evolution of the Australian biota

The natural ecosystems and biota of Purnululu National Park provide significant representative examples of the ongoing ecological and biological processes by which the Australian biota has responded to environmental change over evolutionary time. The plants, animals and ecosystems associated with the dissected upland areas, complex karst landscapes and adjacent riverine systems and plains of Purnululu National Park illustrate aspects of the evolutionary responses of the Australian biota to increasing aridity and climatic variability which progressively influenced the continent during its northward drift from far southern latitudes following separation from Gondwana about 80 million years ago. Important examples include relict species, endemic species, and species within taxonomic complexes.

Purnululu National Park is a significant refuge area for flora and fauna. The sheltered valleys and gorges of the uplands provide important habitat for relict species believed to have been formerly widespread at times when the climate was wetter . The diversity of habitats associated with the dissected and karst terrain, and particularly the retention of permanently moist areas in a seasonally-arid climate, are major factors contributing to the importance of the region as a refuge for flora and fauna during times of drought and climatic variation (Forbes and Kenneally 1986). The Purnululu region has been rated as 'highly significant' in the context of other refuge areas in arid and semi-arid Australia (Morton et al. 1995).

A number of important relict species have been recorded within the nominated property. These include plant species of palms, trees, ferns, shrubs, herbs and mosses (Menkhorst and Cowie 1992). Many relict species are restricted to the sheltered moist environments of the steep valleys and deep gorges that extend into the elevated areas of the massif, and also the adjacent Osmand Ranges and Plateau. Examples include the palm, *Livistona victoriae*, and also the fern, *Taenitis pinnata*, which has a remarkably disjunct distribution confined to the Purnululu region and several remote areas in far north-east Queensland. The nationally-vulnerable *Solanum carduiforme* also has a remarkably disjunct distribution with a single collection from Purnululu National Park and other known populations restricted to north west Queensland.

Relict fauna species recorded for the Purnululu region include the nocturnal burrowing skink *Egernia slateri* which has been recorded on the upland areas of the Bungle Bungle Ranges. Other known populations of this species occur on the alluvial plains of the Finke, Palmer and

Todd Rivers in Central Australia (Gambold 1992). Although the invertebrate fauna is yet to be substantially surveyed, the property is regarded as likely to include many more relictual invertebrate species (J. Woinarski, Parks and Wildlife Commission of the Northern Territory, personal communication, September 2002).

Relict plant species recorded in Purnululu National Park
(from Menkhorst and Cowie 1992)

Scientific name	***Common name***
Comesperma secundum	Shrub
Erigeron ambiguus	Daisy
Melicope elleryana	tree species
Grevillea psilantha	shrub
Leptospermum longifolium	tree species
Lindernia sp.	Herb
Livistona victoriae	Victoria palm
Micraira sp.	resurrection grass
Stemodia sp.	Herb
Stephania japonica	Vine
Taenitis pinnata	Fern
Triodia bunglensis	Grass
Uleobryum peruvianum	Moss

Other species of vertebrate fauna recorded for the Purnululu region which have not been recorded from other conservation reserves in north-western Australia include *Scotorepens sanborni, Pseudomys desertor, Ctenotus piankai, Cyyclodomorphus melanops, Lerista aericeps, Varanus kingorum* and *Lerista bunglebungle* (Woinarski et al. 1992). These may also include taxa of relictual or endemic significance.

Purnululu National Park is significant as a centre of endemism for both plants and animal species, particularly amongst taxa restricted to the sheltered valleys and gorges of the upland areas. Endemic plant species recorded for the Purnululu region include *Grevillea psilantha, Lindernia eremophiloides* an species of *Stemodia* and also the spinifex species *Triodia bunglensis* which occurs on the sandstone upland areas of the Bungle Bungle Range and the adjacent Plateau (Menkhorst and Cowie 1992). There is one endemic vertebrate species, *Lerista bunglebungle*, known only from Cathedral Gorge within Purnululu National Park

The distribution and diversity of the arid-adapted grass, *Triodia*, within Purnululu National Park provides a significant illustration of the adaptation and evolution of important elements of the Australian biota (Graham Griffin, CSIRO Sustainable Ecosystems, personal communication, September 2002). The genus *Triodia* belongs to an isolated sub-tribe (Triodiniinae) of the tribe Eragrostideae. *Triodia* includes 64 species, all of which are endemic to Australia (Lazarides 1997). *Triodia* is believed to have separated from other closely-related groups in the late Miocene (Clayton and Renvoize 1986) and to have evolved subsequently on the Australian continent, particularly in the northern elevated areas during post-Miocene glacial periods when sea levels were up to 150 metres lower than present-day levels (Chappell and Shackleton 1986). These areas, such as the sandstone uplands of the Kimberley region (including the Bungle Bungle Ranges), Arnhem Land and the Pilbara region (Beard 1976), were up to 300 kilometres further inland, and subject to more arid climates. During the interglacial periods, the genus radiated out from these areas into environments that were no longer hyper-arid, including the infertile desert habitats towards the centre of the continent.

Triodia species show remarkable adaptations to the hot dry conditions and infertile soils with poor water-holding capacity typical of Australia's environments (Winkworth 1967, Beard 1976). The adaptations include a distinctive leaf anatomy adapted to reduce water loss (Burbidge 1946, Jacobs 1971, McWilliam and Mison 1974), and root systems able to absorb maximum moisture from soils through mechanisms of osmotic adjustment (Slatyer 1961). The foliage is highly flammable, which is regarded as a key factor in influencing the frequency and intensity of the periodic fires that are characteristic of ecosystems dominated by the genus (Griffin 1992).

The present distribution of *Triodia* now extends across most of the arid and semi-arid areas of the continent, including tropical seasonally-arid environments of northern Australia (Lazarides 1997). The genus dominates many of the ecosystems in which it occurs. It is regarded as forming the dominant species in almost one third of Australia's tropical, sub-tropical and arid zone plant communities (Graham Griffin, CSIRO Sustainable Ecosystems, personal communication, September 2002).

The Purnululu region represents a major centre of endemism and diversity for *Triodia* species. A total of thirteen species have been recorded for the property and adjacent areas, including *Triodia bunglensis* which is known only from Purnululu National Park. The property is one of the two areas of highest diversity for *Triodia* currently known for the continent, the other being Kakadu National Park (J. Woinarski, Parks and Wildlife

Commission of the Northern Territory, personal communication, September 2002). Comparative studies using a rectangular mapping grid for the continent have confirmed that the Purnululu region is one of the richest of equivalent grid cell areas in Australia (Graham Griffin, CSIRO Sustainable Ecosystems, personal communication, September 2002). The mix of mesic, transitional and xeric species of *Triodia* within the property is thought likely to be a result of successive radiations and contractions of *Triodia* in response to major climatic change associated with recent glacial and interglacial periods (Graham Griffin, CSIRO Sustainable Ecosystems, personal communication, September 2002).

Supplementary Information: Natural Criterion III – Superlative Natural Phenomenon

Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

Purnululu National Park is of exceptional beauty and aesthetic importance and contains superlative natural phenomena.

Although widely known in Australia only in the past few decades, and still relatively inaccessible, Purnululu National Park is recognised internationally for its exceptional natural beauty. The extent, scale and the grandeur of the karst landforms of Purnululu National Park impart an aesthetic quality of outstanding universal value. This beauty derives particularly from the extraordinary arrays of banded 'beehive' cone structures of the Bungle Bungle Range. The beehive structures, rising steeply from the surface, are unrivalled in their extent, size and diversity of form. Individual cones or chains of cones may reach heights of over a hundred metres. They undergo extraordinary seasonal variation in appearance, including striking colour transitions after rain.

To the north and west of the Bungle Bungle Range, cone karst gives way to a stark plateau and outliers dissected by narrow, deep, steeply cliffed gorges. A range of vegetation types brings a diversity of colour, texture and form to the landscape. The diversity includes the spiny spinifex tussock grassland, typical of the arid centre of Australia on the Park's arid slopes and plains, the dark closed forests of northern monsoonal taxa in the moister gorges, the Paperbark-Red Gum forests of the riparian zone, and the wide grasslands and open woodland of the plains. The setting of the unusual karst landforms of Purnululu National Park, on the edge of a desert that extends across the ancient centre of the continent, contributes to their exceptional beauty and inspirational qualities.

Purnululu National Park is of outstanding aesthetic importance - recognised in a range of creative achievement. The Bungle Bungle Range has inspired the internationally recognised Warmun (Turkey Creek) indigenous art movement, some of whose work has been reproduced in Australia's nomination of Purnululu National Park (Commonwealth of Australia 2002). The dark resinous surface of the 'massive brooding' *Purnululu Country*, 1989, another important work of the movement, is incised with zig-zag and linear markings reminiscent of the engraving that decorates artefacts, slates and boab nuts in the region. The rock forms also bear dotted designs that derive from body paintings, showing that country and law are

intertwined in the mind of the artist (Ryan 1993: 41-42). Hector Jandany's *Gayirriwariny mountain rang*e, 1990, depicts a range of hills in the north-eastern part of the Bungle Bungles. Gayirriwariny was formed in the ancestral period from the echo of Ganggamerl, an old spirit woman (Ryan 1993: 43). Unlike *Purnululu Country*, the mountains stand out as separate shapes outlined against a black background.

A communal fostering of two way education at Warnum in art forms such as mythopoeism (dreamt corroborees), as well as painting, has strengthened cultural identity, pride in language, knowledge of sacred sites mythology and a resurgence of ritual law, and is a vital element in the current efflorescence of art in the east Kimberley (Ryan 1993: 43). The paintings of Purnululu are not simply images: 'The Turkey Creek paintings crystallized out of the recent history of the eastern Kimberleys and are part of the continual process of establishing the relationships between people and land. Relationships are passed on in new forms, old forms take on new meanings, established myths find new expressions and the sources of influence are sometimes wider than they were before. Continuities and connections can be seen everywhere . . . (Morphy 1998: 142)'

Despite their isolation, the Bungle Bungles have drawn and inspired non-Indigenous Australian artists. Notable among them have been Sir Sidney Nolan (1917-1992) and John Olsen. Nolan, arguably Australia's greatest ever painter in the Western tradition (Rosenthal 2002), was distinguished for his exploration of Australian identity and landscape, particularly in the arid hinterland and interior. He is well-known internationally for his influential responses to landscape and for internationalising Australian art. His *Central Australia, Bungle Bungles*, 1967, captures the isolation of the interior. Olsen, recognised nationally and internationally as one of Australia's most significant artists (Hart 1991), is well known for his mural *Salute to Five Bells* which adorns the Sydney Opera House. His journey to the North West of Australia including Purnululu in 1983 inspired a number of paintings including *Bungle Bungle Ranges* and *Bungle Bungle Ranges and Owl* (Olsen 1984a). Olsen's works of this period are amongst his best known. Of his journey he observed that conventional European compositional devices based on geometric patterns would be totally inadequate to the landscape. *Camel and Bungle Bungle Ranges* was one of the most memorable works of the series (Hart 2000: 155-159). Recurring visual themes in artistic interpretations of Purnululu have been colour, scale, evocations of the emblematic cone landforms and the dramatic setting of the Bungle Bungle Range at the edge of the deserts of Australia's interior. Purnululu has also inspired a number of contemporary musical compositions.

The poet Geoffrey Dutton (1922-1998), a central figure in Australian literary life, was privileged to see the area during rain. Dutton, responded strongly to the colours of the rock and its banding, to the form of the domed towers, and to the timelessness, and scale of the place. In *Bungle Bungle Ranges* (Olsen 1984b), he evoked the landscape through imagery connecting the forms and colour of the Bungle Bungle landscape to Buddhist temples in Cambodian, a mosque in Mashhad or a striped marble cathedral in Siena.

'. . . Tessellated domes, layers of colour
Laid cinnamon, black and white up from the high-grass plain . . .'

The Bungle Bungle Range encapsulates themes of remoteness, stark beauty, mystery and aridity that have been powerful threads through the artistic and literary history of non-Indigenous Australia.

The remarkable landscapes of Purnululu have captured the public imagination. When the Park was established in 1988 it received about 4,000 visitors per year, twelve years later annual visitor numbers were estimated to be in the order of 20,000 despite the remoteness of the location. Numbers of visitors are expected to continue to increase. The powerful aesthetic experience offered by the area's unique environment has figured largely in the attraction of the area, and is prominent in national and international tourism advertising.

Purnululu National Park is dominated by the Bungle Bungle Range – a superlative natural phenomenon. Parabolic siliceous cones, unmatched in form, scale and areal extent, dominate the Bungle Bungle Range. The long term stability of the Western Australian Shield has lead to deep weathering and dissolution processes within the Palaeozoic quartzites of Purnululu National Park. Erosion of the rocks of the Bungle Bungle range, mitigated by protective mineral and biological skins, has contributed to the dramatic sculpting of the landscapes of Purnululu. The visual impact of this landscape is further enhanced by horizontally continuous bands of surface cyanobacterial crust, alternating with iron and manganese stained belts. This banding, reflecting the horizontal stratigraphy of the rock, complements the distinctive form of the karst cones that are widely recognised as emblematic of Purnululu. Such highly developed cyanobacterial banding is unique to the sandstones of the Bungle Bungles.

'*The truth is, such remote places whose appearance suggests all the vigour of nature's erosive action are, in a way, alive. They are not dead, nor are they the bones of geological age long since past. What I was walking on and through seethed with terranean existence, as if the earth lived a life of its own, independent of me*
(Cowan, of the Bungle Bungle Range, 1991: 90).'

Supplementary Information: Cultural Criteria III, V and VI

Preface

Today's visitor to Purnululu National Park arrives by four-wheel drive or by air, and is guided around the property in tour buses. A story told by guides is that there is no evidence of Aboriginal ownership and only limited evidence of use of the Bungle Bungle area by Aboriginal people other than in transit. This reflects the theme of an empty and hostile land – so strong in the history of European imaginings of the continent.

Research by the Purnululu Aboriginal Corporation for the purposes of recognition of native title rights, and for ensuring the transmission of cultural values from generation to generation, show that their cultural heritage extends back time immemorial. Radiocarbon dating of the Aboriginal occupation of the Kimberley region has revealed a sequence more than 40,000 years old, or some 2000 generations.

Despite the traumatic impact of European colonisation and disruption of Aboriginal use and occupation of the land, the evidence of the long connection between Aboriginal people and the Bungle Bungle area, the cultural links with land, is still there today.

The Purnululu Aboriginal Corporation has recorded hundreds of sites where people made camps and lives, where shelters were used for carving, and where rock paintings were done. A small sample of such sites in the North-West of the Park is mapped at Attachment 1.

Looking at some of the main places within Purnululu National Park visited by tourists, such as Echidna Chasm and Palm Gorge, and examining a representative sample of sites, it is possible to see how Aboriginal people used the complex terrain of gorges and overhangs as shelters, with ready access to the nearby riverine areas, plains and hillslopes with their resources of water and food, and necessary resources. The deep gorges with their permanent resources of foods, water, providing shade and also cooling breezes, would have been especially significant as other water sources disappeared during dry periods.

In addition to maintaining cultural continuity and ties to land continuously for tens of millennia Aboriginal Australia is remarkable on a global scale for the opportunity to see significant expression of hunter-gatherer religion and mythology embodied in the landscape. By visiting these sites, and recognising the rich heritage representative of 99% of human history, the visitor is provided with rare and privileged access to understanding the way in which our human ancestors engaged with the landscape and shaped it.

The gorges and landscapes of Purnululu National Park tell the story of how the ancestors shaped the landscape. The spirituality of the landscape is recognised, respected, reaffirmed and recreated through ritual, and through the daily repetition of actions and language handed down through the generations. This spiritual heritage is as important to Aboriginal people today as it was to previous generations despite the dislocation, dispossession and denial of rights that has occurred over recent centuries of European occupation.

Today, the visitor to Purnululu National Park has little opportunity to see, to appreciate or to understand these values that are integral to this aspect of the Park. In the future, after the cultural values of the Purnululu National Park are recognised through its potential World Heritage inscription and the establishment of a joint management regime and Aboriginal people are able to act as the guides and interpreters of this place, these values and their significance will become an essential and integral component of the visitor experience.

Background

The Cultural Heritage values of Purnululu National Park have been documented by Kirkby and Williams (2001) as part of the development of Australia's nomination of Purnululu National Park for inscription on the World Heritage List. This supplementary information draws from Kirkby and Williams, providing further evidence of the outstanding universal value of the cultural landscape of Purnululu National Park. The supplementary information describes Indigenous people's cultural tradition, including the religious, social, and economic dimensions and their expression in the landscape. It provides further information on the traditional landuse in the Park and further clarity on the belief system associated with the cultural landscape.

The section 'Aboriginal Traditional Land Ownership' provides context for the detail provided by Williams and Kirkby. 'Prehistory' of the Purnululu region establishes the continuing

occupation of the region. The political economy of the Middle Ord describes Indigenous people's use and proprietary interests in the land. They are related to the Indigenous cosmology and how cultural meaning is imbued in the landscape. The relationship between Indigenous use of fire and the landscape is described. The manifestation of cultural tradition in rock art and contemporary art are discussed. Finally, international comparisons with other riverine hunter-gatherer cultures are made.

Additionally, a small sample of archaeological sites has been mapped in the North West of Purnululu National Park (Attachment 1). This sample is representative of the many hundreds of known sites within the Park. The map shows the variety and density of material artefacts that have been found in different areas of this small part of the Park. A list of recorded sites is at Attachment 2.

The sample of sites provides important material evidence of the cultural links with the land that are expressed within the nominated property, and which are ongoing. The mapped sites demonstrate the wide range of usage by Aboriginal people of significant components of the landscape associated with the complex terrain of the north-western plateau edge, particularly sites associated with the cliffs and overhangs which afforded living sites and places of significance (expressed for example through engravings and stencils), and the riverine areas and gorges with their permanent resources of water and food. Certain sites of particular cultural sensitivity have not been included. Recent excavations at Mimbi, 90 km east of Fitzroy crossing in the South Kimberley, have returned radiocarbon dates from about 40,000 years ago (Balme 2000), suggesting a far longer period of occupation in the Kimberley than the 20,000 years previously recorded in the Ord Valley.

Aboriginal traditional land ownership

> An international review of hunter-gatherer cultures has noted that the Australian Aborigines present the most fully realized instance of these cultures imbuing a landscape with cosmological meaning (Lee and Daly 1999: 4).

Aboriginal people in the Purnululu and East Kimberley region have strong systems of traditional land ownership which continue to be practised despite the substantial disruption

caused by European settlement. These systems are similar to those found elsewhere in Aboriginal societies (Bungle Bungle Working Group 1986: 31).

Traditional ownership of land, on its own, is not the only important factor in rights to land. The ways in which people look after this land is important as well, including knowledge of appropriate ritual and belief systems, the continuing performance of ritual cycles, acquaintance with major sites and site complexes, possession of sacred objects and general continuing interest in the area. (cf Palmer and Williams 1990: 10).

Traditional ownership of land is much more than a question of geography. The societies of the East Kimberley can, like other Aboriginal societies, be termed 'religious societies' (Berndt 1980: 13). This is because land, and indeed all aspects of society, are thought of in spiritual and religious terms rather than material ones. Society, and the landscape itself, are believed to be created and maintained by a belief system described in Aboriginal English as the 'Law' or '*ngarrangkarni*' across the Aboriginal languages of the East Kimberley.

In some cases this belief system has been termed the 'Dreaming' in Aboriginal English. Most Aboriginal communities prefer not to use this term and instead use the appropriate relevant language name or its English equivalent 'the Law'. These latter terms are considered to better convey the gravity of this system of beliefs and also, that to Aboriginal people, it is a tangible and not a mythological system.

***Ngarrangkarni* (the 'Law')**

The 'Law' is the fundamental belief system of Australian Aboriginal societies. Its general features are similar across these societies and describe how the land - initially featureless - was created and given form by the adventures of ancestor beings. In so doing, these beings brought human society into being and set down laws which regulate all aspects of interactions between people, and between people and the land.

The information presented here describes '*ngarrangkarni*' - the system in place for the East Kimberley. *Ngarrangkarni* shares the overall features of the Law found across Australia and, like all of these systems, has geographic and other details which are specific to the region (see Berndt 1980: 14, Palmer and Williams 1990: 14-15).

Ngarrangkarni refers to the beings, to time and events long past. It has a beginning but no end. During the beginning, at a time long past, the earth has no form and is a void.

In this void are beings who are heroic in scale and who have both human and animal features. The beings travel throughout the void, encountering each other and having a series of encounters and adventures. These encounters and adventures create the land, giving the landscape form and at the same time imbuing the region with spiritual force. All features such as rivers, springs, waterholes, rocks and hills are created at this time. The physical manifestations of those beings and events as rocks, hills, and other tangible things are indications of the continuing presence of *Ngarrangkarni*, and to a system of religious beliefs that buttresses the social, economic, and aesthetic qualities of contemporary life.

Many of the beings are shape-changing and possess special power which can be brought to bear on humans and on the landscape. This power can be released through the power of ritual.

The beings move across the land, within and beyond language territories. In some cases their travels are quite short, in others more extensive. Everywhere they go, they leave an essence of themselves in the landscape. When the beings finish their adventures they either leave their image in the landscape, such as in paint on the walls of rockshelters, or they physically meld with the landscape - entering into a particular place such as a rockhole, or turning into a rock, hill or some other tangible feature of the countryside.

The leaving of essences, images and the melding each have the effect of imbuing the landscape with spiritual power. This power is ongoing and must be channelled and controlled through ritual.

Phyllis Kaberry, an anthropologist who worked with the Aboriginal women of the East Kimberley region of the 1930s, describes in her words and those of her informants, how people think of ngarrangkarni (Kaberry 1973: 193-194):

'[She] does not view her country as so much geological strata, as so much sand, stone and spinifex. The boulders and the pools are ngarrangkarni; that is, they belong to the past and to the totemic ancestors. When this word is used it always implies unquestionable finality on the subject at issue; ngarrangkarni stamps a practice as legal; it invokes a religious sanction for its performance. … These ancestors did not have the physical characteristics of animals or birds, but they did possess some quality which made their transformation later into real birds and animals possible. The myths attribute superhuman feats to them. Under the hands of the marsupial the hills rose to their colossal immobility, and the river courses were carved out by the rainbow snake. There are myths of fire and flood, of totemic ancestors that wandered over vast tracts of country, hurled spears from one mountain to another, and left their footprints in solid slabs of rock. These must be distinguished from the birds and animals already existing at that time, which also possess remarkable powers, as pictured by the native companion [Brolga] scooping up a pond in kulamon [wooden carry dish] and flying into the air with it.

But in the myths the inauguration of certain customs, methods of carrying kangaroo and cooking it, marriage laws, initiation, rainmaking, corroborees [ritual ceremonial cycles, and certain natural features of the country are credited to the intervention of the totemic ancestors who stood in a kinship relationship with one another and who had subsection names [a kin classification system applied to all people in society bestowed on them by the rainbow serpent. Having performed their task they changed into birds, animals and reptiles, and some into stones as well. It is these boulders, these depressions in the rock where they camped that bear tangible witness to their previous existence.'

The process of creating and then melding with the landscape means there is an intimate association between the beings and the land, with the two being inseparable. In this way, the landscape is a cultural artefact rather than a natural one.

A traditional owner noted in 1987 that the Aborigines call the sheer-walled bulk of the massif Kawara and every other aspect and creek in the area has its own special name and stories.

The adventures of the beings not only create the landscape, they also form rules which are set down by the beings to order all aspects of human life - religious, social and economic. The rules condition all interactions between people, and between people and the landscape (Palmer and Williams 1990: 14). If they are not followed, then the spiritual power which is imbued in the landscape can become volatile and unleash a potentially destructive force.

Ngarrangkarni does not adhere to a linear system of time and operates now, and in the past, simultaneously. The rules thus must be continuously followed, along with the rituals which relate to the landscape's spiritual power.

The travels of the various beings are described in oral narratives in which the narrator traces a sequence of events occurring at successive named places. These places are described or pointed out in the countryside. These narratives can be sung and are enacted in associated ritual performances. They describe the identity of the beings, list their adventures, show how a particular area of land was created and explain what religious, social and economic rules were created as a result (Palmer and Williams 1990: 14-15).

As in all religious systems there are certain levels of knowledge. Admittance to a particular level depends on factors such as age, gender, general standing in society and demonstrated commitment to the system of belief. Both men and women have sacred sites and objects and ceremonial cycles.

Instruction is by performance of rituals and the revelation of the appropriate level of knowledge, which can also include reference to material items which are imbued with spiritual essence. Instruction can occur throughout a lifetime, with the highest level of knowledge only being revealed to few people.

Admittance to knowledge is taken as an indication of an individual's spiritual, as well as physical, maturity and of *h*is or her spiritual association with a particular area. Transmission of the detailed religious knowledge of an area is the responsibility of the traditional land owner, or landowners, though others may also may undertake this as long as they have the owner's consent. Performance of the detailed religious knowledge of a particular stretch of country is a signal to others of the rights of a mature adult land-holder.

The actions of the great beings of *ngarrangkarni* are used by people who narrate, sing or enact them in ritual, to assert rights in a particular area of country they have inherited. Narratives and songs are considered as a form of 'property' and their transmission is a sign of land-owning and ritual authority. The rituals are used by landowners as a means of asserting their rights in country, and their own spirituality and existence is considered to be inexorably linked to that country.

Such rituals do not necessarily have to be held in the country itself but may be performed many kilometres away. In this way, people can maintain their links to land, religion and society even though they may have been forcibly removed from their land.

Information on *ngarrangkarni* is traditionally privileged. A man or a woman may not freely provide a detailed version of a narrative sequence or unless they are entitled to do so. Songs, narratives and ritual may only be sung, told or enacted in the presence of, or with the permission of, those who are acknowledged to have proprietary rights over the transmission of such material. As well, the revealing of material items believed to be imbued with spiritual essence (in conjunction with the appropriate rituals), cannot usually be undertaken except with the appropriate traditional custodians and in the proper geographic location.

Prehistory

The traditional owners of the middle Ord Valley assert their connection to their country extends back to the time, *ngarrangkarni*, during which the features of the landscape were first formed. Results of archaeological research support the argument for a long and continuous occupation of this part of northern Australia, extending back tens of thousands of years.

At Lake Argyle, less than 100 kilometres downstream from the Purnululu National Park, radiocarbon dating carried out following salvage archaeological programmes by the Western

Australian Museum before the flooding of the Ord River demonstrate occupation of the Ord Valley for at least the past 20,000 years (Dortch 1977: 109).

Dortch determined two sequences – an early and a late phase – following analysis of the stone artefact assemblages excavated from two rockshelters, Miriwun and Monsmont, as part of the salvage programme. The later stone assemblages are characterised in part by finely retouched blades and points including denticulated bifacially flaked points, that mark the introduction of pressure-flaking, referred to as *lerntij* by Kija speakers, as a means of stone tool manufacture. Dortch argues that the transition between the early and the late phase assemblages occurred about 3,000 years ago based on radiocarbon dates taken from excavations at both rockshelters.

Dortch (1977: 111) also infers the seasonal occupation of the rockshelters based on the presence of fragments of goose (*Anseranas semipalmata*) eggshell in the Miriwun deposits, as *Anseranas semipalmata* breed and lay eggs during the wet season. This he expands to argue a model of landscape usage comprising occupation of uplands during the wet seasons and riverine areas during the dry season.

Contact history

The East Kimberley was one of the last regions of Australia to be occupied by non-Aborigines with the first settlers arriving in the middle Ord region in the mid 1880's, about 120 years ago. As the senior members of the families who are the traditional owners of Purnululu National Park were born from about 1920 onward, there is a rare continuity, between the period prior to European contact and now, provided by oral accounts of their immediate antecedents and their own life histories.

Historical accounts of the entry of non-Aboriginal people to the Middle Ord region begin in July 1879 when Alexander Forrest, a government surveyor, and his party became the first to reach the upper middle reaches of the Ord River.

Glowing reports of verdant grass plains that stretched from the Ord River to the horizon immediately south of the Bungle Bungle Range created a paper land rush in the first half of the 1880's and the Kimberley was divided into a series of leases of from 50,000 to 300,000 hectares depending upon their proximity to major river systems.

It was the discovery of gold at Old Halls Creek in 1885, however, and the impact of the subsequent influx of thousands of men seeking their fortunes that profoundly changed the way in which the traditional owners lived their lives.

Following settlement instances of violence against the local people are recorded in oral history accounts (see for example Ross 1989). Introduced diseases such as measles, smallpox and flu took a heavy toll - as in other parts of Australia - because of a lack of immunity. Leprosy was also introduced.

According to Broughton (1965: 34, 35, 61-63) the period following the discovery of gold to 1908, approximately twenty-five years, was marked by lawlessness, atrocities against local Aboriginal people, spearing of cattle, and generally hostile relationships between the intruders and local people. To survive contact, Aboriginal people became the labour-force for the new settlers, particularly in the pastoral industry where people could remain close to the traditional lands.

Government measures were introduced to ameliorate the suffering of the Aboriginal people and included the issuing of rations from 1901 and the provision of refuges in particular localities from 1910. These measures were designed to assist Aboriginal communities but also to provide incentives to stop Aboriginal people raiding pastoralists to defend their traditional lands (Ross 1989: 32). Government intervention was limited in its success and the record of violence against local people continued into the middle of the 1920s. Other factors contributed to help communities survive, including the fact that some pastoralists were sympathetic to the needs of Aboriginal people and ran their stations as refuges.

Aboriginal people started gathering at white settlements and forming a workforce for the new settlers from the 1890s, the majority of East Kimberley Aboriginal communities did not settle on pastoral stations until the early 1920s and some people remained in the bush long after that time (Ross 1989: 36).

Aboriginal knowledge and understanding of the land facilitated the effective running of the stations and the fact that Aboriginal people were not paid for their labour facilitated the economic return of pastoralism. In the first half of the 20th century and prior to that time Aboriginal workers and their dependents received rations only for their labour (Ross 1989: 37).

By the late 1920s, when the first ethnographies of the East Kimberley region were attempted by Elkin, the population size of the local Aboriginal population had declined significantly as a result of European contact. In the 40 years following the 1880s, when non-Aboriginal people first entered the East Kimberley, Elkin estimated that 'Djaru, Malngin and Mirun [Miriwoong] have certainly decreased by over fifty per cent.' (Elkin 1932: 297).

As well as this major decrease in the numbers of people, the pastoral occupation of traditional lands, the associated heavy stocking of areas around rivers and waterholes, and the destruction of native plants and animals by the introduced stock and removal of habitat, had a radical impact on the survivors and their landscape (Bungle Bungle Working Group 1986: 30).

Despite these tremendous losses, traditional knowledge continued to be passed on to surviving relatives and the elements of customary society were maintained (Ross 1989: 31). The stories of these events have been incorporated into social life and have the continuing message that European settlement was achieved at forebears' expense (Ross 1989: 31). Kaberry (1938: 272) wrote of the continuing importance of country to Aboriginal people throughout the East Kimberley, most of whom she observed were engaged on cattle stations, and that for the period October to March 'when his holidays arrive he returns if possible to his horde country, though it is 80 or 100 miles away and water is scarce.'

Following the introduction of the Pastoral Award in 1968, which provided for wages for Aboriginal workers in the pastoral industry, Aboriginal people were compelled to leave the stations directly or indirectly by station managers. They settled either in camps on the fringe of Halls Creek or joined the families that had walked off Texas Downs station at the old Police Reserve at Turkey Creek, a small area of reserve land in a sea of pastoral leases that stretched between Halls Creek and the newly created town of Kununurra, living in humpies constructed from tree trunks and branches and rusted pieces of corrugated iron or in rusted old car and truck bodies.

Life in the fringe camps on the margins of Halls Creek, Wyndham, and Kununurra and on the Turkey Creek Reserve during the next 10 years was frustrating and difficult for many of those who had been forced to move from pastoral stations, in part because they were no longer able to access their country readily – in some cases pastoralists chained and locked gates to prevent access – and in part because they were having to face new social problems such as alcohol abuse and associated violence and malnutrition.

Traditional owners are currently permitted to reside at Kawarre and Kayiyirriwareny, within Purnululu National Park.

The political economy of the Middle Ord

The Ord River forms the major focus of the riverine environment in the Middle Ord region, and people orient themselves, their proprietary interests and their use rights as well as the cosmology in which these interests and rights are embedded, in relation to the Ord, its tributaries and features defined by these watercourses.

The indigenous relationships of Aboriginal people to the Purnululu region is organised in economic, social, and political terms on the major river system whose main course English-speakers named the Ord River. Traditional owners refer to the river in terms of local features – narrow gorges and large pools of water, rockholes or soaks in its upper reaches or tributaries where the flow is seasonal or intermittent, places where it flows over flat slabs of rock, and places where it fans out and forms a sandy bed. All have names, as do all the confluences (*palmuntum* or 'junction'), and rocks, trees, and other features of each. The people of this region are river people. In the past all their economic activities, including a widespread trading network, were given outline and substance by the tributaries, junctions, headwaters, and outflows of rivers, and their relation to the Ord.

Within the boundaries of Purnululu National Park, Bellburn Creek and Piccaninny Creek flow south directly into the Ord and Red Rock Creek and Buchanan Creek flow north-west into Osmand Creek, which empties into the Ord (Osmand Creek as well as the Osmand Range lie within the Conservation Reserve). Within the Park are a number of ranges, hills, and outcrops that are also significant. In addition to the Bungle Bungle Range (of which the massif is a part) are Mt. Glass and Mt. Buchanan, Doughboy Hill, the Dixon Range, limestone outcrops around Kawarre, and Kayiyirriwareny. Communities of traditional owners are located at Kawarre and Kayiyirriwareny.

Naming and narraku

The name of a geographical feature may be given to a traditional owner of the lands of the Middle Ord as a personal name. The term *narraku* refers to the relationship that is created by a shared name, thus the individuals may be said to be narraku for the feature.[1] Individuals now alive or remembered who are narraku to features or places within the Park include

Tawukul, a prominent isolate on the southern margin of the Dixon Range and Nyitparriya, a sharp sandstone outlier at the north-west corner of the Bungle Bungle Range.

Taawirriny

A number of places within the Park, as well of course as in the surrounding area were and are known as 'main camping places', that is places where a large number of people might gather from time to time throughout the year. *Taawirriny* refers to these main camping places or base camps. For example, and in addition to places within the Park such as Kawarre and Kayiyirriwareny, Wulenginji, a rockhole and its immediate surrounds northwest of the Bungle Bungle, was such a base camp.

Ngarrangkarni, landscape mnemonics, and names

The landscape takes its major framework from riverine features, and the local cosmology and political economy are consistent with that kind of landscape. Water was put in the country for the first inhabitants by the giant snake, *Kaleruny*: in rockholes, pools, and springs at the base of hills, waterfalls in the high reaches of streams, and permanent trickles from porous rocks. Gaps cut in ranges of mountains where rivers rise or flow in the upper elevations with steeper gradient are the marks left by fish that jumped through there in the formative time of the world. Crocodiles sometimes turned into stone in the upper reaches of rivers, forming waterfalls and rapids, and preventing fish from travelling further upstream. A frog was successful in retrieving water, stolen by a crane and carried away in a coolamon, to form permanent waterholes. These events explain the features of the Purnululu region in relation to surrounding countries. They are explained through narrative not by definition, 'that is, about what happened at a place rather than [by] what the place 'is' essentially' (Merlan 2000: 21).

In an area where riverine features provide dominant organising and conceptualising characteristics, rocky outcrops, sandy open areas, stands of trees, are viewed in terms of their relation to rivers, creeks, streams, and their confluence – to the Ord and its tributaries. In addition, lithological or geomorphological terms that refer to specific features are used by local people to name individual sites and larger tracts of land. Thus *kewaluwalu* denotes small hills with large, square boulders and *jimpij* (plus affix) a site identified by the presence of water from, or trickling through porous rock, a reliable source of water. Purnululu refers to friable white sandstone and by extension this term has been used to label the Bungle Bungle massif which is composed principally of this sandstone. One striking feature of Purnululu, that is, of the massif, is the extensive sheer rock face rising up to 200 metres above the

[1] A narraku relationship also exists between two people who share a name, who are thus 'namesakes.'

surrounding plain on the north-western margins opposite the location of the former Bungle Bungle outcamp. Local people refer to this and similar features as *kawarre*. *Kawarre*, they explain, is 'cliffs you can't climb up'. This term is applied to sheer faces of more than four of five metres and does not imply that the area above is inaccessible. As with other named features, such as *jimpijpiny* and *kewaluwalu*, *purnululu* and *kawarre* may be used by extension to incorporate surrounding areas. Although *kawarre* is typical of gorges, gaps, and jump-ups, but during the past twenty years, the primary referent of Kawarre (without qualification) has come to be the location of the community of Kija people originally established by Raymond Wallaby near the old Bungle Bungle outstation.

Floral terms, particularly names of trees, with the suffix *-pany* or *-wany* (meaning 'place of') denote in terms similar to those of lithological referents, a parcel of land to which a group of people claim primary rights. Thus Walarripany is derived from the Kija term for ghost gum, *Eucalyptus papuana* and Jingkurlpany, Kija from the term for river mangrove, *Tristania grandiflora*.

The names of places often refer to some particular focal feature or story connected with them. For example, *Kangkiny* is a rocky formation on the Ord River in the Dixon Range which is significant as a site integral to myths centred on the moon. Mt. Glass and Mt. Buchanan are significant in accounts that explain the relationship between certain of the local languages and their geographic location, as explained below

There are also names of types of country, that is for features of the landscape that typify them. For example, *minjiwurr* is a term used to refer to limestone (by extension limestone features), as *purnululu* is sandstone in general. In the context of the formations within the Park it refers to them collectively. *Pulurr* refers to crumbly sandstone. *Pilinjirr* is sandy open plains; *kawany* is blacksoil country and refers to the soils and country west of the massif (when it is boggy it is *yawul-yawul*).

The semantic domain of such terms is wide, in the case of *kawarre* ranging from a circumscribed physiographic feature that may be only twenty metres long, to a geographic area hundreds of square kilometres. The context and nature of the conversation, and the background of the participants provide the information that conveys the specific meaning. That is, although the geographical, lithological, ecological, and mythological features are thought to characterise particular areas of country, they do not necessarily or uniquely provide information about particular boundaries. For Kija, Miriwoong, Jaru and Malngin speakers, the myths which portray the travels and exploits of the Water- or Rainbow-snake provide

much of the information on which language groups are defined, for people say that Rainbow was responsible for the distribution of languages. One senior man said, 'He the bloke bin carry language. Give it language la everybody.' Another myth, described below, explains that the distribution of languages in relation to land.

The placement of the four languages (Kija, Malngin, Miriwoong and Jaru) into two linguistic families (Jarrakan and Palma-Nyungan) corresponds to major socio-cultural differences between these groups. This is perhaps most strongly demonstrated in the area of 'Law', a term that is used locally to refer to foundation Aboriginal beliefs and the social and ritual structures that they underpin. Thus, families with connections to the east and south of the Park generally look to relatives in places such as Wave Hill and Balgo for assistance and support when organising and arranging Law business including women's ceremonies and the initiation of junior male members of their families. Places like Kununurra and Port Keats to the north and Mowanjum and Mt Barnett to the west are regarded by families with connections to the west and north of the Park as important centres for support and aid in their ceremonial preparations. Thus it is not surprising that the trading partnerships established between individuals of different and geographically separated groups mirror the orientations of these families and that this region is an important node in the *winan* system, or trading network, described below, that connects the north and west Kimberley to the desert regions to the east and to the south.

The distribution of the four languages is cast in *ngarrangkarni* time and is attributed to the deeds of mythic beings, also referred to as *ngarrangkarni*, and is evidenced by named physical features – in this case Mt Glass, Mt Buchanan and a small hill located near the north-east margin of the Bungle Bungle Range. Perhaps the most frequently recounted myth narrating the boundary between Kija and Miriwoong is an encounter between *Warnampany* (a Miriwoong language 'mountain') and *Rawulili* (a Kija 'mountain'). Some accounts pit these language-defined groups more recently against each other as enemies in battles over territory. Thus the *ngarrangkarni* accounts link language to country rather than to social groups. As Rumsey (1989: 75) has noted for the traditional owners of Nitmiluk National Park near Katherine in the Northern Territory,

> *… it is not the case that, for example, Jawoyn country is called Jawoyn because it is or was occupied by people who speak the Jawoyn language. Rather it is called Jawoyn country because it is the region in which that language was directly installed or 'planted' in the landscape by Nabilil, 'Crocodile.*

Aboriginal people throughout this region were multi-lingual, in part because spouses were sought from adjacent groups. Today senior traditional owners continue to converse in two or three languages in addition to the local Kriol and English. Buttercup Leringery, a senior woman born some time before 1920 is fluent in five languages.

Senior traditional owners continue to conceive of their connection to country as being mediated by kinship rather than language. The land-owning group is referred to by adding the suffix *–wangkuny*, 'belonging to', to the name of particular topographic features or botanical species that are said to characterise the area to which they assert rights. Thus the descent group with connections to the area in which the Bungle Bungle Range is a prominent feature, may be referred to as *Purnululu-wangkuny* or may also be referred to as *Kawarre-wangkuny*, after *kawarre* a term glossed as 'cliff' or 'steep sides' used to describe the north-western margins of the Bungle Bungle Range.

Owning and Managing Land

The entities to which people here attribute proprietary interests in land correspond to Sutton's (1997) restricted cognatic descent groups. Membership is traced from an apical ancestor and descent through varying series of patrifilial and matrifilial links. The ancestor(s), as stated, is/are a real person or persons known to senior members from their late childhood. The named ancestors are both male and female; but it appears that in all instances, it is believed these named ancestors derived their interests in land through descent from their fathers, although they are unknown and unnamed. These cognatic descent groups are unnamed. Also it is immediately apparent from inspection of the genealogies collected to date that these cognatic descent groups are not exogamous.

Women as well as men are actively owners of land and are responsible for managing resources. Their relationship to the land is founded in their relationship to *ngarrangkarni* in the same way that men's is (Kaberry 1939, cf Maddock 2001). Management is however also based on pragmatics. The pragmatics of use that was and is an integral aspect of management is based on traditional ecological knowledge (cf Anderson 2001).

A senior man was and is head of each local group, and is nominally responsible for organising its economic activities, including trading relations, settling disputes between people within his group or territory, arranging and participating in religious ritual and protecting the are from territorial aggrandisement by others. He and his group share responsibility for the safety of all persons who are on their land; hence the importance of seeking appropriate permission before entering the land of another group for any purpose, even to travel through it. Protocol

governing seeking and granting permission is significant also as a marker of the rights of control over land and resources; to fail to seek it, even though its granting is virtually assured, is a serious breach. 'They didn't ask' or 'They should have come and asked us' are common expressions of the failure to acknowledge the rights of traditional owners (cf Myers 1982).

The riverine economy

The economy of the Bungle Bungle region is based on its riverine features. Places where people used to gather are located along rivers. These places ideally have large numerous rockshelters, usually in limestone ridges, or open sandy areas for sleeping, or both; and they have an open area large enough for performing ritual, including rituals to signal the end of disputes. Pools of water in the river's course hold abundant fish, crocodile, water goanna, and shell fish, while the nearby area may have good stands of fruit- or nut-bearing trees, edible grass seeds, roots, or tubers. Such places were hubs of economic activity when people gathered from a number of surrounding areas when the head of the group owning the site invited them to take part in joint harvests. Fish was a major food source and a large quantity would be taken by stunning them with a toxic substances (extracted from the leaves of certain bushes or plants – several could be used for this purpose) put in the pools, or by netting them in large rolls of spinifex pushed through the pool. Some fish were dried on rocks or sheets of bark, sometimes salted in the drying process, and then wrapped in bundles of paperbark.

Plate 1. Fishing remains an important economic activity for traditional owners of all ages throughout the Middle Ord region.

[Photograph taken at Date Palm on Red Rock Creek immediately upstream of its confluence with Osmand Creek, 2000.]

The heads of families from other countries taking part in the harvest would make gifts to the head of the land-owning group returning to their own country. The harvest might take four to five days and during this time people would also be busy with other activities such as arranging marriages, and performances of religious ritual (including those connected with rites of passage). Middle-aged people describe these gatherings that they took part in during their childhood and early adulthood at such places along the Ord River and its tributaries. These sites are places where traditional owners still go for fishing (Plate 1) and for harvesting fruits, roots, tubers, and other resources, and they are teaching their children about the sites, their resources and their religious meaning – their stories, both in the lifetimes of known generations of ancestors and in the mythological era or 'Dreaming' referred to as *ngarrangkarni*.

The yearly round

In addition to the riverine environment, two other macro-environments occur within the region and were part of the seasonal patterns of traditional life: the sandplains, which occur predominantly to the south and east of the massif, and the uplands – the hills and ranges as well as the massif. In terms of their economic importance, the uplands can be further divided into plateau and fringe. The sandplain areas as well as the margins of the upland zones, including the massif itself, were of economic and spiritual importance, all having abundant evidence of occupation and use. Areas of economic and mythological significance, and sandstone overhangs with rock art, hand stencils, and/or axe and seed/ochre grinding marks have been recorded at frequent intervals along the base of the massif. These sites are associated with water, although not all with permanent sources of water. During periods of heavy rain, the run-off forms large, temporary pools of water around its perimeter. This run-off sustains a fringe woodland community dominated by *Eucalyptus collina*, significantly different from the adjacent and now severely degraded open sandplains. This fringe was generally occupied and used by small groups of people for limited periods during and immediately after the heavy rains, when water is widely distributed throughout the landscape. In addition, there is evidence of Aboriginal use of the top of the massif. This evidence consists of oral accounts, including accounts of known people who climbed to the top of the massif, and archaeological material. One of the traditional owners, for example, related the following story: a large hunting party of men, women and children that travelled to the western margins of the massif from a camp five kilometres away during the wet season and staged a successful kangaroo drive originating from the top of the massif and continuing

down to the surrounding plains. They then returned to their camp on the same day. Other accounts tell of small numbers of people living on the plateau for short periods, or provide evidence of technologies and strategies that allowed access to plateau areas to obtain resources there: people constructed and used 'ladders', *parrkurrany*, consisting of a pole with notches, and when they climbed to the top of the massif they would use stones to mark their ascent in order to be sure they could return to the same place at the bottom.

The traditional occupation and use of the Purnululu region was not simply one of 'dry season-downstream, wet season-upstream'. Rather, Aboriginal use of the region reflects their management of it through the use of fire in conjunction with topography and climatic features such as wind and temperature to produce a mosaic of vegetation systems. The desire for variety in the diet was also a factor in people's movement throughout the year. As the traditional owners of the Purnululu area used their country they were managing it – use and management were a single process, one in which both men and women were engaged (cf Young 2001: 28). That process and their desire to maintain it has underlain the struggle of the traditional owners to acquire secure living areas within the area of the Park.

Winan exchange

A widespread exchange network, called *winan*, exists throughout the Kimberley. Much is known about the routes and extent of *winan* in the East Kimberley, including its links with similar networks in the Daly River and Western Desert areas. Ritual continues to play a role in the exchanges, and objects used in ceremonies are exchanged. Primary exchanges in the past appear to have been in economic commodities: tools, weapons, and raw materials, as well as foodstuffs (mostly prepared for long-term storage). Accounts of *winan* recorded at places where people used to gather – for example at Ngirriyiny on the Ord River (Plate 2) – of numbers of people who were there, where they came from, and what they brought with them, and how the trading was conducted (along with accounts of the harvest in which they had been invited to participate), invite comparisons with large-scale barter and exchange. Trading was the focus of activity; bartering and sometimes driving a hard bargain are the impressions that the stories give. This system of trade was not however a 'free market' (whatever that is); trading partnerships were established between individuals of different and geographically separated groups, and it was important or even necessary to assure that obligations to one's primary trading partner were met. But exchange was not at all limited to that partner.

Plate 2. Ngirriyiny (Blue Hole) on the Ord River remains an important place for members of the different families with connections to the Park to gather.
[Photograph taken of meeting at Blue Hole, 2000.]

Comparisons: 'seasons'/'seasonality'

Features of wind (direction, intensity, and duration), rain (from fine mist, small infrequent droplets, large drops in a steady fall, to torrential downpour and whether short and intermittent or of long duration) and its association with various winds, the probability of storm activity (including waterspouts, lightning, and thunder), and ambient temperature, combined with characteristics of flora and fauna (usually emphasising or indicating degrees of maturity) appear to be common among Indigenous people, whether their economy is based on hunting and gathering or horticulture, as the phenomena that are at least roughly equivalent to 'seasons' and 'seasonality'. Their physical manifestations are generally embedded in or explained in relation to the sentient nature of the environment. They are related parts of a moral system of which human beings are enmeshed and have the responsibility of knowing the right times and the wrong times to interact with it. They are also connected to spiritual forces, often personified, that are more often threatening or destructive than benign or beneficial.

The Kimberley Language Resource Centre in Halls Creek has recorded names for seasons provided by Kija speakers in the Halls Creek area (Kimberley Language Resource Centre 1996: 9): 'The Kija people recognise five seasons, according to the direction and intensity of

wind and rain, the ripening of certain fruits, and the presence or absence of certain fish and animals. The take note of how fat these animals are.' A chart illustrating the cycle of these seasons and their characteristics, including animal and plant foods was designed by Josie Farrer, a Kija woman, and is reproduced in Australia's nomination (Commonwealth of Australia 2002: 18).

To people whose first language is English and whose cultural background is broadly that of western Europe, 'seasons' and the features that inhere in a notion of seasonality are quite fixed, often even defined or bounded by a series of consecutive months, or beginning on a particular date, for example in Australia winter 'begins' on the first day of December. As Rose (1988: 381) observes expectations are conditioned by a sense of calendar time and notions of statistical normality.

To Aboriginal people, concatenations or conjunctions of characteristics of wind, rain, ambient temperature, vegetation, and availability or desirability of particular foods or categories of food (and other locally specific features) are labelled when they occur and are assumed generally to occur in an annual cycle. These patterned co-occurrences may be thought of as analogous to seasons, but it should not be assumed that they correspond in any precise way (Williams and Mununggurr 1989: 77).

Economic factors, seasonal patterns and management of the environment

Economic use of particular areas

The primary focus of Aboriginal people to the Purnululu area in terms of religious, social and economic terms is the river and its tributaries. Europeans named the major course of the river the Ord, but Aboriginal people do not have a single, equivalent term. They instead have many separate terms, each referring to a single local feature within the river and those of its tributaries (Kirkby and Williams 1986 quoted in Kirkby 1991). These local features are all named *ngarrangkarni* sites.

The types of river features that are individually named include: narrow gorges and large pools of water; rockholes or soaks in the river's upper reaches; tributaries where the flow is seasonal or intermittent; places where the river flows over flat slabs of rock, and places where it fans out and forms a sandy bed (Purnululu National Park Management Plan 1995: 23).

Because of the dominance of the river in this landscape to Aboriginal people, features such as hills and tablelands are seen in relation to the river rather than as areas in their own right. Thus the Bungle Bungle massif is described in relation to the Ord River and two of its tributaries, Osmand and Belburn Creeks.

The focus on the river contrasts the emphasis paid to the Bungle Bungle range by non-Aboriginal societies. It reminds us that the ways in which a landscape are seen as important can be culturally defined, with different societies placing an emphasis on different features.

Many of the details of how Aboriginal communities used the region economically are related to the *ngarrangkarni* and are not currently publicly available. The information that is available is presented here in summary form. It includes material specific to use of the Purnululu region, along with more general information gathered at the wider regional level.

Traditional owners have retained a strong and detailed knowledge of plant and animal resources including: methods of cooking, processing and storing foods; detoxifying particular plant resources; interrelationships between plants, animals and the seasons; plants which can be used as medicines and for technological uses, and a detailed knowledge of the resource bases of animals. This knowledge also includes documentation and understanding of how the seasons, and plant and animal resources, change over time (Rose 1984: 3).

Areas along rivers and creeks were hubs of economic activity. Resources harvested included fish and also fruits, tubers and other foods. The siting of camps was related primarily to the water supply, availability of fish and game, and shelter. Shelter was an important factor during the wet season, caves and rock shelters were utilised (Purnululu National Park Management Plan 1995: 24, Scarlett 1985: 5).

Large waterholes, with their rich resources, were primary occupation areas and also the sites of meetings between local groups. Camping sites at permanent waterholes were favoured because these locations yielded a great variety and quantity of foods, both water and land resources (Purnululu National Park Management Plan 1995: 24, Rose 1984: 8).

Significant hauls of fish were taken during times when people gathered for meetings. Nets were used, also chemicals extracted from plants to stun the fish. Some fish were dried and processed so that they could be taken back to the territory of visiting groups. The harvest might take four to five days and during this time people would be busy with other activities such as performing key ritual ceremonies, exchanging goods and arranging marriage alliances and other social networks.

Other than the riverine environment, two other types of environment in the Purnululu region were related to the seasonal pattern of life. These were the sandplains which occur predominantly to the south and east of the massif, and the hills, ranges and tablelands. These environments, like the river system, comprise numerous named *ngarrangkarni* places.

Material manifestations of occupation are particularly common along the margins of the massif. Sandstone overhangs with rock art and seed/ochre grinding areas occur at frequent intervals. These sites are often associated with water sources, although not all sources are permanent. During periods of heavy rain, the run-off from the massif forms extensive, temporary pools of water around its perimeter. This run-off maintains a fringe woodland community dominated by *Eucalyptus collina*. These immediate areas were generally occupied by small groups of people immediately after the heavy rains during the wet season. (Rose 1984: 7): From the shelters people foraged onto the plains and up into the gorges. Land mammals, fruits and vegetables, and native honey, were the primary resources obtained whilst living in the shelters.

There is also anthropological and archaeological evidence of use of the top of the massif. People lived there for short periods and in some cases access by notched ladders was necessary. Stone trail markers were used to marked routes The tops of the ranges were well

watered at certain times of the year and abundant in land animals (Purnululu National Park Management Plan 1995: 24, Rose 1984: 8).

Types of food resources harvested

In the rainy season, berries, fruits, wild-honey ('sugarbag'), frogs and white ant larvae are plentiful, in addition to game and fish. In winter, lily-roots and seeds, yams, tubers, nuts, grass seeds, pandanus and baobab nuts are collected by the women, and later in September grubs are found in river-gums, and lily-roots are dug from the mud of the drying water of river beds or billabongs. Fish, game, reptiles, echidna and birds are secured by men most of the year round, although at some seasons they are better in quality that at others (Kaberry 1973: 11).

The impacts of European settlement such as introduced plant and animal species, grazing by stock and erosion resulting from over-stocking, has altered the distribution and abundance of many of these species (eg Rose 1984). Most are still found in the Purnululu region however, and the knowledge of when and where these resources can be harvested and processed is still held by traditional owners.

Management of food and other resources - fire

Traditional owners of the Middle Ord have an extensive understanding of fire even though their traditional methods of using fire as a tool in environmental management have been suppressed by or subordinated to the uses of pastoralists, whose land use has been dominant in the East Kimberley since the last quarter of the nineteenth century. Protocol that governs who may burn and when and who has authority to give or withhold permission remains important (Plate 3.).

Fire has always been a feature of the northern Australian environment. Natural fires, the result of lightning, often occur during the build up to the wet season around October-November and through to the wet season. Fires are also the result of human agency, and Aboriginal activities and practices in the East Kimberley have involved the use of fire throughout the past millennia, as they have in other regions of Australia (see Langton 1998 and references therein).

Plate 3. Using a branch of green leaves in her right hand, one of Buttercup Leringery's great-grand-daughters controls the direction and spread of a fire lit by senior members of her family to reduce ground litter and thus protect buildings from the 'hot' fires that occur later in the year.
[Photograph taken at Wurrerranginy Community (Frog Hollow) 2001]

Selective grazing pressure and frequent widespread fire led to changes in the vegetation. The mosaic structures have mostly been destroyed, a major factor in the disappearance or reduction of many plants and animals. By manipulating fire periods, intensities, and size, habitat suitability can be controlled for particular target species and ecological diversity maintained (Woinarski 1990).

Aboriginal use of fire is only one of the suite of resource management tools that have been suppressed or significantly altered. More precisely, although the practices themselves have lapsed of have been curtailed or even prohibited by pastoralists, the knowledge remains alive in the minds of some of the older traditional owners. A striking example of the suppression of traditional burning is seen in the changing distribution of the cypress pine, *Callitris intratropica*. A site on the western border of the Purnululu massif bears the Kija name *Kuwirriny* (cypress pine) and in the past was a place notable for a stand of those tress, which are still valued for medicinal and ceremonial use. This species will not tolerate hot fires and is therefore a good indicator of regular controlled burning practices characteristic of an Aboriginal fire regime. The decline in the cypress pine can thus be correlated with the

disruption of traditional management practices which accompanied the movement of Aboriginal people from their countries to mission stations, pastoral stations, and towns.

In the past, fire was used in hunting by traditional owners of the Middle Ord region. At the end of the dry season, a group of men would 'encircle a stretch of country, burn off the grass and spear the game, while the women come behind and collect the reptiles and marsupials' (Kaberry 1939: 18). In the adjacent North Kimberley, 'The pattern of burning traditionally undertaken over the seasonal cycle in the Kalumburu region was characterised by extensive application of fires, individually of limited size, throughout the dry season. Burning was concentrated in the early part of the year when conditions were relatively cool and resultant fires were readily manageable. Such burning clearly was highly organised, regulated and controlled. While objectives were various, one evident intention of this management system was to strategically promote food resources of larger macropods, major staples in the regional economy. This seasonal pattern of burning is very similar in outline to fire management practices as documented for other, relatively high rainfall, monsoonal regions of northern Australia. (e.g. Western and central Arnhem Land, parts of Cape York)' (Saint and Russell-Smith 1997: 11).

Other ways of managing food resources and the environment

Prior to European contact, the people of the Purnululu region, like other Aboriginal people in Australia, had developed strategies for managing the environment in such a way that it was maintained as a system which would produce sufficient resources for all living beings. People recognised the interconnections of species through food chains, understood the actions of the seasons on resources, and intervened in ecological relationships through the use of fire, selective gathering and hunting, food taboos, and religious ritual. These techniques were considered to be interrelated (Rose 1984: 9)

Women practiced a selective harvesting of resources that recognised that plants and other resources are self-generating and must not be overused. Not all of a resource was harvested, so that sufficient would be available next time the area was harvested.

Ngarrangkarni has primary importance to hunting-and-gathering strategies because of the belief that all plants, animals and birds owe their present forms to events that took place during the creation period. Animals, birds and reptiles are believed to have been formerly human-like and then changed into their present shape as a consequence of the adventures of the ancestor beings. Humans, plants and animals, and the landscape are thus considered to be inter-related (Palmer and Williams 1990: 17).

Because of this interrelationship, people believe they are able to intercede on behalf of certain plant and animal resources at a place of particular importance where the spirit of that species was ordained during *ngarrangkarni*. The *ngarrangkarni* presence is believed to be ongoing and the continuation of the species is considered dependent on the integrity and physical protection of the place and also the appropriate *ngarrangkarni* ritual practice for that species at that place.

Kaberry describes examples of such places and their associated rituals for the East Kimberley region. They are designed to ensure the continued existence of the species and to also increase their numbers (1973: 203). They are known by anthropologists as 'increase ceremonies' and are an integral part of the 'Law' in many parts of Australia.

Kaberry states how during the *ngarrangkarni* the ancestor beings, as they passed through the country, left stones or sometimes a tree, each of which contains the *guning* (essence) of an animal, bird, fish, reptile, or plant. By undertaking the appropriate ritual such as rubbing one of these or striking it with bushes and uttering the appropriate ritual, the *guning* will go forth and cause the species with which it is associated to multiply.

In some groups, men and women held distinct responsibility for increase rituals for particular species. Men were responsible for rituals for meat such as kangaroo, wallaby and marsupials in general, whereas women were responsible for performing the rituals for fish, plant foods such as lily roots, yams and fruits, and wild honey. In other groups, responsibilities varied and the gender distinctions were not as clear in terms of food that was hunted and food that was gathered (Kaberry 1973: 204-205, Toussaint 1999: 50).

A local group may perform increase ceremonies on behalf of the language group as a whole. This stresses the interdependence of local groups and their links back to wider social groupings.

Kaberry describes these processes as 'spiritual storehouses' (1973: 203). They complement the physical techniques noted above, such as not harvesting all of one resources at any one time. All of these techniques were practised to ensure that sufficient food resources were always available.

Increase ceremonies were not restricted to individual food resources. There were also increase ceremonies for many inedible and poisonous species. As well, rain making is also

considered part of this system (Kaberry 1973: 206-207) and there are also references to increase sites and ceremonies for stars, the sun and moon (Kaberry 1973: 205). Increase ceremonies are therefore not just a way of having control over food resources as such but, like all aspects of *ngarrangkarni* are about perpetuating the natural order and existence of the world as a whole (cf Kaberry 1973: 205).

Ethnobotany and seasonal occupation

Scarlett (1985) undertook a preliminary account of the ethnobotany of the Kija people of Bungle Bungle outcamp in 1984. Subsequently, in 1986 Forbes and Kenneally carried out a botanical survey within Purnululu National Park, including the area of Scarlett's study. This work resulted in a substantial plant list including a number of taxa identified by Maiden (1889) as food sources exploited by Aborigines in Australia.

Plant food resources

Scarlett (1985) divided the plant foods into fruits, seeds, roots, and a category of 'Stems, leaves and edible gum'. He also included a discussion on honey, identified by his informants as significant.

Fruits

Scarlett (1985) identified 24 plants yielding edible fruits, of which 3 were regarded by Aboriginal people as particularly important. The majority of fruits ripen in the wet season when root vegetables are unavailable or less palatable.

A number of fruits in the area noted by Scarlett appear to be typical of the moister riparian habitats, including in the gorges.

Kija	**Linnaean name**	**Season**	Occurrence noted	**Notes**
Minyjiwarram	Vitex glabrate	Wet	Riparian woodland	Eaten raw or pounded, wrapped and stored
Taaluny	*Buchania obovate*	Wet-early dry	On levees and terraces on plain	ditto
Mapura	*Carissa lanceolata*	Wet to mid-dry	ditto	Eaten raw

Seeds

Scarlett (1985) also identified six seed bearing species, of which five are regarded as significant. The sixth is a *Pandanus* palm. An unidentified grass is also included in the list.

Panicum species appear in Forbes and Kenneally's plant list for the area. Maiden (1889: 51) reported that *Panicum* provides 'excellent' food (when the seeds are pounded and made into cakes). If so, this taxon would be one of few staple plant foods, like *Terminalia*, below, to be found on the plains.

Throughout Australia, the importance of grass seed meal to traditionally oriented populations has declined with the availability of wheaten flour.

Kija	**Linnaean name**	**Season**	Occurrence noted	**Notes**
Ngarnthanji	*Cycas pruinosa*		In Osmand Valley area (distinguished as a somewhat moist locality)	Toxic, no longer used requires processing for food including steeping and grinding
Wirlarr	a grass	Dry season	Black soil (ie between Bungle Bungles and Ord)	No longer available, once abundant ground-up for food
Partiki	Terminala arostrata	Seeds can be collected through the year from beneath trees	Inter-range plains	Nuts are eaten raw
Wurlarlji	Brachychiton diversifolius	Early dry season	Riparian forest	Green pods cooked and seeds removed
Panjaruny	Sterculia sp	Early dry season		Green pods cooked and seeds removed

Roots

Scarlett's evidence root use is extremely limited, with only three species clearly identified. There is no clear indication whether the staple taxa of other areas, *Dioscorea* and *Ipomea*, were utilised. Forbes and Kenneally record the occurrence of *Tacca sp* in a gorge location, its use is not recorded by Scarlett but its use is well known elsewhere in Australia.

Scarlett notes roots are less available, or less palatable in the wet season. For the last century the Wet is the season in which people were most likely to return to country, and as roots may

not have been an attractive resource during this season, their use may have declined accordingly. Elsewhere in Australia wheaten flour has displaced root staples to a varying degree.

Kija	Linnaean name	Season	Occurrence noted	Notes
Kunja	*Cochlospernum fraseri*	Dry	Western range	Roots from small tree
Ngawunji	*Vigna lanceolata*	Dry	Riparian forest	Roots from trailing herb
Jimarniny	*Colocasia esculenta*	Dry	Currently restricted to Osmund valley	Wild form of domestic taro, a probable high value staple no longer used.

Stems, leaves and edible gum

Kija	Linnaean name	Season	Occurrence noted	Notes
Yingajali	*Livistona* sp	Particularly welcome vegetable in the wet	In chasms and riparian closed forest	Upper stem and apical bud.Very popular
Nyaarnte	*Acacia sp. Terminalia sp*		Species occur across a range of habitats	Edible gum cooked to soften and improve digestibility

Location of key plant resource taxa

The available information suggests a few general plant food resource areas which are likely to have been of even greater importance before the seasonal availability of western station food such as flour.

Although limited, the data would appear to suggest two general classes of resource areas:
riparian forests and moister areas including the deep gorges and valleys; and,
black soil and levee systems of the flood plains which would have become accessible as resources ripened into the Dry Season.

	Gorge/riparian forest	Plain, black soils, levees	Other plains	Other (eg cliff foot, other ranges)
Fruits	1	2		
Seeds	2	1	1	1
Roots	2			1
Stems etc	1			1
Total	6	3	1	1

The camps visited by Scarlett appear to have been sited with more of a view to exploiting protein rather than vegetable foods. Nonetheless, it is apparent that with the exception of fruits, plant foods would be most limited during the wet season growth period.

Rock art

In a regional context, there has been little formal documentation of Purnululu rock art and its relation to the rock art of the west Kimberley. Kaberry (1939: 206), however, records '…rock-paintings of animals including kangaroo, crocodile, emu, rainbow-snake, and other species' at Forrest River, west of Wyndham, and observes that it was painted or touched up principally by senior men as part of a process to ensure the increase of the species painted. Unlike the Worora, Wunambul and Ngarinyin who maintain that the Wandjina are responsible for the monsoons that bring rain and rebirth to the north-west Kimberley, the peoples of the Forrest River region in common with the traditional owners of the middle Ord attribute the power to create rain to *Kaleruny,* the rainbow snake (Elkin, 1930). Thus it is not surprising that the rock art recorded from the Purnululu National Park and Conservation Reserve does not fall within the Wandjina or the Bradshaw traditions of the north-western Kimberley, but displays striking similarities to the art that Kaberry briefly reports on from Forrest River.

In 1988, with financial assistance from the Department of Aboriginal Sites of the Western Australian Museum Purnululu Aboriginal Corporation undertook a 3- month survey of archaeological sites as part of a larger Aboriginal cultural resources documentation programme. The survey focussed on the northern and western margins of the Bungle Bungle Range, since these were thought to be the areas most likely to be impacted by the increasing numbers of tourists visiting the then newly gazetted National Park.

At the completion of the archaeological survey, 222 site records from within the Purnululu National Park were held in the Corporation's computer database. 54 of these sites are shelters or overhangs exhibiting paintings on rock. The shelters or *nawuny,* located at the foot of the sandstone walls of the Bungle Bungle Range or cut into the limestone outcrops that parallel the western and northern margins of the Range are mostly 3 to 4 metres in depth, generally have a northerly or westerly aspect and house rock-art galleries of from 4 to 100 metres. The paintings are mostly of animals including crocodile, turtle, fish, kangaroos and emu but including human stick and snake-like figures. These paintings are generally accompanied by

stencils of hands and in at least one instance feet, including those of children, as well as implements such as boomerangs, spear throwers and sticks that may have been used for digging, fighting or throwing, mostly in red ochre (see Commonwealth of Australia 2002: 20).

The larger galleries offer evidence of recurrent and prolonged use; numerous stencils mainly of hands, grindstones, remnants of hearths and dense scatters of stone artefacts attest to the importance of these areas as occupation sites. Some of the shelters document the arrival of Europeans into the region. At one shelter the rock art includes a painting of boots with spurs, at another there are engravings of trucks and heads with hats. A metal rasp, tobacco tins and tools of glass at a third shelter point to continued occupation of the Park well after contact.

The predominance of species such as crocodile, turtle and fish as graphic elements in the galleries recorded at the foot of the Bungle Bungle Range reinforce the accounts recorded from people of this region of the continuing significance of riverine resources in their lives today.

Contemporary art

The aesthetic dimensions of traditional owners' relationship to the Middle Ord region is expressed in the words they use to describe its myriad beauties, in their performance of ritual singing and dance, and in their painting. It would not be hard to trace continuity in the visual forms from the earliest rock paintings to the canvases and prints that have earned them an international reputation. Indeed, the economic base of some families in the decades following Europeans' 'discovery' of Australian Aboriginal art after World War 2 has increasingly been craft production rather than hunting and gathering (cf Morphy 1999: 442). As with other Australian Aboriginal peoples' relations to land, the foundation of the riverine adaptation of the traditional owners of the Middle Ord is the relationship that links *ngarrangkarni*, land, and people. It is a relationship that organises the relations of people to land and acts as a means of monitoring relationships to the environment. 'Art is an integral part of this process, since designs are associated with particular areas of land; the right to produce designs is one means by which people assert their connections with place' (Morphy 1999: 443). The paintings of the traditional owners of the Middle Ord are virtually always maps of some part or feature of their own country, or of country to which they are related in a way that gives them the authority to depict it. Paintings may also illustrate a story, whether of

ngarrangkarni, or of distant or recent history. As such they may include figurative elements as well as stylised representations of country.

It was the forced departure from the pastoral stations, life in the large community that came into existence as families from the surrounding pastoral leases congregated in the small reserve at Turkey Creek and the discontent and frustration at not being able to have access to their country that provided the backdrop in the mid-1970s for the genesis of the *Keriyil-keriyil*, a public ceremony or *junpa*, and the subsequent emergence of the Turkey Creek artists.

> The flowing forms and visual textures which appear in the paintings of Rover Thomas, Paddy Jaminji and other Turkey Creek artists give a new and vibrant perspective to the nature of Aboriginal perception and depiction of country. Both plan and profile treatments of landscapes as intuitive forms create 'maps' of the geographic and historical topography of the Kimberley. While these paintings are perhaps more easily approached by the non-Aboriginal observer, they are still imbued with the presence and mystery of the Narungani (sic.), or creative past, and the power beings who inhabited it and who can still be invoked through ritual. The physical landscape is a palimpsest of history and human interaction (Rover Thomas *et al*.: 1994: 3).

Among the prominent artists who are traditional owners of Purnululu National Park and the Conservation Reserve are Jack Britten, Queenie McKenzie (deceased), George Mung (deceased), Phyllis Thomas, Churchill Cann, Henry Wambi, Hector Chunda, Beryline Mung and Sadie Carrington (Budbaria). Their works are held in major museums and galleries including the National Gallery of Australia, the Museum of Australia, Parliament House, the National Gallery of Victoria, the Art Gallery of South Australia, the Art Gallery of Western Australia, the Queensland Art Gallery, the Museum and Art Gallery of the Northern Territory, the Berndt Museum of Anthropology at the University of Western Australia as well as private collections such as those of Holmes a Court, the Kelton Foundation located in Santa Monica, U.S.A. and Sammlung Essl, Vienna, Austria.

The works of these artists are tangible manifestations of the continuing significance that their countries have for them and their families.

Comparisons with other riverine peoples

Throughout the world many hunting and gathering peoples have adapted their economy to riverine environments. However, no riverine environment similar to that of the traditional

owners of the Middle Ord River area that includes the Purnululu National Park has been identified. It may be that the combination of biogeographic features within this area has no close analogy. It has been suggested (A. Kearns CSIRO Sustainable Ecosystems, personal communication) that similar geographic environments may exist in the Sahel of West Africa, Turkana in East Africa, and southeastern Ethiopia. On the basis of latitude and apparently similar topographic features, it is possible that parallels may also exist in areas of northeastern Brazil or central-western Rajasthan. Lee and Daly's global review of hunter-gatherer cultures (1999), indicates that while some hunting and gathering peoples may be found in regions such as these, it was rare to find groups who had not been in contact with indigenous pastoralist or horticulturalist communities or who did not undertake limited horticulture themselves.

As described in the sections on natural values of the Park, the Middle Ord Region is a transition zone between the aid desert environments of central Australia and the monsoon savanna environments of northern Australia. The deep gorges and contrasting geology and soil types contain many microenvironments that support the most southerly extension of some monsoon savanna plant and animal species. Similarly the sandplains and sandstone plateau support a rich diversity of arid zone plants.

A number of social and cultural features of the traditional owners of the upper and middle reaches of the Ord River suggest parallels with peoples of other riverine environments despite differences in physiography and climate. Thus, for example, regional economies with extensive trade networks and seasonal abundance with local variation in food resources which require specialised organisation of labour for harvesting, processing and storage are characteristic of all these environments.

The Sehaptin-speakers of Eastern Oregon and Washington live where the Columbia River 'cuts a deep gash through the Miocene basalts of the Columbia Plateau. The river courses deeply through the lives of these Indians as well. It forms the spine of their land, the core of their habitat, and thus profoundly shapes their lives' (Hunn 1990: 3). The Indians (Hunn 1990: 89-91) occupy an area of great seasonal extremes. 'In summer the low valleys are hot as furnaces with temperatures regularly rising over 100^{o}F (40^{o}C), yet in sight of the perpetual ice of the dozing volcanic summits. Cool huckleberry meadows near timberline provide a refuge from this heat when the mid-summer fish runs slacken. The low valleys receive on average as little as seven inches (175 mm) of precipitation annually.' There are no summer rains, and in winter for 'weeks on end a monotonous subfreezing overcast reigns, nourishing depression in people confined to their lodges. Fresh foods are virtually unavailable … The only edible plants at this season are a few tuberous perennials…found by careful searching

amongst the sagebrush near winter villages … [People are sustained by] their stores of dried roots, salmon, berries, and venison prepared during many long hard days of spring, summer, and fall, then carefully cached in cellars and in special baskets.'

An interesting strategy of ecological co-existence characterised the Klikitat Indians of south-central Washington Cascades and their Chinookan neighbours. 'The two groups maintained linguistic and ethnic distinctiveness despite intermarriage and co-utilization of all major resources of the south-central Cascades and upper Columbia River Gorge…Available evidence suggests that the ethnic boundary was reflected in contrasting subsistence strategies. The Chinookans of the upper Columbia Gorge were aquatic in orientation and moved primarily east and west along the river by canoe in search of season harvests. The Klikitat moved north to south with the seasons, up the tributary valleys – later on horseback – taking advantage of resources ripening at a range of elevations. They spend the better part of their subsistence effort in upland meadows …The Klikitat also were favourably situated to take advantage of trans-Cascade trade; a network of trails linked their camas and berry campsites to the lower Yakima Valley … to winter villages and salmon fishing sites of the Columbia between the White Salmon River and The Dalles, and to Chinookan villages of the lower Columbia River via a trail down the Lewis' (Norton, Boyd, and Hunn 1999: 67).

The Western Penan live in the upland plateaux of central Borneo (Brosius 1999: 312-316), an area of wide valleys, steep ridges, and mountains. The many rivers, along with local ridges, form the template around which Penan organize ecological and environmental information. Rivers and related features are named and ecological information is commonly encoded in place names. Most of the interior plateau is covered with dense primary tropical forest and adjacent to the larger rivers are mature secondary forests. The kin-based community comprises of bands of 60 to 200 members occupying foraging areas of approximately 1500 square km. The community claims rights over particular watersheds as corporate estates, claims validated by the management of resources, especially the sago palm. The Western Penan have now adopted swidden agriculture, chiefly planting rice and cassava. The primary game species, the bearded pig, valued for its fat, is hunted by men with spears and dogs and/or shotguns.

The Batak of Palawan Island in the Philippines (Eder 1999: 294-297), comprise eight local groups, each identified with a particular river and its watershed. A chain of mountains runs the length of Palawan Island; in the interior rivers tend to be short and relatively the drainage steep, but riverine resources figure prominently in Batak subsistence. Climatically, Palawan has a rainy season from June through December and a dry season from January through May,

one of the driest areas of the Philippines with about 1600 mm. of rain a year. The interior regions, where Batak mostly live now have a dry monsoonal vegetation which provides a variety of carbohydrate-rich seeds, fruits, and tubers. Principal forest foods include wild pig, gliding squirrel, jungle fowl, honey, yams, fruits, and greens. Fish, molluscs, and crustaceans are taken from the river. Pigs are hunted with spear and hunting dogs or from blinds with bow and arrow or homemade guns. Most forest food collecting is done by individuals or small groups from local group settlements or temporary forest camps. In the past, pig hunting and fish stunning were sometimes large-group activities. The Batak have also long produced some rice, maize, cassava, and sweet potato by shifting cultivation

For centuries, the Batak have engaged in important trade with maritime peoples of the Sulu region, exchanging forest products for manufactured goods and other requirements. Forest products are now exchanged with outside peoples in return for rice, clothing and other consumer goods. The importance of forest product exchange and more recently of wage labour to Batak subsistence has made patron-client ties a prominent feature of Batak economy. Consumer demands from the market are growing, but opportunities to earn cash are few. Increasing pressure on their land continues to force Batak into the higher areas of the river valleys, despite the fact that the several components of their economy (trade and wage labour as well as hunting and gathering) have evolved together for more than a hundred years (Eder 1984: 838). In dealing with the changes that have resulted from the impingement of external forces, they are however typical of all hunter-gatherers, not only of those focused on a riverine environment.

The hunting-and-gathering way of life characterises 99% of the period of hominid evolution, as well as the overwhelming majority of time that fully modern humans (*homo sapiens sapiens*) have been present on earth. Although hunter-gatherer cultures were formerly widespread, they have become vulnerable to impacts from other cultures. The outstanding universal values of properties representing contemporary hunting-and-gathering cultures are not well represented on the World Heritage List. Of the 552 properties inscribed for their cultural and mixed values only two are listed for these values - Kakadu National Park and Uluṟu-Kata Tjuṯa National Park. Both are Australian properties. Kakadu is in the monsoonal zone in the north and Uluṟu-Kata Tjuṯa lies within the desert region, in the centre of the continent.

Australia considers that the representation of hunting-and-gathering societies needs to be extended so that the List can be more properly representative of the full range of human cultures, this being consistent with the Global Strategy. Australia considers that it is well

placed to represent key features of these cultures, as the only continent of hunting-and-gathering societies at the time of European occupation. An international review of hunter-gatherer cultures has noted that the Australian Aborigines present the most fully realized instance of these cultures imbuing a landscape with cosmological meaning (Lee and Daly 1999: 4).

Australia considers that Purnululu National Park well extends this representation. The landscape has comparable features of outstanding universal value to the existing listings - particularly in terms of the embeddedness of religious, social, aesthetic and economic factors in the landscape - and it complements the existing listings in two important ways.

The first is that Purnululu National Park represents the survival of a cultural landscape in a region that received even more catastrophic impacts from European contact than those areas represented by existing listings. It enlarges our understanding of the struggle that hunting-and-gathering cultures have in the modern world to maintain their customary traditions.

The second is that Purnululu's location in a zone intermediate between the desert and monsoon regions informs us about hunting-and-gathering cultures in regions of major environmental diversity. A knowledge of such cultures demonstrates how these type of cultures deal with such diversity both in contemporary times and in the past.

The Management of Purnululu National Park

Native Title and joint management

National

In Australia, the evolving concept of native title has since 1992 shaped the interaction between Indigenous people and park management policies. In June 1992, the High Court in the Mabo decision, overturned the doctrine that Australia was terra nullius (no one's land) at the time of European settlement. The court held that the common law of Australia recognized the form of native title to land which, in the cases where it has not been extinguished, reflects the entitlements of the Indigenous inhabitants, in accordance with their traditional laws or customs, to their traditional lands. Since that time, the concept of native title and its impact on traditional ownership rights over areas dedicated to conservation and biodiversity protection has evolved in both common and statute law.

The two World Heritage areas established on land owned by Aboriginal people are Uluru-Kata Tjuta and Kakadu. In both cases, Aboriginal rights to land had been established under the Northern Territory land rights act 1976. While traditional owners hold full and inalienable title to the land they have leased that land to the Director of National Parks and Wildlife who is responsible for ensuring that all joint management arrangements are effective and that there is a balance between conservation interests, tourism, and Aboriginal cultural values.

Purnululu National Park

For Purnululu, the negotiation of native title interests and the pursuit of joint management and living areas in the park and adjacent reserve has been the subject of discussion and court action for the last decade. Both during and after the visit by the World Heritage assessors, native title and joint management issues have been rapidly evolving.

In the case of Purnululu, the land comprising the national park and adjacent reserve had been claimed by Aboriginal groups who expressed a traditional attachment to the land and sought the recognition of their ownership rights

The Miriuwung Gajerrong native title claim under the *Native Title Act 1993 (NTA)* was over land and waters of the Ord area of the East Kimberley and adjacent areas of the Northern Territory. The native title determination by Justice Lee of the Federal Court handed down on

24 November 1998 found the Miriuwung Gajerrong people had significant native title rights and interests for land that included Lake Argyle and the Ord project. While not including the area of the National Park, the decision implied that the same rights and interests would be found in this area also.

Following appeals, the Full Court of the Federal Court largely overturned Justice Lee's decision and few native title rights and interests were recognised in the Full Court's decision of 11 May 2000. Appeals were again lodged.

Extinguishment of Native Title for Certain Reserves

The High Court's decision of 8 August 2002 (shortly before the visit of the assessment team) set aside the earlier Full Court decision. Such complex matters cannot be easily summarised but the High Court also limited the determination of significant native title rights and interests. No appeal party in the High Court decision entirely 'won' or 'lost' but the State's arguments were largely upheld. Aboriginal people and Aboriginal bodies, including the Purnululu Aboriginal Corporation, were greatly disappointed by the High Court ruling.

A most significant outcome for Native Title claimants and the Department of Conservation and Land Management (DCLM) is the extinguishment of native title over reserves vested under section 33 of the *Land Act 1933*. The High Court ruled that vesting of a reserve vested a right of exclusive possession to the reserve's vesting body and extinguished native title. This ruling has effectively equated reserves vested under the *Land Act 1933* with freehold or land that was previously freehold.

State Government Policy Response

The Working Paper about Ownership, Administration and Joint Management of Conservation Lands in Western Australia is to be reviewed in light of both the High Court decision and the comments received from ATSIC Regional Councils, Native Title Representative Bodies and the Western Australian Aboriginal Native Title Working Group (WAANTWG).

The Working paper about Ownership, Administration and Joint Management of Conservation Lands in Western Australia proposed to use the Native Title process as the vehicle or the trigger (Federal Court Determinations) to enable Parliament, under an amended CALM Act, to consider transferring vesting or inalienable freehold ownership of conservation reserves from the Conservation Commission of WA to approved Aboriginal Bodies Corporate for joint management with the Department.

The policy of linking with native title determinations was seen to be the most effective way of progressing formal joint management arrangements grounded in a title transfer to the rightful native title holders. This strategy now appears to have limited application.

The ATSIC Regional Councils, Native Title Representative Bodies and WAANTWG have submitted to the Minister for the Environment and Heritage that the CALM Act should be amended to enable title transfers to be undertaken in the absence of a determination of native title or where native title has been found to be extinguished. The Aboriginal community is seeking beneficial economic outcomes to be associated with recognition of cultural connection to country.

For Purnululu traditional owners, who actively support the nomination of the area for inscription on the world heritage list, the decision of the court was regarded as weakening their potential claims for native title, joint management and the recognition of their cultural values as central and essential to the management of the potential world heritage area.

The Western Australian Environment and Heritage Minister has formally indicated to representatives of Aboriginal people, that it is timely for the Government to signal its intention to amend the CALM Act to enable a transfer of title to reserves and their joint management to be undertaken by Aboriginal Bodies Corporate and the Department. A joint WAANTWG-Ministerial working group chaired by the Minister's Chief of Staff with representation from DCLM and the Department of the Premier and Cabinet will revise the working paper and through the Minister distribute a policy paper for public review.

The Minister has committed to amending the *Conservation and Land Management Act 1984* in this term of government, i.e. by 20th December 2003.

Implications for Joint Management

These decisions by the government of Western Australia accelerate the negotiation of joint management over the World Heritage area. The state government and the PAC have now entered into discussion over arrangements that will see the establishment and operation of the Park Council on an interim basis until amendments to the *Conservation and Land Management Act 1984* provide a framework to secure traditional ownership of the land and establish full joint management initiatives to protect both the natural and cultural values of the Park.

Park Council, mining and on-ground management issues

Park Council and living leases

It is the policy of the Western Australian Government to establish additional living leases and a Park Council for Purnululu National Park and adjacent conservation reserve. The Government has developed a draft Deed of Agreement between the Western Australian Minister for the Environment and Heritage and the Purnululu Aboriginal Corporation for the establishment of the Council. The position of the Western Australian Government is set out in the correspondence to the Purnululu Aboriginal Corporation at Attachment 4.

Mining

The policy of the Government of Western Australia is for no mining or exploration in national parks and nature reserves. The Mining Act requires the Western Australian Minister for the Environment and Heritage to give concurrence for any activity (i.e. issue of exploration and/or mining licences, permits or other activities, whether ground disturbing or not). This effectively means the Minister for the Environment and Heritage can veto mining in national parks and nature reserves regardless of the tenure history (i.e. where Exploration licences or mining tenements overlap parks and pre-date parks). It is common for 'no mining' or stringent access and remediation conditions to be placed over parts of tenements that intersect with conservation reserves.

The Minister has the right to be consulted over mining activity in other reserves, such as the Purnululu reserve abutting the national park. The Minister for Mines must consult and take into consideration the comments of the Minister for the Environment and Heritage, who also in turn consults with the Conservation Commission and the traditional owners. The relevant agencies have Memoranda of Understanding for administrative arrangements to enable them to work together to achieve environmental protection and mineral exploration.

In the event that important mineral resources are discovered in a conservation reserve, mining activity can only be permitted if both Houses of Parliament agree following and environmental assessment by the Environmental Protection Authority. In such rare cases (only 5 in the last ten years) the ore body is excised from the park, whilst an equivalent or larger area is required to be added into the park. On completion of mining activity the remediated area is to be added back into the park.

The Western Australian Environmental Protection Act provides a vehicle for the State Environment Protection Authority to consider any matter brought to its attention by a member

of the public, including mining activity in the areas outside the conservation reserves at Purnululu. The EPA can impose conditions on a wide range of activities to protect the environment and this would be the case in relation to any mining or exploration activity that might occur in the catchment of the Ord.

The Native Title Act also contains provisions for claimants to be notified of mining proposals and negotiate over 'future acts'. This provides a vehicle for the traditional owners to be aware of any proposed capital works or the issue of permits or licences and have their concerns addressed by way of exclusion of activity or the attachment of conditions that satisfy the traditional owners.

Detailed outline of the processes are contained in the Department of Minerals and Petroleum publication 'Guidelines for Mineral Exploration and Mining within Conservation Reserves and Other Environmentally Sensitive Lands in WA' (1998).

Feral Animal Control

Feral animal assessment and eradication/control programs are conducted every five years or as required, and in conjunction with the Department of Agriculture where an eradication program exists. A feral 'monitoring and assessment program' is being established by Park management. Cattle are regularly mustered and removed from parks and reserves neighbouring pastoral stations. Fencing is not an option in the Purnululu landscape. Notices of intent to remove and/or destroy cattle can be issued to owners of branded stock. Unbranded stock can be removed or destroyed. The southern part of the park has some incursions by stock.

Tourism and Infrastructure

A scheme is in place requiring (restricted) licensed commercial tour operators to acquire accreditation from the Tourism Council of Australia (WA) and the Nature Based and Ecotourism Accreditation program. Licences for tourist operators will only be issued with the approval of the Park Council. Tour operator interpretation education programs are conducted by the Department every two years in the Kimberley. On ground visitor impacts are regulated by facility design, infrastructure development and the standard of roading (4WD). Visitor impacts such as vandalism are not high but, will require increasing management presence which will be attained by employing traditional owners in the capacity of park officials. A training and employment program has been offered to Purnululu Aboriginal Corporation.

Purnululu offers opportunities for visitors including those who wish to experience isolation and remoteness. All DCLM promotional material for the park highlights the need for aircraft and/or 4WD access. Public access (gazetted road) will be secured through negotiation with local government and pastoral lessee. Approaches are currently being formulated currently. There are provisions under the Land Administration Act 1997 for the acquisition of land for such public works. Aerial noise and visitor impacts are controlled by way of licence conditions on licensed charter flight operators. Flight paths and operating times are specified. Breach may result in a loss of licence.

Western Australia is committed to seek more resources for Park management including through the provision of employment and economic benefits through the Purnululu Aboriginal Corporation (see Attachment 4).

Fire

Fire management is an issue throughout the Kimberley. Protection burns and traditional patch burning patterns are to be applied as the country recovers from the effects of pastoral grazing. The main focus since the park was created has been to minimise the effect of fire and optimise recovery of the vegetation of denuded pastoral country by fire reduction strategies. The country is now approaching a state where the fire management strategies are to be reviewed by the DCLM and Park Council.

Australian World Heritage Legislation

Environment Protection and Biodiversity Conservation Act 1999

Australia introduced the *World Heritage Properties Conservation Act* (WHPC Act) in 1983, to become the only country at the time with national-level World Heritage legislation. The WHPC Act enabled the Commonwealth to make regulations to protect Australia's World Heritage Properties from threatening actions identified in the regulations. The legislation, in effect, operated as a last resort mechanism for stopping specified actions.

Australia's World Heritage legislation has been strengthened to provide greater protection for Australia's World Heritage properties. The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which came into force in 2000, replaces and significantly improves on the WHPC Act by ensuring up-front protection and improved management for the World Heritage values of Australia's World Heritage properties.

The EPBC Act regulates actions that are likely to have a significant impact on the World Heritage values of a World Heritage property. Under the EPBC Act, the 'World Heritage values' of a property are the natural and cultural heritage in that property as defined by the World Heritage Convention. The Act imposes substantial civil and criminal penalties on a person who takes an unlawful action.

The EPBC Act provides thorough environmental impact assessment mechanisms for proposed actions that are likely to have a significant impact on World Heritage values. It also creates a mechanism for the Commonwealth and State governments to enter bilateral agreements to achieve the requirements of the Act, encouraging integrated and cooperative management of World Heritage properties and removing duplication of regulatory processes. In order to be accredited, the relevant State plan or process must be consistent with the Australian World Heritage Management principles, which are regulations made under the Act.

Australia's experience with the EPBC Act to date has shown that the Act is a more responsive tool for setting and implementing Commonwealth standards for World Heritage protection than the legislative regime it replaced. For example, the Commonwealth Minister for the Environment has made decisions relating to the protection of World Heritage values for some 65 proposed actions within the first two years of the EPBC Act's operation. This compares with six uses of the regulatory provisions of the WHPC Act in the course of the sixteen years of its operation.

Australia's nomination of Purnululu National Park for inscription on the World Heritage List notes that the EPBC Act requires that the Commonwealth use its best endeavours to ensure a management plan for each declared World Heritage Property is prepared and implemented. The Act requires that the management plans be consistent with the Australian World Heritage Management Principles. The principles are listed below.

<u>Australian World Heritage Management Principles</u>

1. General principles

1.01 The primary purpose of management of natural heritage and cultural heritage of a declared World Heritage property must be, in accordance with Australia's obligations under the World Heritage Convention, to identify, protect, conserve, present, transmit to future generations and, if appropriate, rehabilitate the World Heritage values of the property.

1.02 The management should provide for public consultation on decisions and actions that may have a significant impact on the property.

1.03 The management should make special provision, if appropriate, for the involvement in managing the property of people who:

(a) have a particular interest in the property; and

(b) may be affected by the management of the property.

1.04 The management should provide for continuing community and technical input in managing the property.

2. Management planning

2.01 At least 1 management plan should be prepared for each declared World Heritage property.

2.02 A management plan for a declared World Heritage property should:

(a) state the World Heritage values of the property for which it is prepared; and

(b) include adequate processes for public consultation on proposed elements of the plan; and

(c) state what must be done to ensure that the World Heritage values of the property are identified, conserved, protected, presented, transmitted to future generations and, if appropriate, rehabilitated; and

(d) state mechanisms to deal with the impacts of actions that individually or cumulatively degrade, or threaten to degrade, the World Heritage values of the property; and

(e) provide that management actions for values, that are not World Heritage values, are consistent with the management of the World Heritage values of the property; and

(f) promote the integration of Commonwealth, State or Territory and local government responsibilities for the property; and

(g) provide for continuing monitoring and reporting on the state of the World Heritage values of the property; and

(h) be reviewed at intervals of not more than 7 years.

3. Environmental impact assessment and approval

3.01 This principle applies to the assessment of an action that is likely to have a significant impact on the World Heritage values of a property (whether the action is to occur inside the property or not).

3.02 Before the action is taken, the likely impact of the action on the World Heritage values of the property should be assessed under a statutory environmental impact assessment and approval process.

3.03 The assessment process should:

(a) identify the World Heritage values of the property that are likely to be affected by the action; and

(b) examine how the World Heritage values of the property might be affected; and

(c) provide for adequate opportunity for public consultation.

3.04 An action should not be approved if it would be inconsistent with the protection, conservation, presentation or transmission to future generations of the World Heritage values of the property.

3.05 Approval of the action should be subject to conditions that are necessary to ensure protection, conservation, presentation or transmission to future generations of the World Heritage values of the property.

3.06 The action should be monitored by the authority responsible for giving the approval (or another appropriate authority) and, if necessary, enforcement action should be taken to ensure compliance with the conditions of the approval.

Bibliography

Ackerman, K (1980) 'Material Culture and trade in the Kimberleys today' *in* Berndt and Berndt, pp 243-251.

Ackerman, K (1998) 'The Original Inhabitants' pp 36-47 in *The Australian Geographic Book of the Kimberley*. David McGonigal (ed). Australian Geographic Pty Ltd, Sydney. Revised Edition 1998.

Altman, JC (1987*) Hunter-Gatherers Today: an Aboriginal Economy in North Australia*. Australian Institute of Aboriginal Studies, Canberra.

Anderson, EN (2001) Maya Knowledge and 'Science Wars'. *Journal of Ethnobiology,* Vol.20, No. 2: 129-158.

Aucamp, JP and Swart, DPR (1991) The underground movement in Zimbabwe. *Bulletin South African Speleological Association*, 32: 79-91.

Balme, J (2000) Excavations revealing 40,000 years of occupation at Mimbi Caves, south central Kimberley, Western Australia. *Australian Archaeology*, No. 51: 1-5.

Barker, WW, Welch, SA and Banfield, JF (1997) Biochemical Weathering of Silicate Minerals. In Banfield, JF and Nealson, KH (eds) Geomicrobiology: Interactions Between Microbes and Minerals. *Reviews in Mineralogy*, 35: 391-428.

Beard, JS (1976) The evolution of Australian desert plants. In Goodall, D.W. (ed) *Evolution of Desert Biota*. University of Texas Press, Texas, pp. 51-63.

Bernabei et al, (1994) Tepui 93. *Progressione*, 30: 5-119, 2 maps.

Berndt, RM (1980) 'Traditional Aboriginal Life in Western Australia: as it was and is' pp 3-27 *in* Berndt and Berndt (1980).

Berndt, RM and Berndt, CH (1980) (Eds) *Aborigines of the West - Their Past and Present* University of Western Australia Press, Perth.

Bolton, GC (1958) *Alexander Forrest; his Life and Times.* Melbourne University Press, Melbourne.

Boulevert, Y et Juberthie, C (2001) République Centrafricaine. *Encyclopædia Biospeleologie*, 3: 1659-1668.

Bradley, JJ (1995) Fire: Emotion and Politics; a Yanuwa Case Study. In *Country in Flames. Proceedings of the 1994 Symposium on Biodiversity and Fire in North Australia.* DB Rose (ed). Biodiversity Series, Paper No. 3, Biodiversity Unit, Canberra and Darwin: Department of the Environment, Sport, and Territories and the North Australia Research Unit, the Australian National University.

Bradley, JJ (1997) Li-Anthawirriyarra, People of the Sea: Yanyuwa Relations with their Maritime Environment. Ph.D. Thesis, Northern Territory University.

Brosius, JP (1999) The Western Penan of Borneo. In *The Cambridge Encyclopedia of Hunters and Gatherers*. RB Lee and R Daly (eds). Cambridge University Press.

Broughton, GW (1965) *Turn Again Home.* Angus and Robertson, Sydney.

Bungle Bungle Working Group (1986) *Final Report to the Environmental Protection Authority, Bulletin No 261*. Western Australia Department of Conservation and Environment, Perth.

Burbidge, AA (1985) Fire and Mammals in Hummock Grasslands of the Arid Zone. In *Fire Ecology and Management in Western Australian Ecosystems. Proceedings of a Symposium in May 1985, Western Australian Institute of Technology Environmental Studies Group Report No. 14*. J Ford (ed).

Burbidge, NT (1946) Morphology and anatomy of the Western Australian species of *Triodia* R.Br. II. Internal anatomy of leaves. *Transactions of the Royal Society of South Australia*, 70: 221-35.

Chappell, J and Shackleton, JN (986) Oxygen isotopes and sea level. *Nature* 324: 137-40.

Chase, A (1980) Which Way Now? Tradition, Continuity and Change in a North Queensland Aboriginal Community. Ph.D. Thesis, University of Queensland.

Clayton, WD and Renvioze, SA (1986). Genera Graminum. Grasses of the World.' (HMSO: London.).

Clement, C (1988) *Pre-settlement intrusion into the East Kimberley.* **(**East Kimberley Working Paper; no. 24). CRES, ANU.

Clement, C (1989) *Historical notes relevant to impact stories of the East Kimberley.* **(**East Kimberley Working Paper; no. 29). CRES, ANU.

Commonwealth of Australia (2002) *Nomination of Purnululu National Park by the government of Australia for inscription on the World Heritage List*.

Cowan, J (1991) *Sacred Places in Australia.* Simon & Schuster, Sydney

Davis, S (1989) *Man of All Seasons.* Angus and Robertson, Sydney.

Department of Conservation and Land Management (1995) *Purnululu National Park Management Plan 1995-2005*. Management Plan No. 33, Department of Conservation and Land Management for the National Parks and Nature Conservation Authority, Perth.

Dortch, CD (1977) Early and late stone industrial phase in Western Australia. In *Stone Tools as Cultural Markers: Change, evolution and complexity.* RVS Wright (ed). Australian Institute of Aboriginal Studies, Canberra.

Eder, JF (1984) The Impact of Subsistence Change on Mobility and Settlement Pattern in a Tropical Forest Foraging Economy: Some Implications for Archeology. *American Anthropologist,* Vol. 86, No. 4:837-853

Eder, JF (1999) The Batak of Palawan Island, the Philippines. In *The Cambridge Encyclopedia of Hunters and Gatherers*. RB Lee and R Daly (eds). Cambridge University Press.

Edinger, D, Coate, K and How, R (1999) *Secret of the Sandstone – the Osmand Range and Bungle Bungles 1999.* LANDSCOPE Expedition Report No. 32, Western Australian Department of Conservation and Land Management, Perth.

Eldridge, DJ et al (2001) Soil biota in banded landscapes. In Tongway, J, Valentin C, Seghieri, J (eds) *Banded vegetation patterning in arid and semiarid environments: ecological processes and consequences for management*. Springer, New York.

Elkin, AP (1930) The Rainbow-serpent myth in North-West Australia. *Oceania,* Vol. 1:349-352.

Elkin, AP (1932) Social organization in the Kimberley Division, North-Western Australia. *Oceania,* Vol. 2, No. 4:296-333.

Fisher, A and Woinarski, J (2002) *Assessment of the Vertebrate Fauna of the Bradshaw (Juliki) Field Training Area, Northern Territory.* Report to the Australian Heritage Commission, Canberra. Parks and Wildlife Commission of the Northern Territory, June 2002.

Forbes, SJ and Kenneally, KF (1986) A botanical survey of Bungle Bungle and Osmand Range, south-eastern Kimberley, Western Australia. *Western Australian Naturalist*, 16:93-169

Ford, D and Williams, P (1989) *Karst Geomorphology and Hydrology*. Unwin Hyman, London.

Galan, C and Urbani, F (1989) Venezuela. In Courbon, P et al (eds), *Atlas of the Great Caves of the World*. Cavebooks, St. Louis.

Gambold, N (1992) 'Chapter 6. Herpetofauna of the Bungle Bungle Area.' in Woinarski, JCZ (ed) A *Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin No. 6, Department of Conservation and Land Management, Como, Western Australia, pp. 95-116.

Griffin, GF (1992) Will it burn - should it burn: management of the spinifex grasslands of inland Australia. in *Desertified Grasslands: Their Biology and Management.* Editor G Chapman, 63-76. London: The Linnean Society of London.

Hallam, SJ (1985) The History of Aboriginal Firing. In *Fire Ecology and Management in Western Australian Ecosystems. Proceedings of a Symposium in May 1985, Western Australian Institute of Technology Environmental Studies Group Report No. 14.* J Ford (ed).

Hart, D (2000) *John Olsen* (2nd ed). Fine Art Publishing. Sydney.

Haynes, CD (1985) The Pattern and Ecology of Munwag: Traditional Aboriginal Fire Regines in North Central Arnhem Land. *Proceedings of the Ecological Society of Australia*, Vol. 13:203-214.

Hoatson, DM, Blake, D, Mory, A, Tyler, I, Pittavino, M, Allen, B, Kamprad J, and Oswald-Jacobs, I (1997) *Bungle Bungle Range, Purnululu National Park, East Kimberley, Western Australia: a guide to the rocks, landforms, plants, animals, and human contact.* Australian Geological Survey Organisation, Canberra.

Hunn, ES (1990) *Nch' i-Wana 'The Big River'; Mid-Columbia Indians and Their Land.* University of Washington Press, Seattle.

Hviding, E (1996) *Guardians of Marrovo Lagoon; Practice,Place, and Politics in Maritine Melanesia.* Pacific Islands Monograph Series 14, Centre for Pacific Studies, School of Hawaiian, Asian, and Pacific Studies, University of Hawai'i. University of Hawai'i Press, Honolulu.

Jacobs, S W L (1971) Systematic position of the genera *Triodia* R.Br. and *Plectrachne* Henr. (Gramineae) in Australia. *Proceedings of the Linnean Society of New South Wales* 96: 174-85.

Kaberry, PM (1936) Spirit-children and spirit-centres of the North Kimberley Division, West Australia. *Oceania*, Vol. 2, No. 4:392-401.

Kaberry, PM (1938) Totemism in East and South Kimberley, North-west Australia. *Oceania,* Vol. 2, No. 4:265-288.

Kaberry, PM (1939) *Aboriginal Woman - Sacred and Profane.* George Routledge and Sons Ltd, London.

Kimber, R (1988) Landscape Character Types for the Kimberley Region, Western Australia. Unpublished report.

Kimberley Language Resource Centre (1996) *Introduction to the Kija Language.* Kimberley Language Resource Centre, Halls Creek.

Kirkby, I (1991) *Assessment of Aboriginal heritage values of the Middle Ord region - a report to the Australian Heritage Commission*. Purnululu Aboriginal Corporation, September 1991.

Kirkby, I and N Williams (1983) Aboriginal relationships to land in the Bungle Bungle region, East Kimberley. Report prepared on behalf of the Warmun Community and submitted to the Western Australian Aboriginal Land Inquiry.

Kofod, F (1997) Introduction to Kija Grammar. Unpublished report prepared for the Kimberley Language Resource Centre.

Kurtz, HD, and Netoff, DI (2001) Stabilization of friable sandstone surfaces in a dessicating, wind-abraded environment of south-central Utah by rock surface microorganisms. *Journal of Arid Environments* 48:89-100.

Langton, M (1998) *Burning Questions; Emerging Environmental Issues for Indigenous Peoples in Northern Australia.* Centre for Indigenous Natural and Cultural Resource Management, Northern Territory University, Darwin.

Latz, P and GF Griffin (1978) Changes in Aboriginal Land Management in Relation to Fire and to Food Plants in Central Australia. In *The Nutrition of Aborigines in Relation to the Ecosystems of Central Australia*. BS Hetzel and HJ Frith, (eds). CSIRO, Melbourne.

Lazarides, M. (1997) A revision of *Triodia* R.Br. including *Plectrachne* Henr. (Poaceae, Eragrostideae, Triodiinae). *Australian Systematic Botany* 10: 381-489.

Lee, RB and Daly, RH (eds) (1999) The Cambridge encycopedia of hunters and gatherers, Cambridge University Press.

Lewis, HT (1985) Burning the 'Top End': Kangaroos and Cattle. *In Fire Ecology and Management in Western Australian Ecosystems. Proceedings of a Symposium in May 1985, Western Australian Institute of Technology Environmental Studies Group Report No. 14.* J Ford (ed).

Lowe, D and Waltham, T (2002) *Dictionary of Karst and Caves*. British Cave Research Association.

Maddock, K (2001) Women, Religion, and the Meaning of the Sacred in Phyllis Kaberry's Australian Ethnography. *Anthropological Forum*, Vol. 11, No. 1:55-71.

Maiden JH (1889) *The useful native plants of Australia.* Facsimile edition 1975 Compendium Melbourne.

Mainguet, M (1972) *Le Modelè des Grés*. Institut Gégeographique Nationale, Paris.

Martini, JEJ (2000) Quartzite Caves in Southern Africa. In Klimchouk et al. (eds) *Speleogenesis: Evolution of Karst Aquifers*. National Speleological Society, Huntsville, AL. pp. 458-461.

McConvell, P (1981) Kija Verbs. Unpublished paper.

McGregor, W (1988) A survey of the languages of the Kimberley region – report from the Kimberley Language Resource Centre. *Australian Aboriginal Studies*, Vol. 2:90-101.

McWilliam, J. R., and K. Mison. (1974) Significance of the C_4 pathway in *Triodia irritans* (spinifex),a grass adapted to arid environments. *Australian Journal of Plant Physiology* 1: 1171-75.

Menkhorst, K and Cowie, I (1992) 'Chapter 3. Flora of the Bungle Bungle Area.' in Woinarski, JCZ (ed) A *Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin No. 6, Department of Conservation and Land Management, Como, Western Australia, pp. 16-52.

Merlan, F (2000) Representing the Rainbow: Aboriginal Culture in an Interconnected World. *Australian Aboriginal Studies*, Vol. 2000/1&2:20-26.

Morphy, H (1998) *Aboriginal Art*. Phaidon, London.

Morphy, H (1999) Traditional and Modern Visual Art of Hunting and Gathering Peoples. In *The Cambridge Encyclopedia of Hunters and Gatherers*. RB Lee and R Daly (eds). Cambridge University Press.

Morton, SR, Short, J and Barker, RD (1995) *Refugia for Biological Diversity in Arid and Semi-arid Australia*. Biodiversity Series, Paper No. 4, Biodiversity Unit, Environment Australia, Canberra.

Multiple authors (1976) *Catastro Expeleologico de Venezuela* (and associated reports). Boletin de la Sociedad Venezolana de Espelecologia, 7(13): 81-119, 4 maps.

Myers, FR (1982) Always Ask: Resource Use and Land Ownership Among Pintupi Aborigines of the Ausstralian Western Desert. In *Resource Managers: North American and Australian Hunter-Gatherers, AAS Selected Symposium 67*, NM Williams and ES Hunn, (eds) Boulder: Westview Press for the American Association for the Advancement of Science.

Neto, AVC (2000) Speleogenesis in Quartzite in Southeastern Minas Gerais, Brazil. In Klimchouk et al (eds) *Speleogenesis: Evolution of Karst Aquifers*. National Speleological Society, Huntsville, AL. pp. 452-457.

Norton, HH, R Boyd, and E Hunn (1999) The Klikitat Trail of South-central Washington; a Reconstruction of Seasonally used Resource Sites. In *Indians, Fire, and the Land in the Pacific Northwest*. R Boyd (ed). Oregon State University Press, Corvallis.

Olsen, J (1984a) *The land beyond time: Paintings and drawings by John Olsen.* Art Gallery of Western Australia.

Olsen, J (1984b) *The land beyond time: a modern exploration of Australia's northwest*. Macmillan. South Melbourne.

Palmer, NK and Williams, NM (1990) 'Aboriginal relationships to land in the southern Blatchford escarpment area of the East Kimberley'. In RA Dixon and MC Dillon (eds) *Aborigines and Diamond Mining - the Politics of Resource Development in the East Kimberley, Western Australia*. University of Western Australia Press, Perth, pp 5-28.

Pandya, V (1999) The Andaman Islanders of the Bay of Bengal. In *The Cambridge Encyclopedia of Hunters and Gatherers*. RB Lee and R Daly, (eds). Cambridge University Press.

Purnululu National Park Management Plan (1995) *Purnululu National Park Management Plan 1995 - 2005*. Department of Conservation and Land Management for the National Parks and Nature Conservation Authority. Management Plan No. 33. Perth.

Radcliffe-Brown, AR (1948) *The Andaman Islanders.* The Free Press, Glencoe (first edition 1922).

Rose, DB (1984) 'Preliminary Report: Ethnobotany in the Bungles'. Unpublished report of 27/7/1984 held by the Australian Heritage Commission.

Rose, DB (1988) Exploring an Aboriginal Land Ethic. *Meanjin* Vol. 47, No. 3:378-387.

Rosenthal, TG (2002) *Sidney Nolan*. Thames and Hudson. London.

Ross, H (1989) *Impact stories of the East Kimberley.* (East Kimberley Working Paper; no. 28). CRES, ANU.

Rudder, John (1996?) The World of the Yolngu: the People of North-east Arnhem Land. In *The Native Born; Objects and Representations from Ramingining, Arnhem Land*. D Mundine, (ed). Museum of Contemporary Art, Sydney.

Rumsay, A (1989) Language groups in Australian Aboriginal land claims. *Anthropological Forum*, Vol. 6(1):69-79.

Russell-Smith, J, comp (1997) Traditional Resource Management Using Fire in the Kalumburu Region. In *Malgara: Burning the Bush, Fourth North Australian Fire Management Workshop Kalumburu, North Kimberley, Western Autralia, June 1997.* P Saint and J Russell-Smith (eds).

Ryan, J (1993) *Images of Power: Aboriginal art of the Kimberley.* National Gallery of Victoria.

Scarlett, NH (1985) *A preliminary account of the ethnobotany in the Kije people of the Bungle Bungle outcamp.* East Kimberley Impact Assessment Project Working Paper No. 6, Centre for Resource and Environmental Studies, the Australian National University.

Slatyer, RO (1961) Internal water balance of *Acacia aneura* F. Muell. in relation to environmental conditions. *Plant-Water Relationships in Arid and Semi-Arid Conditions. Proceedings of the Madrid Symposium. Arid Zone Research* 16: 137-46.

Strang, V (1997*) Uncommon Ground; Cultural Landscapes and Environmental Values.* Oxford, New York.

Sutton, P (1997) *Core and contingent rights and interests: 'possession', 'occupation' and Aboriginal native title.* Forthcoming National Native Title Tribunal discussion paper.

Taylor, TN and Taylor, EL (1993) *The Biology and Evolution of Fossil Plants*. Prentice Hall, New Jersey.

Thomas, Rover, with K Akerman, W Christensen and W Caruana, (1994) *Roads Cross. The Paintings of Rover Thomas.* National Gallery of Australia, Canberra.

Thomson, DF (1949*) Economic Structure and the Ceremonial Exchange Cycle in Arnhem Land.* Macmillan, Melbourne.

Toussaint, S (1999) *Phyllis Kaberry and me - anthropology, history and Aboriginal Australia*. Melbourne University Press.

Truluck, TF (1991) Deepest and Longest Caves in Africa and Southern Africa and the deepest sandstone caves in the world. *Bulletin South African Speleological Association*, 32: 99-101.

Urbani, F (1997) Venezuela. In Chabert, C and Courbon, P. (eds) *Atlas des Cavités non Calcaires du Monde*. Union Internationale de Speleogie.

Western Australia Department of Conservation and Land Management (1995) *Purnululu National Park Management Plan 1995 – 2005.* Western Australia Department of Conservation and Land Management for the Nationals Parks and Nature Conservation Authority, Perth.

White, WB, Jefferson, GL and Haman, JF (1966) Quartzite Karst in southeastern Venezuela. *International Journal of Speleology*, 2: 309-314.

Williams, NM and D Mununggurr (1989) Understanding Yolngu Signs of the Past. In *Who Needs the Past? Indigenous Values and Archaeology*. RH Layton (ed). Unwin Hyman, London.

Winkworth, RE (1967) The composition of several arid spinifex grasslands of central Australia in relation to rainfall, soil water relations, and nutrients. *Australian Journal of Botany* 15: 107-30.

Woinarski, J (1992) 'Chapter 5. Birds of the Bungle Bungle Area.' in Woinarski, JCZ (ed) A *Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin No. 6, Department of Conservation and Land Management, Como, Western Australia, pp. 68-94.

Woinarski, J (1992) 'Chapter 7. Fish of the Bungle Bungle Area.' in Woinarski, JCZ (ed) A *Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin No. 6, Department of Conservation and Land Management, Como, Western Australia, pp. 117-18.

Woinarski, J, Braithwaite, R, Gambold, N and Menkhorst K (1992) 'Chapter 8. Discussion and Recommendations of Biological Survey of the Bungle Bungle Area.' in Woinarski, JCZ (ed) A *Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin No. 6, Department of Conservation and Land Management, Como, Western Australia, pp. 119-34.

Woinarski, J, Menkhorst K, Gambold, N and Braithwaite, R (1992) 'Mammals of the Bungle Bungle Area.' in Woinarski, JCZ (ed) A *Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin No. 6, Department of Conservation and Land Management, Como, Western Australia, pp. 53-67.

Woinarski, JCZ (ed) (1992) *A Survey of the Wildlife and Vegetation of Purnululu (Bungle Bungle) National Park and Adjacent Area*. Research Bulletin No. 6, Department of Conservation and Land Management, Como, Western Australia.

Woinarski, JCZ (ed) (1990) A Survey of the Wildlife and Vegetation of the Purnululu (Bungle Bungle) National Park and Adjacent Area. Final Report to the WA Department of Conservation and Land Management from CSIRO Division of Wildlife and Ecology, Darwin. Unpublished Report.

Wray, RAL (1997a) A global review of solutional weathering forms on quartz sandstones. *Earth Science Reviews*: 42: 137-160.

Wray, RAL (1997b) Quartzite Dissolution: karst or pseudokarst? *Cave and Karst Science*, 24(2): 81-86.

Yibarbuk, D (1998) Notes on Traditional Use of Fire on Upper Cadell River. Introductory Essay In *Burning Questions* by M Langton, Centre for Indigenous Natural and Cultural Resource Management, Northern Territory University, Darwin.

Young, RW (1986) Tower Karst in Sandstone: Bungle Bungle Massif, northwestern Australia. *Zeitschrift fur Geomorphologie*, 30(2): 189-202.

Young, RW (1987) Sandstone landforms of the tropical East Kimberley Region, Northwestern Australia. *Journal of Geology*, 95: 205-218.

Young, RW (1988) Quartz etching and sandstone Karst: Examples from the East Kimberleys. *Zeitschrift fur Geomorphologie*, 32 (4): 409-423.

Young, E (2001) Looking After Country is Men's and Women's Business: Institutional Support for Indigenous Land Management. *Dialogue (Academy of the Social Sciences in Australia)* Vol. 20(2): 28-32.

Attachment 1 Sites of Cultural Significance (including Archaeological sites) North-West Purnululu National Park

Map provided separately

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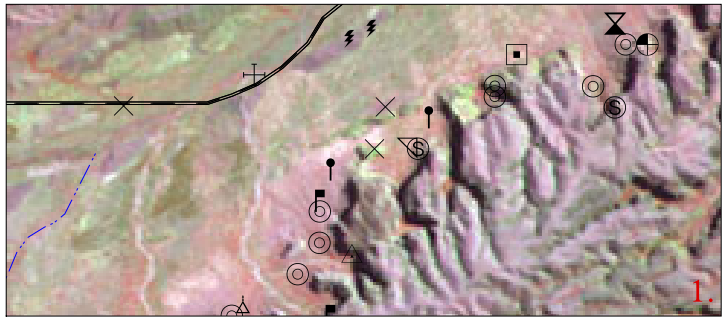
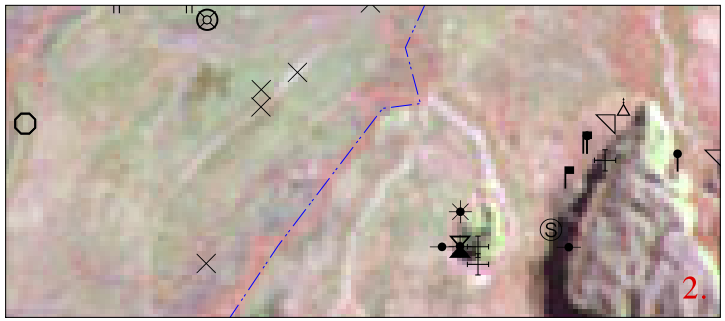
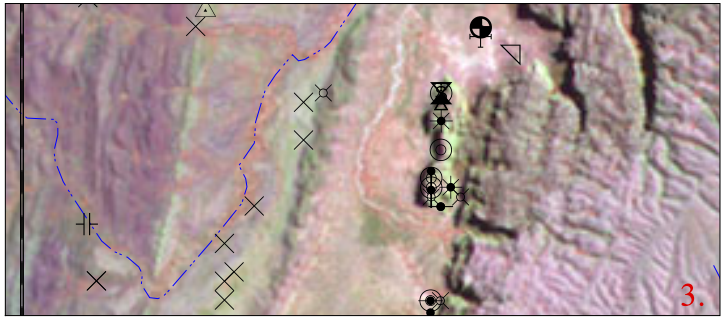
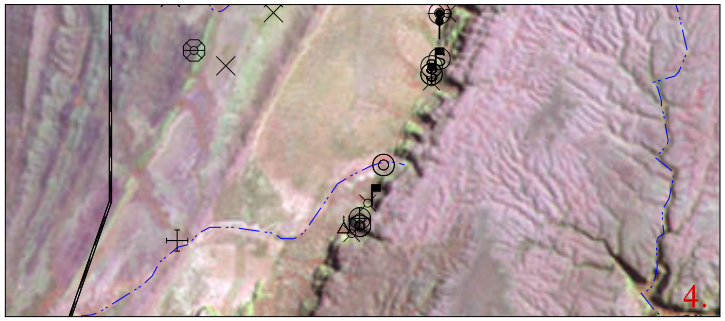
Attachment 1:
Sites of Cultural Significance (including archaeological sites) North-West Purnululu National Park

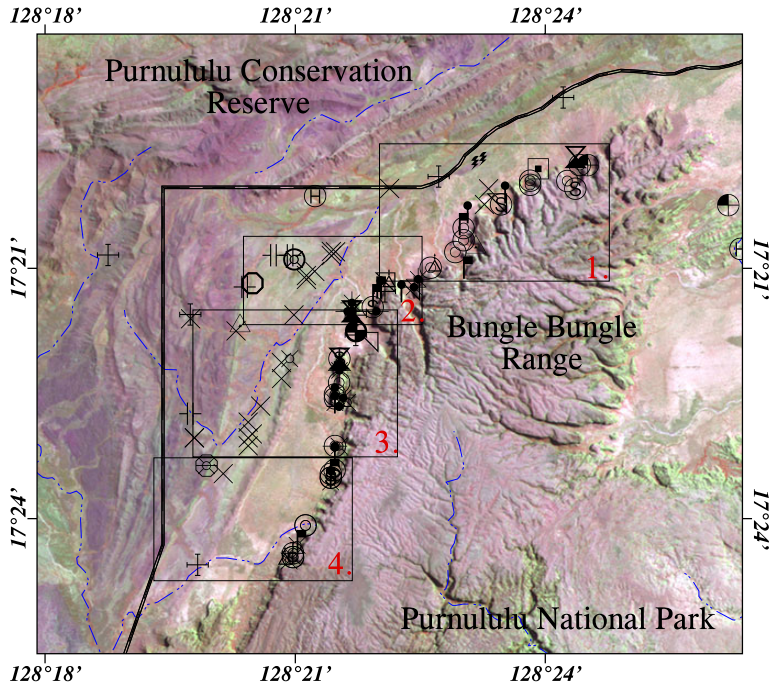
Not all sites in shown area are mapped.

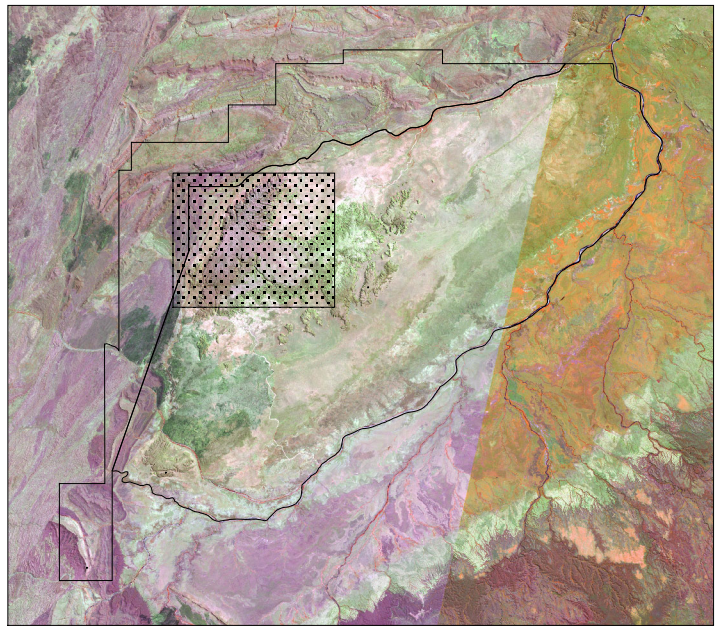












Area of interest

Sites of Cultural Significance
- Ngarrangkani Cultural Site
- Taawirriny Cultural Site

Archaeological sites
- Artefacts, Shelter
- Artefacts, Surface
- Cache, Shelter
- Engravings, Artefacts, Shelter
- Engravings, Stencils, Shelter
- Engravings , Stencils, Artefacts, Shelter
- Engravings
- Engravings, Shelter
- Engravings, Shelter
- Historical
- Evidence of Grindings
- Paintings, Artefacts
- Paintings , Engravings, Shelter
- Paintings, Engravings, Artefacts, Overhang/Shelter
- Paintings, Engravings, Artefacts, Shelter
- Paintings, Stencils, Shelter
- Paintings, Stencils, Artefacts, Shelter
- Paintings, Stencils, Engravings, Shelter
- Paintings, Stencils, Engravings, Artefacts, Shelter
- Paintings, Stencils, Engravings, Artefacts, Shelter
- Paintings
- Paintings, Shelter
- Quarry, Surface
- Stencil, Artefacts, Shelter
- Stencils, Engraving, Artefact, Shelter
- Stencils, Shelter
- Quarry site

- National Park
- Streams

Projection: Geographic
Spheroid: WGS84
Caveat: Data are assumed to be correct as received from the data supplier
Produced by: Environment Australia
Commonwealth of Australia, September 2002.

Environment Australia

Attachment 2 Sample of Sites of Cultural Significance

North-West Purnululu National Park

No	Description
1	Artefacts Shelter
2	Artefacts Shelter
3	Artefacts Surface
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56 Artefacts Surface
57 Artefacts Surface
58 Artefacts Surface
59 Artefacts Surface
60 Artefacts Surface
61 Artefacts Surface
62 Artefacts Surface/Shelter
63 Burial
64 Burial, Artefacts Shelter
65 Burial, Paintings, Stencils, Engravings, Artefacts Shelter
66 Burial-Primary Shelter
67 Burial-Secondary/Ledge Shelter
68 Burial-Secondary/Ledge Shelter
69 Burial-Secondary/Ledge Shelter
70 Cache Shelter
71 Cache Shelter
72 Engraving
73 Engraving Shelter
74 Engraving Shelter
75 Engraving Shelter
76 Engraving Shelter
77 Engraving Shelter
78 Engraving Shelter
79 Engraving Shelter
80 Engraving Shelter
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100 Engraving Shelter
101 Engraving Shelter
102 Engraving Shelter
103 Engraving Shelter
104 Engravings, Artefacts Shelter
105 Engravings, Artefacts Shelter
106 Engravings, Artefacts Shelter
107 Engravings, Artefacts Shelter
108 Engravings, Artefacts Shelter
109 Engravings, Artefacts Shelter
110 Engravings, Artefacts Shelter
111 Engravings, Artefacts Shelter
112 Engravings, Artefacts Shelter

113 Engravings, Stencils Shelter
114 Engravings, Stencils Shelter
115 Engravings, Stencils Shelter
116 Engravings, Stencils Shelter
117 Engravings, Stencils Shelter
118 Engravings, Stencils Shelter
119 Engravings, Stencils Shelter
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131 Engravings, Stencils, Artefacts Shelter
132 Engravings, Stencils, Artefacts Shelter
133 Engravings, Stencils, Artefacts Shelter
134 Historical
135 Historical
136 Historical
137 Historical
138 Ngarrangkarni Cultural Site
139 Ngarrangkarni Cultural Site
140 Ngarrangkarni Cultural Site
141 Ngarrangkarni Cultural Site
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147 Ngarrangkarni Cultural Site
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155 Other
156 Other
157 Other
158 Other
159 Other
160 Other
161 Other
162 Other
163 Other
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165 Other
166 Other
167 Paintings, Stencils, Engravings Shelter
168 Painting Shelter
169 Painting Shelter
170 Painting Shelter
171 Painting Shelter
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175 Painting Shelter
176 Painting Shelter
177 Painting Shelter
178 Paintings
179 Paintings, Artefacts
180 Paintings, Artefacts
181 Paintings, Engravings Shelter
182 Paintings, Engravings Shelter
183 Paintings, Engravings Shelter
184 Paintings, Engravings Shelter
185 Paintings, Engravings Shelter
186 Paintings, Engravings, Artefacts Overhang/Shelter
187 Paintings, Engravings, Artefacts Overhang/Shelter
188 Paintings, Engravings, Artefacts Overhang/Shelter
189 Paintings, Engravings, Artefacts Overhang/Shelter
190 Paintings, Stencils Shelter
191 Paintings, Stencils Shelter
192 Paintings, Stencils Shelter
193 Paintings, Stencils Shelter
194 Paintings, Stencils Shelter
195 Paintings, Stencils Shelter
196 Paintings, Stencils Shelter
197 Paintings, Stencils, Artefacts Shelter
198 Paintings, Stencils, Artefacts Shelter
199 Paintings, Stencils, Engravings Shelter
200 Paintings, Stencils, Engravings Shelter
201 Paintings, Stencils, Engravings Shelter
202 Paintings, Stencils, Engravings Shelter
203 Paintings, Stencils, Engravings Shelter
204 Paintings, Stencils, Engravings Shelter
205 Paintings, Stencils, Engravings Shelter
206 Paintings, Stencils, Engravings Shelter
207 Paintings, Stencils, Engravings Shelter
208 Paintings, Stencils, Engravings Shelter
209 Paintings, Stencils, Engravings, Artefacts Shelter
210 Paintings, Stencils, Engravings, Artefacts Shelter
211 Paintings, Stencils, Engravings, Artefacts Shelter
212 Paintings, Stencils, Engravings, Artefacts Shelter
213 Paintings, Stencils, Engravings, Artefacts Shelter
214 Paintings, Stencils, Engravings, Artefacts Shelter
215 Paintings, Stencils, Engravings, Artefacts Shelter
216 Quarry Surface
217 Stencils Shelter
218 Stencils Shelter
219 Stencils Shelter
220 Stencils Shelter
221 Stencils Shelter
222 Stencils Shelter
223 Stencils Shelter
224 Stencils Shelter
225 Stencils Shelter
226 Stencils Shelter
227 Stencils Shelter
228 Stencils, Artefacts Shelter
229 Stencils, Artefacts Shelter
230 Stencils, Artefacts Shelter
231 Stencils, Artefacts Shelter
232 Stencils, Artefacts Shelter

233 Taawirriny Cultural Site
234 Taawirriny Cultural Site
235 Taawirriny Cultural Site
236 Taawirriny Cultural Site

Attachment 3 Draft Values Table

Purnululu National Park

Nominated World Heritage Values

Purnululu National Park was nominated for inscription on the World Heritage List for natural values in January 2002. The World Heritage criteria against which Purnululu National Park was nominated have been included in the Values Table below.

Examples of the World Heritage values for which Purnululu National Park was nominated are included in the Values Table for each criterion. These examples are illustrative of the World Heritage values of the property, and they do not necessarily constitute a comprehensive list of these values. The nomination and other sources referenced in the nomination document should be consulted for a more detailed understanding of the World Heritage values of Purnululu National Park.

Criteria against which the property has been nominated for inscription on the World Heritage List.	Examples of the World Heritage values of Purnululu National Park for which the property has been nominated for inscription on the World Heritage List.
Natural criterion (i) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features	Purnululu National Park provides an outstanding example of significant on-going geomorphic processes associated with weathering, erosion and dissolution processes in a siliceous landscape over more than twenty million years, including the development of mature cone karst quartzite landforms that are exceptional on a global scale. The World Heritage values include: • a twenty million year record of geomorphic processes and landscape evolution associated with the formation of mature karst in siliceous sedimentary rocks; • extensive areas of karst formation, including tower karst, cone karst and distinctive banded beehive structures, that are unrivalled in terms of their extent, size, variety of shapes and arrays of cyanobacterial banding; • exceptional development of cyanobacterial banding in the exposed sedimentary layers including extensive formation of biological surface crusts that are integral to the formation and stabilisation of the sandstone karst structures. • a diverse array of geomorphic features associated with the areas of karst including deeply-incised sandstone plateaux, towering cliffs and steep escarpments and gorges formed by the Ord River following the uplift of northern parts of the continent with the convergence of the Indo-Australian and Pacific Plates in the mid-Miocene.
Natural criterion (ii) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;	Purnululu National Park, in the transition between the monsoonal tropics and arid climatic zones, contains outstanding examples of the ongoing ecological and biological processes by which a continent's unique biota adapted to aridity and climatic variability resulting from tectonic movement of the Australian plate over geological time. The World Heritage values include: • a representative example of the responses of the biota to the transition between Australia's northern and central biogeographic regions, including an unusually-wide diversity of vegetation communities associated with the transition from arid to humid climatic zones across the property combined with the exceptional range of microenvironments and habitats within the complex, deeply dissected topography of the karst landscape. The vegetation communities include arid-adapted spinifex-dominated grasslands and acacia-dominated shrublands, open eucalypt woodlands and savanna grasslands that extend into more mesic areas characteristic of the East Kimberley Region, riverine vegetation associated with the Ord River system and its tributaries, and closed forest communities in the sheltered sandstone gorges; • a significant example of the diversity of the Australian biota in a relatively low rainfall environment including a high diversity of plant and animal species associated with these communities, including 619 species of vascular

Criteria against which the property has been nominated for inscription on the World Heritage List.	Examples of the World Heritage values of Purnululu National Park for which the property has been nominated for inscription on the World Heritage List.
	plants and 298 species of vertebrates, with 149 bird species, 81 species of reptiles, 41 mammal species, 15 species of fish and 12 frog species. Many of these species are at the limits of their range within the nominated property. • an exceptional diversity of the Spinifex grass *Triodia* which dominates the major part of arid Australia. The 13 species recorded for Purnululu National Park represent one of the two areas of highest diversity recorded for the continent. The Purnululu region is an centre of endemism for *Triodia*; • exceptional representation of cyanobacteria banded biological crusts that are adapted to the transition from arid to mesic conditions and are integral to the formation and stability of the karst landscape. These single-celled organisms represent some of the oldest life forms on Earth. Other known examples include fossil forms found in Western Australia believed to be 3500 million years and also the living stromatolite forms found at Shark Bay World Heritage property.
Natural criterion (iii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	Purnululu National Park contains a natural phenomenon of exceptional natural beauty and aesthetic value in its sandstone karst landscapes which are unmatched elsewhere in the world in terms of their scale and grandeur. The World Heritage values include: • the extensive arrays of sandstone towers, cones and beehives that dominate the karst landscapes of the nominated place and which are unmatched in scale and grandeur; • the extraordinary beauty and the majestic scale of the horizontal banding provided by the cyanobacterial crusts which dominate the vistas of karst landscapes; • the high aesthetic appeal of the orange and grey cyanobacterial banding, including its extraordinary seasonal variations and transitions to other colour combinations such as shiny dark green hues after rain; • The Park's diversity of landforms and ecosystems.
Cultural criterion (iii) bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared.	The cultural landscape of Purnululu National Park is an exceptional example of hunting-and-gathering culture, embodying religious, social, aesthetic and economic dimensions of this tradition. Hunting and gathering cultures, formerly numerous throughout the world, are now noticeably rare. The World Heritage values include: • The all-pervading connection of people to land through the phenomenon of *ngarrangkarni* (the Law); • The cultural landscape of Purnululu including the meaning imbued in local features including narrow gorges and large pools of water, rockholes or soaks, intermittent tributaries, places where water flows over flat slabs of rock, and places where it fans out and forms a sandy bed. tributaries which give outline and substance to the social and economic activities of its people. • The relation between the traditional owners and their families to places along the river and the *narraku*, referring to the relationship that is created by a shared name linking an individual to the geographical feature, and which is connected to personal identity. • People's adaptation to a diverse environment, transitional between Australia's arid interior and the wetter, northern monsoonal areas, showing how people adapt to areas of significant environmental diversity; • People's adaptation to a riverine environment where examples of such hunter-gatherer cultures are particularly scarce in today's world given ever-widening competition for resources such as water and land; • The four distinct Indigenous language groups - Kija, Miriwoong, Malngin and Jaru, reflecting the diversity occurring because of the transition between arid desert and monsoonal savanna and consequent social, religious and cultural differences; • The participation of the society in the Kimberley-wide *winan* exchange network where the survival of such networks are increasingly rare; • The material reflection of connection to land illustrated by many

Criteria against which the property has been nominated for inscription on the World Heritage List.	Examples of the World Heritage values of Purnululu National Park for which the property has been nominated for inscription on the World Heritage List.
	hundreds of archaeological sites, including rock art sites, artefact scatter, stone quarry site, burial sites and sites dating to the contact period.
Cultural criterion (v) outstanding example of a traditional human settlement or land-use which is representative of a culture (or cultures), especially when it has become vulnerable under the impact of irreversible change.	Purnululu National Park is an outstanding example of the traditional human settlement and land-use known as hunting and gathering. Relatively few contemporary hunting and gathering cultures now exist throughout the world. The World Heritage values include: • the continuing persistence of the cultural landscape of Purnululu National Park which: - is an outstanding example of a traditional human type of settlement and land-use, namely hunting and gathering, that dominated the globe until relatively late in human evolution and the entire Australian continent up to modern times; - shows the interactions between hunter gatherer cultures and a transitional physical environment, demonstrating adaptations to both arid and monsoonal environments. - shows a diversity of adaptations to an area of significant diversity and seasonality including riverine, upland and sand plain environments - demonstrates the political economy, languages, food sources, participation in trade networks that link *ngarrangkarni*, land and people - is in large part the outcome of millennia of continuous management using traditional methods; - is a place where landscapes are actively managed by Aboriginal communities on a substantial scale using traditional practices and knowledge that include: - particular types of social organisation, ceremonies and rituals which form an adaptation to the fragile and unpredictable ecosystems of the arid landscape; - detailed systems of ecological knowledge that closely parallel, yet differ from, the Western scientific classification.
Cultural criterion (vi) directly or tangibly associated with events or living traditions, with ideas or with beliefs, with artistic and literary works of outstanding universal significance.	Purnululu National Park is directly and tangibly associated with events, living traditions, ideas and beliefs of outstanding universal significance. The World Heritage values include: • the living religious tradition and beliefs of *ngarrangkarni*, an outstanding example of the Indigenous Australian religious philosophy. • the continuing cultural landscape of Purnululu National Park which is imbued with the values of creative powers of cultural history; • the associated powerful religious, artistic and cultural qualities of this cultural landscape; and • the tangible manifestation of the continuing significance of country in works of contemporary art illustrating the connection between humanity and land; people and place. • cultural sites which: - form a rich collection of places imbued with strong spiritual associations relating to creator beings and are connected to the continuing practice of traditional beliefs and practices; - are of great antiquity and represent a continuous temporal span from the Pleistocene to the present; - exhibit great diversity, both in space and through time, yet embody a continuous cultural development;

Further information relevant to the World Heritage values Purnululu National Park may be found in the following document and its references:

Nomination of Purnululu National Park by the Government of Australia for Inscription on the World Heritage List. Environment Australia 2002.

Attachment 4 Correspondence – Progress on Government Commitments

Ms Shirley Drill
A/Chairperson
Purnululu Aboriginal Corporation
P O Box 440
KUNUNURRA WA 6743

Dear Ms Drill

PURNULULU NATIONAL PARK – PROGRESS ON GOVERNMENT COMMITMENTS

In August 2001 the Western Australian Government, through the Hon Eric Ripper MLA, Deputy Premier committed to:

- Recognising Purnululu Aboriginal Corporation (PAC) as the appropriate party to represent Aboriginal interests in the park pending a native title determination by the Federal Court.
- Expediting the approval of three living area leases in the park in accordance with a commitment made by a previous Labor Government.
- Establishing a Park Council by the Department of Conservation and Land Management (the Department) to progress World Heritage nomination of the park and to participate in the mid-term review of the park management plan.
- Development of training and economic development proposals for PAC members by the Department.
- Coordination of the recommendations by the Office of Native Title (ONT), Department of the Premier and Cabinet.

Officers of the Department and the ONT visited Frog Hollow on 4 September 2001 to discuss the Government commitments and a course of action to issue the leases, establish a Park Council and develop training and economic development proposals.

Progress toward implementing the commitments has been made with the assistance and cooperation of PAC, including:

- Commonwealth submission of a nomination document to the World Heritage Committee to inscribe Purnululu National Park onto the list of World Heritage places for various cultural and natural values.
- Two living area leases issued 23 March 2002. At the same time the Premier and the Ministers for the Environment and Heritage and Kimberley, Pilbara and Gascoyne signed certificates to commemorate a commitment to a new and just relationship between the Government and the Kawarre and Kayiyirriwareny Aboriginal Corporations representing the lessee families.
- Allocation of Departmental funds in 2002/03 for the implementation of a Park Council, employment and training initiatives and a review of the park management plan.
- Grant from Environment Australia to PAC through the Department to assist with the World Heritage assessment process and the review of the management plan.
- A visit by the World Heritage technical assessment team to Purnululu National Park and associated tour of the country with PAC members.

- Support for the Kimberley Sustainable Regions Program grant application by PAC for the development of infrastructure at the leases in the park.
- Offer of two field officer traineeships for PAC members to attain Certificate IV entry level qualifications for Departmental field officer positions, including ranger.
- Draft Deed of Agreement for the establishment of a Park Council for the Purnululu National Park.

The Department was advised verbally that PAC determined at their Annual General Meeting that their priority was to develop infrastructure on the Kawarre living area lease as a prerequisite to accepting the traineeships that were offered by the Minister for the Environment and Heritage when she visited for the living area lease signing ceremony earlier this year. The Department acknowledged the concerns of PAC and subsequently assisted in bids for funding support to the Kimberley Sustainable Regions Program and ATSIC.

The Department is prepared to negotiate about contributions to infrastructure funding on the basis that the infrastructure is available for park management purposes, eg housing for PAC land management trainees/employees and their families.

World Heritage Assessment and a Park Council

The recent visit by Mr Paul Dingwall and Mr Kevin Jones, the technical assessors to the IUCN and ICOMOS to consider the nomination of Purnululu was well supported by PAC, Environment Australia and the Department and they have expressed their thanks and appreciation for the time and experiences they shared with you. I also wish to acknowledge the special efforts made by PAC during a time of sorry business for the Chairman.

During the visit both Mr Dingwall and Mr Jones expressed the opinion that the nomination would, in their view, be strengthened and less likely to be deferred if effective joint management arrangements under the park management plan were put into place with PAC as soon as possible. This is a matter of concern to the State and Commonwealth officials and it has been left in the hands of the Department and PAC to resolve the matter. However, it has been suggested by Environment Australia officers that any deferral may lead to the Commonwealth Minister considering withdrawal or postponement of the nomination of Purnululu by the Commonwealth in order to advance other proposed nominations.

I enclose a copy of a draft Deed of Agreement between the Minister for the Environment and Heritage and PAC for the establishment of a Park Council for Purnululu National Park and adjacent conservation reserve.

The draft Deed of Agreement is in accordance with the Government commitment to honour the promises of a previous Labor administration. The role, responsibilities and composition of the Park Council are outlined in the agreement.

There has been discussion between Mr Peter Sharp of the Department and Mr Ian Kirkby on behalf of PAC about aligning the priorities of PAC and the priorities of the Government to achieve a sustainable and enduring joint management model under existing legislation. I am advised that PAC seek a commitment from the Government to implement a program of amendments to the *Conservation and Land Management Act 1984*. The commitment should, among other things, enable the ownership or vesting of the park to be transferred from the Conservation Commission of Western

Australia to an Aboriginal Body Corporate for joint management with the Department. I also understand that PAC are seeking a commitment that the Park Council and existing tenure arrangements will be an interim arrangement until a preferred inalienable freehold title and leaseback model can be applied under a revised Conservation and Land Management Act.

The Government is currently exploring policy options for the development of joint management strategies for conservation lands and it is intended that a public discussion paper be distributed for broad public input to assist in a revision and modernisation of the Conservation and Land Management Act to address Aboriginal heritage and joint management. At this stage it is not possible to give a definitive undertaking that the Government intends to pursue the inalienable freehold title and leaseback model, although it was an option circulated to ATSIC Regional Councils and Native Title Representative Bodies in an earlier draft discussion paper.

It is likely to be some time before the ramifications of the High Court decision of Western Australia v Ward are fully understood in relation to reserved lands and what the State Government's policy options may be. If, as might be expected, native title has been extinguished over the park, the Government will need to give consideration as to whether it wishes to pursue an inalienable freehold title and leaseback model under State legislation. These policy matters are to be referred to the ONT and relevant Ministers for consideration and advice.

In the meantime, under the existing legislation, it is Government policy to establish a Park Council in accordance with the approved management plan and the August 2001 decision of Cabinet. I therefore invite you to indicate your willingness to agree to establishing a Park Council in accordance with the provisions of the attached Deed of Agreement on the understanding that:

- The Deed of Agreement is subject to review with the agreement of the parties.
- The Deed of Agreement should be reviewed pending determination of the native title or within three years, whichever come first.
- In the event the park is inscribed on the World Heritage list, regardless of the above, there is a legal obligation to review the arrangements of the Park Council to accommodate the requirements of the Commonwealth Government under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999.*

Yours sincerely

Keiran McNamara
ACTING EXECUTIVE DIRECTOR

9 September 2002

Enc

Attachment 5 Plant and Animal Species at Purnululu National Park

Plant species recorded in Purnululu National Park

(from records of the Western Australian Herbarium, September 2002)

	Family	*Scientific name*	*Conservation Status**	*Alien species*
Lower plants (algae, bryophytes, fungi)				
		Chara sp.		
	Anthocerotaceae	Anthoceros cf laevis		
	Fossombroniaceae	Fossombronia sp.		
	Parmeliaceae	Parmotrema praesorediosum		
	Ricciaceae	Riccia multifida var. torticolla		
		Riccia muscicola		
		Riccia vesiculosa		
	Sclerodermataceae	Pisolithus tinctorius		
Ferns and FernAllies				
	Adiantaceae	Cheilanthes austrotenuifolia		
		Cheilanthes brownii		
		Cheilanthes caudata		
		Cheilanthes nudiuscula		
		Cheilanthes pumilio		
		Cheilanthes sieberi subsp. pseudovellea		
		Taenitis pinnata		
	Gleicheniaceae	Dicranopteris linearis		
		Dicranopteris linearis var. linearis		
	Lindsaeaceae	Lindsaea aff. ensifolia		
		Lindsaea aff. orbiculata		
		Lindsaea ensifolia		
		Lindsaea ensifolia subsp. ensifolia		
	Lycopodiaceae	Lycopodiella cernua		
	Marsileaceae	Marsilea hirsuta		
		Marsilea mutica		
	Psilotaceae	Psilotum nudum		
Monocotyledons				
	Aponogetonaceae	Aponogeton euryspermus		
	Araceae	Colocasia esculenta		
	Arecaceae	Livistona victoriae		
	Commelinaceae	Murdannia graminea		
	Cyperaceae	Bulbostylis barbata		
		Cyperus bifax		
		Cyperus breviculmis		
		Cyperus brevifolius		Alien
		Cyperus concinnus		
		Cyperus conicus		
		Cyperus cunninghamii subsp. cunninghamii		
		Cyperus cunninghamii subsp. uniflorus		
		Cyperus cuspidatus		
		Cyperus difformis		
		Cyperus flaccidus		
		Cyperus holoschoenus		
		Cyperus microcephalus subsp. chersophilus		
		Cyperus microcephalus subsp. microcephalus		
		Cyperus pulchellus		
		Cyperus sp.		
		Cyperus squarrosus		
		Cyperus vaginatus		

	Cyperus viscidulus		
	Eleocharis atropurpurea		
	Eleocharis geniculata		
	Fimbristylis acicularis		
	Fimbristylis aff. neilsonii		
	Fimbristylis depauperata		
	Fimbristylis littoralis		
	Fimbristylis microcarya		
	Fimbristylis neilsonii		
	Fimbristylis nuda		
	Fimbristylis oxystachya		
	Fimbristylis polytrichoides		
	Fimbristylis sieberiana	P3	
	Fimbristylis sp.		
	Fimbristylis sphaerocephala		
	Fimbristylis tetragona		
	Fuirena ciliaris		
	Lipocarpha microcephala		
	Rhynchospora affinis		
	Schoenoplectus lateriflorus		
	Schoenoplectus mucronatus		
	Scleria brownii		
Eriocaulaceae	Eriocaulon cinereum		
Najadaceae	Najas tenuifolia		
Poaceae	Acrachne racemosa		
	Aristida aff. hygrometrica		
	Aristida capillifolia		
	Aristida contorta		
	Aristida holathera var. holathera		
	Aristida latifolia		
	Arundinella nepalensis		
	Arundo donax		Alien
	Astrebla squarrosa		
	Bothriochloa bladhii		
	Brachyachne convergens		
	Cenchrus biflorus		Alien
	Cenchrus ciliaris		Alien
	Cenchrus setigerus		Alien
	Chloris barbata		Alien
	Chloris pectinata		
	Chrysopogon pallidus		
	Cymbopogon ambiguus		
	Cymbopogon bombycinus		
	Cymbopogon dependens		
	Cymbopogon procerus		
	Cynodon dactylon		Alien
	Dactyloctenium radulans		
	Dichanthium fecundum		
	Dichanthium sericeum subsp. polystachyum		
	Digitaria bicornis		
	Digitaria ctenantha		
	Echinochloa colona		Alien
	Ectrosia agrostoides		
	Ectrosia leporina		
	Ectrosia scabrida		
	Elytrophorus spicatus		
	Enneapogon oblongus		
	Enneapogon polyphyllus		
	Enneapogon purpurascens		
	Eragrostis cumingii		

		Eragrostis desertorum		
		Eragrostis eriopoda		
		Eragrostis exigua		
		Eragrostis olida		
		Eragrostis sp.		
		Eragrostis speciosa		
		Eragrostis tenellula		
		Eriachne ciliata		
		Eriachne imbricata		
		Eriachne mucronata		
		Eriachne obtusa		
		Eriachne sp.		
		Eulalia aurea		
		Heteropogon contortus		
		Hyparrhenia sp.		
		Iseilema vaginiflorum		
		Panicum decompositum		
		Panicum mindanaense		
		Paspalidium rarum		
		Paspalum humboldtianum		
		Paspalum scrobiculatum		
		Perotis rara		
		Phragmites karka		
		Schizachyrium fragile		
		Schizachyrium pseudeulalia		
		Sehima nervosum		
		Setaria apiculata		
		Setaria dielsii		
		Setaria verticillata		Alien
		Sporobolus australasicus		
		Themeda triandra		
		Triodia aff. wiseana		
		Triodia bitextura		
		Triodia bunglensis	P2	
		Triodia bynoei (ref Menkhorst and Cowie 1992)		
		Triodia burbidgeana		
		Triodia epactia (G.Griffin pers comm.)		
		Triodia intermedia (ref Menkhorst and Cowie 1992)		
		Triodia inutilis		
		Triodia microstachya		
		Triodia procera (ref Menkhorst and Cowie 1992)		
		Triodia pungens		
		Triodia spicata		
		Triodia stenostachya		
		Triodia wiseana		
		Tripogon loliiformis		
		Urochloa mosambicensis		Alien
		Urochloa mutica		Alien
		Urochloa piligera		
		Urochloa pubigera		
		Urochloa reptans		
		Whiteochloa airoides		
		Whiteochloa cymbiformis		
		Yakirra australiensis		
		Yakirra australiensis var. intermedia		
		Yakirra majuscula		
		Yakirra pauciflora		
Dicotyledons				
	Acanthaceae	Dicliptera armata		
		Hypoestes floribunda var. angustifolia		

	Nelsonia campestris		
	Rostellularia adscendens		
	Rostellularia adscendens subsp. clementii var. clementii		
Aizoaceae	Trianthema portulacastrum		Alien
	Trianthema pilosa		
	Trianthema portulacastrum		Alien
	Trianthema triquetra		
Amaranthaceae	Achyranthes aspera		
	Aerva javanica		Alien
	Alternanthera denticulata var. micrantha		
	Alternanthera nana		
	Alternanthera nodiflora		
	Amaranthus pallidiflorus		
	Gomphrena aff. cunninghamii		
	Gomphrena breviflora		
	Gomphrena canescens		
	Gomphrena canescens subsp. canescens		
	Gomphrena lanata		
	Ptilotus calostachyus		
	Ptilotus capitatus		
	Ptilotus clementii		
	Ptilotus corymbosus		
	Ptilotus drummondii		
	Ptilotus exaltatus var. exaltatus		
	Ptilotus fusiformis		
	Ptilotus fusiformis var. gracilis		
	Ptilotus spicatus subsp. leianthus		
	Ptilotus spicatus subsp. spicatus		
Anacardiaceae	Buchanania obovata		
Anthericaceae	Thysanotus chinensis		
Apocynaceae	Alstonia actinophylla		
	Carissa spinarum		
	Wrightia saligna		
Asclepiadaceae	Calotropis procera		Alien
	Cynanchum aff. floribundum		
	Cynanchum aff. puberlum		
	Cynanchum puberulum		
	Marsdenia angustata		
	Marsdenia geminata		
	Sarcostemma viminale subsp. australe		
	Tylophora cinerascens		
	Tylophora flexuosa		
Asteraceae	Acanthospermum hispidum		Alien
	Bidens pilosa		Alien
	Blumea diffusa		
	Blumea tenella		
	Blumea diffusa		
	Blumea psammophila		
	Blumea pungens	P2	
	Blumea saxatilis		
	Epaltes australis		
	Flaveria australasica		
	Iotasperma australiense		
	Pentalepis trichodesmoides		
	Pterocaulon globuliflorum		
	Pterocaulon niveum		
	Pterocaulon serrulatum		
	Pterocaulon sphacelatum		
	Pterocaulon sphaeranthoides		
	Streptoglossa odora		

		Vittadinia sp.A Kimberley Flora(R.J.Cranfield 6527)	
?	Aytoniaceae	Asterella drummondii	
	Bartramiaceae	Philonotis tenuis	
	Bignoniaceae	Dolichandrone heterophylla	
		Pandorea pandorana	
	Boraginaceae	Ehretia saligna	
		Heliotropium cf plumosum	
		Heliotropium dichotomum	
		Heliotropium sp.	
		Heliotropium tenuifolium	
		Heliotropium transforme	
		Trichodesma zeylanicum	
		Trichodesma zeylanicum var. latisepalum	
	Byblidaceae	Byblis filifolia	
		Byblis liniflora	
	Caesalpiniaceae	Bauhinia cunninghamii	
		Cassia sp.	
		Parkinsonia aculeata	Alien
		Petalostylis cassioides	
		Senna costata	
		Senna notabilis	
		Senna oligoclada	
		Senna planitiicola	
		Senna symonii	
		Senna venusta	
	Capparaceae	Capparis lasiantha	
		Capparis sepiaria	
		Capparis sp.	
		Capparis spinosa	
		Capparis umbonata	
		Cleome cleomoides	
		Cleome viscosa	
	Caryophyllaceae	Polycarpaea aff. corymbosa	
		Polycarpaea corymbosa	
		Polycarpaea involucrata	
		Polycarpaea longiflora	
	Chenopodiaceae	Dysphania plantaginella	
		Salsola tragus	
		Salsola tragus subsp. grandiflora	
		Salsola tragus subsp. tragus	
	Chrysobalanaceae	Parinari nonda	
	Clusiaceae	Hypericum gramineum	
	Cochlospermaceae	Cochlospermum fraseri	
	Combretaceae	Terminalia arostrata	
		Terminalia canescens	
		Terminalia platyphylla	
		Terminalia sp.	
	Convolvulaceae	Bonamia linearis	
		Bonamia media	
		Bonamia pannosa	
		Bonamia sp.	
		Evolvulus alsinoides	
		Evolvulus alsinoides var. decumbens	
		Genus sp.	
		Ipomoea coptica	
		Ipomoea costata	
		Ipomoea eriocarpa	
		Ipomoea muelleri	
		Ipomoea nil	Alien
		Ipomoea plebeia	

	Ipomoea polymorpha		
	Jacquemontia pannosa		
	Merremia sp.B Kimberley Flora(B.J.Carter 533)		
	Polymeria ambigua		
	Polymeria calycina		
	Polymeria cf longifolia		
	Xenostegia tridentata		
Coriolaceae	Perenniporia medulla-panis		
Cucurbitaceae	Citrullus colcynthis		
	Citrullus colocynthis		Alien
	Citrullus lanatus		Alien
	Cucumis melo		
	Cucumis melo subsp. agrestis		
	Luffa graveolens		
	Mukia maderaspatana		
	Trichosanthes cucumerina		
	Trichosanthes cucumerina var. cucumerina		
Ditrichaceae	Pleuridium ecklonii		
Droseraceae	Drosera burmanni		
	Drosera hartmeyerorum		
	Drosera indica		
	Drosera sp.		
Elatinaceae	Bergia pedicellaris		
	Bergia trimera		
Euphorbiaceae	Breynia cernua		
	Bridelia tomentosa		
	Euphorbia aff. distans		
	Euphorbia aff. maconochieana		
	Euphorbia alsiniflora		
	Euphorbia australis		
	Euphorbia drummondii		
	Euphorbia hirta		Alien
	Euphorbia schizolepis		
	Euphorbia schultzii		
	Euphorbia sp.		
	Euphorbia tannensis subsp. eremophila		
	Leptopus decaisnei		
	Phyllanthus maderaspatensis		
	Phyllanthus reticulatus		
	Phyllanthus virgatus		
	Sebastiania chamaelea		
Goodeniaceae	Dampiera conospermoides		
	Goodenia crenata	P3	
	Goodenia odonnellii		
	Goodenia scaevolina		
	Goodenia sepalosa var. sepalosa		
	Goodenia sp.		
	Scaevola amblyanthera		
	Scaevola amblyanthera var. centralis		
	Scaevola browniana		
	Scaevola macrostachya (hairy form)		
	Scaevola revoluta		
Haloragaceae	Gonocarpus leptothecus		
Hernandiaceae	Gyrocarpus americanus		
Lamiaceae	Basilicum polystachyon		
	Clerodendrum floribundum		
	Clerodendrum floribundum var. coriaceum		
	Clerodendrum floribundum var. floribundum		
	Clerodendrum floribundum var. ovatum		
	Clerodendrum tomentosum		

	Ocimum tenuiflorum	Alien
	Premna acuminata	
	Premna sp.	
	Solenostemon scutellarioides	
	Vitex glabrata	
	Vitex trifolia	
Lauraceae	Cassytha capillaris	
	Cassytha filiformis	
	Cassytha sp	
Lobeliaceae	Lobelia quadrangularis	
Loganiaceae	Mitrasacme nudicaulis var. nudicaulis	
	Mitrasacme scrithicola	
Loranthaceae	Amyema eburna	
	Amyema sanguinea	
	Amyema sp.	
	Decaisnina angustata	
	Dendrophthoe acacioides	
	Dendrophthoe glabrescens	
	Lysiana spathulata subsp. spathulata	
	Lysiana subfalcata	
Lythraceae	Ammannia baccifera	
	Ammannia multiflora	
	Rotala diandra	
	Rotala mexicana	
	Rotala occultiflora	
Malvaceae	Abutilon hannii	
	Abutilon lepidum	
	Abutilon leucopetalum	
	Abutilon otocarpum	
	Gossypium australe	
	Herissantia sp.	
	Hibiscus aff. minutibracteolus	
	Hibiscus leptocladus	
	Hibiscus meraukensis	
	Hibiscus panduriformis	
	Hibiscus pentaphyllus	
	Hibiscus trionum var. vesicarius	
	Malvastrum americanum	Alien
	Sida acuta subsp. carpinifolia	Alien
	Sida fibulifera	
	Sida macropoda	
	Sida rohlenae	
	Sida rohlenae subsp. rohlenae	
	Sida sp.	
	Sida sp.A Kimberley Flora(P.A.Fryxell & L.A.Craven 3900)	
	Sida sp.Bungle Bungles(M.I.Blackwell 219)	
Meliaceae	Melia azedarach	
Menispermaceae	Stephania japonica	
	Stephania japonica var. timoriensis	
	Tinospora smilacina	
Mimosaceae	Acacia coriacea subsp. sericophylla	
	Acacia gonocarpa	
	Acacia lysiphloia x monticola	
	Acacia neurocarpa	
	Acacia acradenia	
	Acacia adoxa	
	Acacia aff. gonocarpa	
	Acacia aff. hippuroides	
	Acacia ampliceps	
	Acacia arida	

	Acacia colei var. colei
	Acacia coriacea subsp. coriacea
	Acacia coriacea subsp. sericophylla
	Acacia elachantha (Golden hairy variant)
	Acacia eriopoda
	Acacia farnesiana
	Acacia galioides var. galioides
	Acacia gonocarpa
	Acacia gonoclada
	Acacia hemignosta
	Acacia holosericea
	Acacia lycopodiifolia
	Acacia lysiphloia
	Acacia monticola
	Acacia neurocarpa
	Acacia neurocarpa (variant)
	Acacia platycarpa
	Acacia plectocarpa
	Acacia plectocarpa subsp. plectocarpa
	Acacia retivenea
	Acacia retivenea subsp. clandestina
	Acacia retivenea subsp. retivenea
	Acacia sp.
	Acacia sp.Cockburn Range(R.Pullen 10.763)
	Acacia stipuligera
	Acacia tumida
	Dichrostachys spicata
	Neptunia dimorphantha
	Neptunia gracilis forma gracilis
Molluginaceae	Glinus oppositifolius
Moraceae	Ficus atricha
	Ficus brachypoda
	Ficus cf scobina
	Ficus coronulata
	Ficus opposita
	Ficus platypoda
	Ficus racemosa
	Ficus racemosa var. racemosa
	Ficus scobina
	Ficus subpuberula
Myoporaceae	Eremophila longifolia
	Myoporum montanum
Myrtaceae	Calytrix brownii
	Calytrix exstipulata
	Corymbia polysciada
	Corymbia aspera
	Corymbia bella
	Corymbia cliftoniana
	Corymbia collina
	Corymbia confertiflora
	Corymbia dichromophloia
	Corymbia drysdalensis
	Corymbia flavescens
	Corymbia opaca
	Corymbia opaca / terminalis
	Corymbia opacula
	Corymbia polysciada
	Eucalyptus aff. herbertiana
	Eucalyptus aff. pruinosa
	Eucalyptus brachyandra

	Eucalyptus brevifolia	
	Eucalyptus camaldulensis var. obtusa	
	Eucalyptus cupularis	
	Eucalyptus gymnoteles	
	Eucalyptus limitans x pruinosa	
	Eucalyptus limitaris	
	Eucalyptus pruinosa	
	Eucalyptus sp.H Kimberley Flora(S.J.Forbes 2560)	
	Eucalyptus tephrodes	
	Leptospermum madidum subsp. sativum	
	Lophostemon grandiflorus subsp. riparius	
	Lophostemon sp.	
	Melaleuca alsophila	
	Melaleuca argentea	
	Melaleuca lasiandra	
	Melaleuca leucadendra	
	Melaleuca nervosa	
	Melaleuca sp.	
	Melaleuca viridiflora	
	Syzygium eucalyptoides subsp. eucalyptoides	
Nyctaginaceae	Boerhavia burbidgeana	
	Boerhavia coccinea	
	Boerhavia gardneri	
	Boerhavia paludosa	
	Boerhavia sp.	
Oleaceae	Jasminum didymum subsp. didymum	
	Jasminum didymum subsp. lineare	
	Jasminum molle	
Onagraceae	Ludwigia perennis	
Papilionaceae	Abrus precatorius	
	Aeschynomene indica	
	Alysicarpus muelleri	
	Cajanus aff. latisepalus	
	Cajanus aff. pubescens	
	Cajanus crassicaulis	
	Cajanus marmoratus	
	Cajanus reticulatus var. grandifolius	
	Cajanus sp.	
	Clitoria ternatea	Alien
	Crotalaria cunninghamii	
	Crotalaria medicaginea	
	Crotalaria novae-hollandiae subsp. novae-hollandiae	
	Crotalaria ramosissima	
	Crotalaria retusa	
	Crotalaria verrucosa	
	Cullen badocanum	
	Cullen pustulatum	
	Desmodium filiforme	
	Glycine pullenii	
	Glycine sp.Kurrajong(I.Solomon 824)	
	Glycine tomentella	
	Indigofera colutea	
	Indigofera haplophylla	
	Indigofera hirsuta	
	Indigofera linnaei	
	Indigofera trita	
	Jacksonia forrestii	
	Jacksonia odontoclada	
	Lotus australis	
	Mirbelia viminalis	

	Nomismia rhomboidea		
	Rhynchosia minima		
	Rhynchosia sp.		
	Sesbania cannabina		
	Sesbania formosa		
	Sesbania simpliciuscula var. fitzroyensis		
	Sesbania simpliciuscula var. simpliciuscula		
	Templetonia hookeri		
	Tephrosia aff. laxa		
	Tephrosia brachyodon		
	Tephrosia eriocarpa		
	Tephrosia forrestiana		
	Tephrosia phaeosperma		
	Tephrosia rosea		
	Tephrosia sp.		
	Tephrosia supina		
	Tephrosia virens		
	Zornia muelleriana subsp. congesta		
	Zornia prostrata var. prostrata		
Passifloraceae	Passiflora foetida var. hispida		Alien
Pedaliaceae	Josephinia eugeniae		
Physciaceae	Dirinaria batavica		
	Dirinaria confluens		
Podaxaceae	Podaxis beringamensis		
Polygalaceae	Comesperma secundum		
	Polygala rhinanthoides		
Polygonaceae	Persicaria attenuata		
	Persicaria attenuata subsp. attenuata		
Pontederiaceae	Monochoria cyanea		
Portulacaceae	Calandrinia sp.		
	Portulaca bicolor		
	Portulaca filifolia		
	Portulaca pilosa		
	Portulaca pilosa subsp. pilosa		
Proteaceae	Grevillea byrnesii		
	Grevillea dimidiata		
	Grevillea miniata	P4	
	Grevillea psilantha	P2	
	Grevillea pyramidalis subsp. pyramidalis		
	Grevillea refracta		
	Grevillea refracta subsp. refracta		
	Grevillea striata		
	Grevillea wickhamii		
	Grevillea wickhamii subsp. aprica		
	Grevillea wickhamii subsp. cratista		
	Hakea arborescens		
	Hakea chordophylla		
	Persoonia falcata		
	Stenocarpus acacioides		
Rhamnaceae	Ventilago viminalis		
	Ziziphus quadrilocularis		
Rubiaceae	Gardenia pyriformis		
	Gardenia pyriformis subsp. pyriformis		
	Gardenia sp.		
	Oldenlandia galioides		
	Oldenlandia mitrasacmoides subsp. mitrasacmoides		
	Oldenlandia sp.		
	Oldenlandia spermacocoides		
	Pavetta sp.		
	Psydrax attenuata var. tenella		

	Psydrax attenuata var. tenella		
	Spermacoce aff. laevigata		
	Spermacoce laevigata		
	Spermacoce sp.		
Santalaceae	Santalum lanceolatum		
Sapindaceae	Atalaya hemiglauca		
	Cardiospermum halicacabum var. halicacabum		Alien
	Distichostemon hispidulus var. phyllopterus		
	Dodonaea coriacea		
	Dodonaea lanceolata var. lanceolata		
	Dodonaea physocarpa		
	Dodonaea polyzyga		
	Dodonaea viscosa subsp. mucronata		
Sapotaceae	Planchonella arnhemica		
Scrophulariaceae	Bacopa floribunda		
	Buchnera linearis		
	Buchnera ramosissima		
	Buchnera sp.		
	Lindernia eremophiloides		
	Stemodia lythrifolia		
	Stemodia sp.		
	Stemodia viscosa		
	Striga squamigera		
Simaroubaceae	Brucea javanica		
Solanaceae	Datura inoxia		Alien
	Nicotiana benthamiana		
	Nicotiana heterantha	P1	
	Physalis minima		
	Solanum carduiforme		
	Solanum dioicum		
	Solanum echinatum		
	Solanum lucani		
	Solanum nigrum		Alien
Stackhousiaceae	Stackhousia intermedia		
Sterculiaceae	Brachychiton viscidulus		
	Melhania oblongifolia		
	Melochia pyramidata		Alien
	Waltheria indica		
Stylidiaceae	Stylidium adenophorum		
	Stylidium fluminense		
	Stylidium muscicola		
	Stylidium schizanthum		
	Stylidium sp.		
Taccaceae	Tacca leontopetaloides		
Tiliaceae	Corchorus aestuans		
	Corchorus fascicularis		
	Corchorus macropetalus		
	Corchorus pumilio		
	Corchorus sidoides		
	Corchorus sidoides subsp. sidoides		
	Corchorus tridens		
	Grewia retusifolia		
	Grewia retusifolia		
	Triumfetta antrorsa		
	Triumfetta antrorsa		
	Triumfetta aspera	P2	
	Triumfetta plumigera		
	Triumfetta sp.		
Trapeliaceae	Trapelia coarctata		
Ulmaceae	Celtis philippensis		

	Celtis philippensis var. philippensis
	Trema tomentosa
	Trema tomentosa var. viridis
Violaceae	Hybanthus aurantiacus
Zygophyllaceae	Tribulopis aff. angustifolia
	Tribulopis angustifolia
	Tribulopis bicolor
	Tribulopis sp.
	Tribulus terrestris

* P1 Pooly known Taxa - known from one or a few (generally < 5) populations which are under threat

P2 Poorly known Taxa - known from one or a few (generally >5) populations, at least some of which are not believed to be under immediate threat

P3 Poorly known Taxa - known from several populations, and the taxa are not believed to be under immediate threat

P4 Rare Taxa – considered to have been adequately surveyed and, whilst rare, are not currently threatened by any identifiable factors.

Animal species recorded in Purnululu National Park

(from records of the Conservation Commission of the Northern Territory, September 2002)

	Family	Species
Amphibians		
	Hylidae	Cyclorana australis
		Cyclorana longipes
		Litoria caerulea
		Litoria coplandi
		Litoria meiriana
		Litoria rothii
		Litoria rubella
		Litoria splendida
		Litoria wotjulumensis
	Myobatrachidae	Crinia bilingua
		Limnodynastes ornatus
		Uperoleia borealis
Reptiles		
	Agamidae	Chlamydosaurus kingii
		Ctenophorus caudicinctus
		Ctenophorus isolepis
		Diporiphora bilineata
		Diporiphora lalliae
		Diporiphora magna
		Lophognathus gilberti
	Boidae	Aspidites melanocephalus
		Liasis childreni
		Liasis olivaceus
		Morelia spilota
	Chelidae	Chelodina sp._aff._novaeguinea
		Emydura victoriae
	Colubridae	Boiga irregularis
		Dendrelaphis punctulata
	Crocodylidae	Crocodylus johnstoni
	Elapidae	Acanthophis praelongus
		Demansia atra
		Demansia olivacea
		Furina ornata
		Pseudechis australis
		Pseudonaja modesta
		Suta punctata
		Vermicella multifasciata
	Geckonidae	Gehyra ‘Keep_River’
		Heteronotia planiceps
		Crenadactylus ocellatus
		Diplodactylus ciliaris
		Diplodactylus conspicillatus
		Diplodactylus robinsoni
		Diplodactylus stenodactylus
		Gehyra australis
		Gehyra nana
		Gehyra pilbara
		Heteronotia binoei
		Oedura marmorata
		Oedura rhombifer
		Rhynchoedura ornata
	Pygopodidae	Delma borea
		Delma nasuta

		Delma tincta
		Lialis burtonis
		Pygopus nigriceps
	Scincidae	Carlia amax
		Carlia munda
		Carlia triacantha
		Cryptoblepharus megastictus
		Cryptoblepharus plagiocephalus
		Ctenotus decaneurus
		Ctenotus inornatus
		Ctenotus militaris
		Ctenotus pantherinus
		Ctenotus piankai
		Ctenotus saxatilis
		Ctenotus tantillus
		Cyclodomorphus branchialis
		Egernia slateri
		Eremiascincus richardsonii
		Glaphyromorphus isolepis
		Lerista aericeps
		Lerista borealis
		Lerista bunglebungle
		Lerista greeri
		Lerista taeniata
		Menetia greyii
		Menetia maini
		Morethia ruficauda
		Notoscincus ornatus
		Proablepharus reginae
		Proablepharus tenuis
		Tiliqua multifasciata
		Tiliqua scincoides
	Typhlopidae	Ramphotyphlops guentheri
	Varanidae	Varanus acanthurus
		Varanus glauerti
		Varanus glebopalma
		Varanus gouldii
		Varanus kingorum
		Varanus mertensi
		Varanus mitchelli
		Varanus panoptes
		Varanus tristis
Birds		
	Accipitridae	Accipiter cirrhocephalus
		Accipiter fasciatus
		Accipiter novaehollandiae
		Aquila audax
		Aviceda subcristata
		Circus assimilis
		Elanus axillaris
		Haliaeetus leucogaster
		Haliastur sphenurus
		Hamirostra melanosternon
		Hieraaetus morphnoides
		Lophoictinia isura
		Milvus migrans
	Aegothelidae	Aegotheles cristatus
	Alaudidae	Mirafra javanica
	Alcedinidae	Alcedo azurea
	Anatidae	Anas gracilis

	Anas superciliosa
	Cygnus atratus
	Tadorna radjah
Anhingidae	Anhinga melanogaster
Ardeidae	Ardea alba
	Ardea pacifica
	Egretta garzetta
	Egretta novaehollandiae
	Ixobrychus flavicollis
	Nycticorax caledonicus
Artamidae	Artamus cinereus
	Artamus leucorynchus
	Artamus minor
	Artamus personatus
	Artamus superciliosus
	Cracticus nigrogularis
	Cracticus torquatus
	Gymnorhina tibicen
Burhinidae	Burhinus grallarius
Cacatuidae	Cacatua galerita
	Cacatua roseicapilla
	Cacatua sanguinea
	Calyptorhynchus banksii
	Nymphicus hollandicus
Campephagidae	Coracina maxima
	Coracina novaehollandiae
	Coracina papuensis
	Lalage sueurii
Caprimulgidae	Eurostopodus argus
Casuariidae	Dromaius novaehollandiae
Centropodidae	Centropus phasianinus
Charadriidae	Elseyornis melanops
	Vanellus miles
Ciconiidae	Ephippiorhynchus asiaticus
Climacteridae	Climacteris melanura
Columbridae	Geopelia cuneata
	Geopelia humeralis
	Geopelia striata
	Geophaps plumifera
	Ocyphaps lophotes
	Petrophassa albipennis
	Phaps chalcoptera
Coraciidae	Eurystomus orientalis
Corvidae	Corvus bennetti
	Corvus orru
Cuculidae	Cacomantis variolosus
	Chrysococcyx basalis
	Cuculus pallidus
	Eudynamys scolopacea
	Scythrops novaehollandiae
Dicaeidae	Dicaeum hirundinaceum
Dicruridae	Grallina cyanoleuca
	Myiagra inquieta
	Myiagra rubecula
	Rhipidura fuliginosa
	Rhipidura leucophrys
	Rhipidura rufiventris
Falconidae	Falco berigora
	Falco cenchroides
	Falco hypoleucos

	Falco longipennis
	Falco peregrinus
Glareolidae	Stiltia isabella
Gruidae	Grus rubicunda
Halcyonidae	Dacelo leachii
	Todiramphus pyrrhopygia
	Todiramphus sanctus
Hirundinidae	Hirundo ariel
	Hirundo nigricans
Maluridae	Malurus lamberti
	Malurus melanocephalus
Meliphagidae	Certhionyx pectoralis
	Conopophila rufogularis
	Lichenostomus flavescens
	Lichenostomus keartlandi
	Lichenostomus plumulus
	Lichenostomus unicolor
	Lichenostomus virescens
	Lichmera indistincta
	Manorina flavigula
	Melithreptus albogularis
	Melithreptus gularis
	Philemon argenticeps
	Philemon citreogularis
	Ramsayornis fasciatus
Meropidae	Merops ornatus
Motacillidae	Anthus novaeseelandiae
Neosittidae	Daphoenositta chrysoptera
Oriolidae	Oriolus sagittatus
Otididae	Ardeotis australis
Pachycephalidae	Colluricincla harmonica
	Colluricincla woodwardi
	Oreoica gutturalis
	Pachycephala rufiventris
Pardalotidae	Pardalotus rubricatus
	Pardalotus striatus
	Smicrornis brevirostris
Passeridae	Emblema pictum
	Heteromunia pectoralis
	Neochmia phaeton
	Poephila acuticauda
	Poephila personata
	Taeniopygia bichenovii
	Taeniopygia guttata
Pelecanidae	Pelecanus conspicillatus
Petroicidae	Microeca fascinans
	Petroica goodenovii
Phalacrocoracidae	Phalacrocorax melanoleucos
	Phalacrocorax sulcirostris
Phasianidae	Coturnix ypsilophora
Podargidae	Podargus strigoides
Podicipedidae	Poliocephalus poliocephalus
Pomatostomidae	Pomatostomus temporalis
Psittacidae	Aprosmictus erythropterus
	Melopsittacus undulatus
	Platycercus venustus
	Psitteuteles versicolor
	Trichoglossus haematodus
Ptilonorhynchidae	Chlamydera nuchalis
Recurvirostridae	Himantopus himantopus

Scolopacidae	Actitis hypoleucos
Strigidae	Ninox connivens
	Ninox novaeseelandiae
Sylviidae	Cincloramphus mathewsi
	Cisticola exilis
	Eremiornis carteri
Turnicidae	Turnix pyrrhothorax
	Turnix velox
Tytonidae	Tyto alba

Mammals

Canidae	Canis familiaris
Dasyuridae	Dasyurus hallucatus
	Planigale maculata
	Pseudantechinus ningbing
	Sminthopsis macroura
Emballonuridae	Saccolaimus flaviventris
	Taphozous georgianus
Felidae	Felis catus
Hipposideridae	Hipposideros ater
Macropodidae	Macropus agilis
	Macropus robustus
	Onychogalea unguifera
	Petrogale brachyotis
Molossidae	Chaerophon jobensis
	Mormopterus beccarii
Muridae	Hydromys chrysogaster
	Leggadina lakedownensis
	Pseudomys delicatulus
	Pseudomys desertor
	Pseudomys nanus
	Rattus tunneyi
	Zyzomys argurus
Pseudocheiridae	Petropseudes dahli
Pteropodidae	Pteropus scapulatus
Tachyglossidae	Tachyglossus aculeatus
Vespertilionidae	Chalinolobus gouldii
	Miniopterus schreibersii
	Myotis moluccarum
	Nyctophilus arnhemensis
	Nyctophilus bifax
	Nyctophilus geoffroyi
	Scotorepens greyii
	Scotorepens sanborni
	Vespadelus caurinus

DATED the 31st day of December 2002

THE MINISTER FOR THE ENVIRONMENT AND HERITAGE

and

PURNULULU ABORIGINAL CORPORATION

DEED OF AGREEMENT

THIS AGREEMENT is made by 31st day of December 2002

BETWEEN:

THE MINISTER FOR THE ENVIRONMENT AND HERITAGE of 29th Floor, Allendale Square, 77 St George's Tce, Perth in the State of Western Australia ('the Minister')

AND

PURNULULU ABORIGINAL CORPORATION c/o PO Box 440 Kununurra in the said State, an association duly incorporated under the Aboriginal Councils and Associations Act 1976 (C'lth.) ('PAC').

WHEREAS

A. By proclamation made on the 6th day of March 1987 by the Lieutenant Governor pursuant to Section 29 of the Land Act 1933 and gazetted in the West Australian Government Gazette (page 557) on the same date the lands therein described as Reserve No. 39897 and Reserve No. 39898 ('the park') were reserved for the purposes of national park and conservation reserve respectively;

B. By virtue of Section 7(2) of the *Conservation and Land Management Act 1984* ('the Act'), the park was vested in the Conservation Commission of Western Australia ('the Commission');

C. PAC represents all the traditional Aboriginal custodians of the park, pending any determination of native title under the *Native Title Act 1993*(C'lth) being made in respect of native title determination applications WAG 6007 of 1998 and WAG 6199 of 1998, at which time the arrangements with PAC set out in this Agreement shall be extended to include any determined native title holder(s), and any prescribed body corporate ordered to hold the native title in relation to the park;

D. The Government of the State of Western Australia, in consultation with the Western Australian Aboriginal Native Title Working Group ('WAANTWG'), is developing a policy discussion paper on the joint management of national parks and conservation reserves by their traditional Aboriginal custodians in conjunction with the State, with a view to legislative changes being introduced to provide for such joint management, including in relation to the park;

E. The Government of the State of Western Australia has decided that, pending these legislative changes, a Committee (to be known as the Purnululu Park Council) should be appointed by the Minister to provide meaningful management input for the traditional Aboriginal custodians in relation to the park and that the Minister and PAC should enter into a formal agreement for this purpose;

F. The Minister, in accordance with the said decision and recognising that the establishment of the Purnululu Park Council to provide this management input is necessary or desirable for the purposes of the Act, enters into this

Agreement with PAC pursuant to Section 44(b) of the Act and every other power enabling her to do so.

NOW THIS AGREEMENT WITNESSES and it is hereby agreed and declared as follows:

1. Definitions

In this Agreement unless the context otherwise requires –

1.(1) the following words and expressions shall have the following meanings:

‘Aboriginal’ means a person who is a member of the Aboriginal race of Australia;

‘the Act’ means the *Conservation and Land Management Act, 1984* of Western Australia;

‘Aboriginal site’ has the same meaning as it is given in the *Aboriginal Heritage Act 1972* of Western Australia;

‘the Commission’ means the Conservation Commission of Western Australia established by the Act;

‘CALM’ means the Department of Conservation and Land Management established by the Act;

‘the Council’ means the Purnululu Park Council appointed pursuant to this Agreement;

‘Chairman of PAC’ means the Chairman for the time being of the Governing Committee of PAC;

'determination of native title' has the same meaning as it is given in the *Native Title Act 1993* (C'lth*)*;

‘Director of National Parks’ means the person appointed to that office from time to time in accordance with Section 42 of the Act;

‘the DIA nominee’ means the nominee of the Director General of the Department of Indigenous Affairs on the Purnululu Park Council in accordance with the Schedule to this Agreement;

‘management plan’ means a management plan approved under Section 60 of the Act;

‘matter of Aboriginal interest’ in relation to the park means any matter referred to in paragraphs (a) to (m) of clause 7(3) hereof and includes the interests of the traditional Aboriginal custodians referred to in clauses 8(5) and 11;

‘the Minister’ means the Minister to whom the administration of the *Conservation and Land Management Act 1984* is committed;

'native title' and 'native title holder' have the same meaning as they are given in the *Native Title Act 1993*(C'lth);

‘PAC’ means Purnululu Aboriginal Corporation, an association duly incorporated under the *Aboriginal Councils and Associations Act 1976* (C'lth);

‘the park’ means the land identified as Reserve No. 39897 in the proclamation referred to in recital A to this Agreement (comprising an area of about 239,723 hectares) and the land identified as Reserve No. 39898 in the said proclamation (comprising an area of about 79,602 hectares) and includes any additions proclaimed as national park or conservation reserve;

'prescribed body corporate' has the same meaning as it is given in the *Native Title (Prescribed Bodies Corporate) Regulations 1993* (C'lth).

‘proposed management plan’ and ‘proposed plan’ have the same meanings as they are given in Part V of the Act and include any proposed amendment to or substitution of a management plan;

‘traditional Aboriginal custodian’ in relation to the park means an Aboriginal person who has, in accordance with Aboriginal tradition, social, economic or spiritual affiliations with, or responsibilities for, the park or any part of it.

1.(2) The *Interpretation Act 1984* of Western Australia as amended from time to time applies, so far as is applicable, to the interpretation of this Agreement as if this Agreement were an Act.

1.(3) A reference to a section is to a section of the Act.

1.(4) A reference to one gender includes the other gender.

1.(5) Words in the singular shall include words in the plural and words in the plural shall include the singular.

1.(6) This Agreement shall be read and construed subject to the Act and to other enactments from time to time in force and so as not to exceed any power thereunder or to purport to impose an obligation on a party which is incompatible with the due exercise of his powers or the discharge of his duties under the Act or those enactments, to the intent that –

(a) where this Agreement or any part thereof would, but for this clause, have been construed as being in excess of that power or as purporting to impose an obligation which is incompatible in such way, it shall nevertheless be valid to the extent to which it

is not in excess of that power or does not purport to impose such an obligation; and

(b) where the effect of severing the whole or any part of a clause or paragraph of this Agreement would be to render the remainder of the Agreement or of the clause or paragraph valid, the whole or any part of that clause or paragraph so severed shall be treated as not forming part of this Agreement but so that any severance is limited to the extent possible so as not to render the said clause or paragraph or the remainder of this Agreement invalid and not to render it inconsistent with the objects and purposes of this Agreement.

2. Establishment and Composition of the Council

2.(1) The Minister shall forthwith appoint a committee to be known as the Purnululu Park Council.

2.(2) The Council shall comprise eight persons.

2.(3) The preconditions that a person must satisfy in order to be eligible for appointment to the office of member of the Council shall be those preconditions set out in the Schedule to this Agreement.

2.(4) (a) The Minister shall, by instrument in writing, appoint to membership of the Council a person who satisfies the relevant preconditions.

(b) Where a vacancy occurs in the membership of the Council, the Minister shall appoint a person to that vacancy in accordance with sub-clause (a) of this clause as soon as practicable after the vacancy occurs.

2.(5) Where a person is appointed a member of the Council and the person ceases to satisfy the relevant preconditions in respect of that membership, the person's appointment terminates at the time when the person ceases to satisfy those preconditions.

2.(6) Where a person is appointed as a member of the Council on the nomination of PAC, the Minister shall, and where a person is appointed as a member of the Council otherwise than on the nomination of PAC, may, terminate the appointment of the member if PAC requests the Minister, in writing, to do so.

2.(7) A member of the Council may resign in writing signed by the member and given to the Minister.

3. Deputy Members

3.(1) Where an appointment of a member of the Council may be made only in pursuance of a nomination by PAC, PAC may nominate a person

who satisfies the relevant preconditions of member to be the deputy of the member.

3.(2) A member of the Council who was appointed otherwise than pursuant to a nomination by PAC (but not including the Director of National Parks) may nominate a person who satisfies the relevant preconditions to be the deputy of the member provided that an officer of CALM who does not satisfy those preconditions may be so nominated with the prior approval in writing of PAC.

3.(3) The Director of National Parks may nominate a member of CALM, who by virtue of his or her position with CALM, is involved in Perth in the management of the park, to be his deputy.

3.(4) Where the person is nominated to be the deputy of a member of the Council, the person so nominated may, if the member is absent from a meeting of the Council, attend that meeting and, when so attending, shall be deemed to be a member of the Council.

3.(5) Where PAC nominates a person, pursuant to sub-clause (1), to be the deputy of a member of the Council, PAC may revoke that nomination.

3.(6) A member of the Council who was appointed otherwise than pursuant to a nomination by PAC may revoke a nomination made by the member under sub-clause (2) or (3).

4. Presiding Member

4.(1) The Council may appoint a member to be the presiding member of the Council.

4.(2) A member appointed to be the presiding member of the Council holds office, subject to sub-clause (3), for such period as is determined by the Council at the time of the member's appointment to that office.

4.(3) A member of the Council ceases to hold office as presiding member of the Council if –

(a) the member resigns that office;
(b) the Council revokes the member's appointment to that office; or
(c) the member ceases to be a member of the Council.

5. Meetings of the Council

5.(1) Meetings of the Council shall be held at such times (not being less than four times in any year unless otherwise agreed between the Director of National Parks and the Chairman of PAC) as the Council from time to time determines to be necessary or desirable for the carrying out of its functions.

5.(2) The presiding member of the Council may at any time, subject to sub-clause (1), and, if so directed by the Minister or if so requested, for the purposes of an emergency meeting, by PAC, shall convene a meeting of the Council.

5.(3) Meetings of the Council shall be held at a suitable location within the park, unless otherwise agreed between the Director of National Parks and the Chairman of PAC.

5.(4) The items for inclusion on the agenda for a meeting of the Council shall, so far as is practicable, have been discussed and approved between the Director of National Parks and the Chairman of PAC not less than seven days prior to the meeting.

5.(5) Subject to the provisions of this Agreement, the Council shall determine its procedures and determine which persons are to be permitted to attend or participate in meetings of the Council.

5.(6) Subject to sub-clauses (7) and (8), six members of the Council constitute a quorum.

5.(7) A meeting of the Council shall not be held, or shall not continue, unless there are present at the meeting at least three members appointed pursuant to nominations by PAC.

5.(8) A meeting of the Council shall not be held, or shall not continue, unless there are present at the meeting at least three members appointed otherwise than pursuant to a nomination by PAC, of whom one such member shall be the Director of National Parks or his deputy and another such member shall be the DIA nominee or his deputy.

5.(9) PAC may from time to time nominate any person to advise or assist the Aboriginal members of the Council at a meeting of the Council and any such person shall be entitled to attend the meeting for that purpose.

5.(10) CALM may from time to time nominate any person to advise or assist the CALM members of the Council at a meeting of the Council and any such person shall be entitled to attend the meeting for that purpose.

5.(11) Subject to sub-clause (12), the presiding member of the Council shall preside at all meetings of the Council.

5.(12) If the presiding member of the Council is absent from a meeting of the Council, the members who are present shall elect one of their number to preside at the meeting.

5(13) The Council shall appoint a Secretary to the Council to keep minutes of its meetings and carry out administrative functions.

5.(14) Minutes shall be kept of all meetings of the Council and, following their approval by the Director of National Parks and the Chairman of

PAC, the Council shall provide copies to the Minister and the Commission.

5.(15) Determinations of the Council shall be made by consensus of its members present. A consensus in relation to a resolution moved at a meeting of the Council shall be deemed not to exist for the purposes of this sub-clause if at least one member of the Council opposes it.

5.(16) The members present at a meeting of the Council shall use their best endeavours to reach a consensus on all matters under consideration. If they fail to reach a consensus in relation to a resolution on any matter moved at the meeting, the minutes of the meeting shall record the differing views of members present.

5.(17) Notwithstanding sub-clauses (15) and (16), the opinion of the DIA nominee or his deputy shall not be taken into account in determining whether or not a consensus of the Council has been reached in relation to a resolution.

6. Remuneration and allowances of Council members

A member of the Council appointed pursuant to a nomination by PAC shall be paid by the Minister such reasonable fees and travelling expenses and other allowances as the Minister from time to time determines.

7. Functions of the Council

7.(1) The functions of the Council are –

(a) to prepare and advise upon proposals for any management plan for the park for the consideration of the Minister;

(b) to participate in the implementation of the management plan as approved, including the development of policy on matters of Aboriginal interest in relation to the park; and

(c) to provide advice to the Minister in all matters relating to Aboriginal involvement in the park.

7.(2) The Council shall report on its decisions directly to the Minister.

7.(3) In carrying out its functions the Council may have regard to such matters as it considers relevant to those functions including, but not restricted to, the following in relation to the park –

(a) provision of areas for Aboriginal community living or use;

(b) Aboriginal community development;

(c) Aboriginal sites, Aboriginal burial sites and other areas of special significance to traditional Aboriginal custodians;

(d) Aboriginal ranger training programs and their implementation, including the appointment of officers responsible for Aboriginal ranger training;

(e) Aboriginal involvement in the day to day operational management of the park;

(f) the selection and induction of rangers and other staff employed by CALM within the park, including the park manager;

(g) fire management;

(h) Aboriginal employment and enterprises;

(i) the promotion of cross-cultural knowledge and understanding among park staff and visitors to the park;

(j) capital works, including the location of buildings, camp sites, roads, tracks and other improvements;

(k) leases and licences;

(l) mining tenements and petroleum permits and any other authority pursuant to the *Mining Act 1978* or the *Petroleum Act 1967*; and

(m) any other matter in relation to the park of which notice is given by PAC to the Council as being a matter concerning Aboriginal involvement in the park.

8. Management Plans

8.(1) During the preparation of any proposed management plan for the park in accordance with section 54 of the Act the Council shall submit to the Commission any matters the Council wishes to have considered in the preparation thereof.

8.(2) Upon the public notification under section 57 of the Act of any proposed management plan for the park the Council shall, in accordance with section 58 of the Act make such further submissions upon the proposed management plan as it thinks fit.

8.(3) The Council shall use its best endeavours to have the Commission submit to the Council under section 59(1) of the Act the proposed management plan and a summary of the submissions thereon, in which event the Council may, as it sees fit, make any submission of the kind referred to in section 59(4) of the Act.

8.(4) Where the Council has made any submission of the kind referred to in this Clause it may provide the Minister with a copy for his information.

8.(5) Without prejudice to the scope of the matters which may be dealt with by the Council in any submission referred to in this Clause, the Council shall include in the submission its views as to what provision should be made in the management plan concerning the securing of the following interests of the traditional Aboriginal custodians of the park:

(a) to enter upon the park and use or occupy the park to the extent that that entry, occupation or use is in accordance with Aboriginal tradition;

(b) to continue the traditional use of any area of the park for hunting or food gathering;

(c) to continue the traditional use of any area of the park for ceremonial and religious purposes; and

(d) to reside in appropriate areas of the park together with interests in access and residence for their employees, staff, invitees and agents.

9. Park Council Determinations

9.(1) In pursuance of its functions as referred to in Clause 7 the Council shall endeavour to arrive at determinations in relation to matters of Aboriginal interest in the park, including the development of policy thereon.

9.(2) Where the Council makes such a determination it shall refer the determination to the Minister and the following shall apply-

(a) if the Minister decides that the determination should be adopted she shall take such steps and exercise such powers as she considers appropriate for the purpose of having her decision put into effect;

(b) if the Minister proposes not to adopt a determination, or to adopt a determination only in part she shall, before making a final decision on the matter, first consult with PAC and may, if she thinks fit, consult with the Minister for Indigenous Affairs.

9.(3) Where, in respect of a matter referred to in clause 9.1, the Council is unable to reach a consensus as to a determination, the record of the deliberations of the Council on the matter shall be referred to the Minister, and before reaching a decision on the matter in question the Minister shall consult with PAC and may, if she thinks fit, consult with the Minister for Indigenous Affairs.

9.(4) All policy issues relating to the matters of Aboriginal interest in relation to the park will be referred to the Council for its consideration

and no policy decisions in relation to such matters will be implemented except in accordance with this Clause.

10. Entry and inspection

The Minister shall take such reasonable steps as she considers appropriate to ensure that, subject to the Act and the management plan, the members of the Council appointed on the nomination of PAC (and such persons authorised by them and approved by the Minister) have access, upon reasonable notice and at all reasonable times, to the park or any improvements on the park for the purpose of carrying out any inspection thereof associated with the responsibilities of those members in the activities of the Council.

11. Aboriginal use and occupation

The Minister shall take such reasonable steps as she considers appropriate to ensure that subject to the Act and to the management plan, the Aboriginal traditional custodians may –

(a) enter upon the park and use or occupy the park to the extent that that entry, occupation or use is in accordance with Aboriginal tradition;

(b) continue the traditional use of any area of the park for hunting or food gathering;

(c) continue the traditional use of any area of the park for ceremonial and religious purposes; and

(d) reside in and have access to appropriate areas of the park, together with their employees, staff invitees and agents.

12. Carrying out of study, research and works

12.(1) The Council may, in the course of carrying out its functions set out in Clause 7(1), report to the Minister in respect of any study, research, or works in relation to the park which may be suitably undertaken by traditional Aboriginal custodians in relation to the park.

12.(2) When she receives a report of the kind referred to in sub-clause (1) the Minister may, if she thinks fit, enter into agreements under section 44 of the Act with the traditional Aboriginal custodians for the carrying out of the study, research or works proposed.

13. Variation of Agreement

13.(1) The parties may from time to time by agreement in writing add to, substitute for, cancel or vary any of the provisions of this Agreement.

13.(2) Upon any determination of native title being made under the *Native Title Act 1993* (C'lth) in respect of native title determination applications WAG 6007 of 1998 and WAG 6199 of 1998, the Minister may add to, substitute for, cancel or vary any of the provisions of this Agreement to include any determined native title holders, and any prescribed body corporate ordered to hold the native title in relation to the park, in any matter set out in this Agreement which involves the traditional Aboriginal custodians, and as parties to this Agreement;

13.(3) The Minister shall meet with PAC at least once prior to 31 October 2004 to review this Agreement (including progress toward legislative changes to provide for joint management in accordance with the policy discussion paper referred to in recital D and toward the establishment of a Board of Management in relation to the park pursuant to amendments to the Act) and if the Minister and PAC agree upon any variation, they shall execute all documents necessary or desirable to give full effect to the variation.

14. Duration of the Agreement

(1) Subject to sub-clause (2) hereof and to Clause 13, this Agreement shall remain in full force and effect for as long as the park or any part thereof remains a national park or conservation reserve.

(2) This Agreement will cease to apply on the first to occur of the following:

(a) the establishment, with the consent of PAC, of a Board of Management in relation to the park pursuant to amendments to the Act; or

(b) 31 October 2005 or such later date as may be agreed in writing by both the Minister and PAC.

15. Miscellaneous

(1) This Agreement shall be governed by and construed in accordance with the laws in force in the State of Western Australia.

(2) Any notice, direction, consent or other communication required or permitted to be given or made under or pursuant to this Agreement shall be deemed to have been duly given or made when delivered in writing or sent by post to the party to which such notice, direction, consent or communication is required to be given or made under this Agreement at the following addresses:

The Minister:

The Minister for the Environment and Heritage
29th Floor
Allendale Square
77 St George's Tce
PERTH WA 6000

PAC:
The Chairman
Purnululu Aboriginal Corporation
PO Box 440
KUNUNURRA WA 6743

or such other addresses as may from time to time be notified by the parties for the purpose of this clause. Any notice, direction, consent or other communication shall be deemed to have been served on the third business day after the date of posting.

SCHEDULE

Members of the Purnululu Park Council	Relevant precondition to appointment as member of the Council
Four (4) members	A traditional Aboriginal custodian nominated by PAC
One (1) member	The Director of National Parks
Two (2) members	An officer of CALM of level 7 or higher
One (1) member	An officer of DIA of level 7 or higher who is nominated by the Director General. (For the avoidance of doubt, the Director General may nominate himself with the approval of PAC and the Minister)

IN WITNESS whereof the parties hereto have executed this Agreement in manner hereinafter appearing.

SIGNED SEALED AND DELIVERED by)
THE HONOURABLE DR. JUDY EDWARDS)
Minister for the Environment and Heritage of)
the State of Western Australia in the)
presence of)

THE COMMON SEAL of)
PURNULULU ABORIGINAL CORPORATION)
was affixed hereto this day of 2002)
in our presence pursuant to a resolution of the)
Committee passed on the day of 2002)

……
Chairman

……...
Secretary

Mr Francesco Bandarin
Director
World Heritage Centre
UNESCO
7, place de Fontenoy
75352 Paris 07 SP
FRANCE

Dear Mr Bandarin

I am writing in relation to the World Heritage assessment reports for Purnululu National Park by IUCN and ICOMOS. As you would be aware, these have recently been made available for the upcoming 27th Session of the World Heritage Committee, and we are grateful for the opportunity to consider the assessment reports.

Before providing information on the specific matters relating to Purnululu, I would like to take this opportunity to commend ICOMOS for the systematic manner in which it has analyzed the nominations and, importantly, the consistency of its analysis and recommendations across the assessments. Such an approach will greatly assist the World Heritage Committee in its decision making. I would also like to note that given the role played by ICOMOS in advising the World Heritage Committee on the inscription and management of places for World Heritage listing, I am pleased to advise that the government is seeking close engagement with Australia ICOMOS to draw on its expertise in strengthening the mechanisms for the effective management of Purnululu National Park. In doing so, we have discussed with Australia ICOMOS the issues raised by ICOMOS, and this dialogue has been useful in the preparation of this response.

We have found the reports on Purnululu very useful and have taken close note of the issues they have raised. It is pleasing to see that IUCN and ICOMOS support Australia's view that the property has outstanding universal value, with IUCN concluding that this level of value exists for natural criteria (i) and (iii) and ICOMOS stating that such values are found for cultural criteria (iii), (vi) and possibly (v) as well. We also note that both the IUCN and ICOMOS reports recommend that the Park be inscribed on the World Heritage List, the ICOMOS report suggesting that this be as a mixed site. It would seem, then, that a strong case has been made for inscription. This is reinforced by a statement from the ICOMOS report (p 6):

> 'On grounds of rarity, this property would seem to have an a priori case for inscription both in itself and on comparative grounds in general. On grounds of overall significance, in comparison with other hunter-gatherer sites, Purnululu is seen as being a unique cultural response to a local environment.'

Australia's preference is for inscription for mixed values, considering that these best reflect the nature of the outstanding universal values. While we note that the ICOMOS assessment report supports inscription, it has recommended this be deferred until matters relating to governance, the sustaining and recording of intangible and tangible values and the development of an updated Management Plan have been addressed. In the event of the Committee accepting the ICOMOS deferment

recommendation Australia would accept inscription on natural values and continue to work with ICOMOS on addressing the cultural values with a view to inscription on mixed values in due course.

I am pleased to be able to provide further information in response to the points raised in the ICOMOS assessment, and hope that it addresses sufficiently the matters raised to allow further consideration of the recommendation on the inscription of Purnululu as a mixed site this June. I will deal with each of them in turn.

Governance

In terms of the governance of Purnululu, joint management has now been implemented. Joint management is undertaken by virtue of a Deed of Agreement (the Deed) between the Western Australian Minister for the Environment and Heritage and the Purnululu Aboriginal Corporation (PAC), signed on 31 December 2002. We forwarded a copy of the signed Deed to your office on 7 March 2003.

The Deed provides for the Park to be managed through a newly established Park Council (the Council), comprising traditional owners and members appointed by the Western Australian Minister for the Environment and Heritage. The Council's functions are to:

- provide advice to the Minister in all matters relating to Aboriginal involvement in the Park,
- to prepare and advice upon proposals for management plans for the Park, and
- to participate in the implementation of the management plan as approved, including the development of policy on matters of Aboriginal interest in relation to the Park.

As well as the general issues of governance, the Deed addresses a number of other issues raised in the ICOMOS report, including:

- the proportion of the traditional owners on the Park Council (Schedule 1 of the Deed - there will be 4 traditional owners, 3 CALM appointees and a nominee of the Director-General of the Western Australian Department of Indigenous Affairs);
- the way that Council decisions will arrived at - this will be in accordance with the Aboriginal cultural practice of decisions by consensus, rather than the Western European approach of decisions by majority;
- that Aboriginal people now have the right to reside in, and have access to, appropriate areas of the Park (together with their employees and agents); and
- that Aboriginal people have the right to enter and use the Park in accordance with Aboriginal tradition (including continuing use for ceremonial, religious purposes and for hunting-and-gathering).

Leases for two major living areas within the Park have already been granted, and handed over, to the Purnululu Aboriginal Corporation. Processes to develop the necessary infrastructure for the leases are now being put in place. The return of traditional owners to live in the Park will allow for the return of traditional practices (religious, social and economic) on a significantly wider scale than was possible under recent land-use systems.

We trust that this information on governance addresses a number of the questions raised in the ICOMOS report and also shows how the joint management arrangements provide the context for an updated Management Plan.

The sustaining and recording of intangible and tangible values

In terms of the sustaining and recording of the living cultural tradition of the Park's traditional owners we are aware that this knowledge is, consistent with customary tradition, held as an oral and not as a written tradition. This is also the case with the living hunter-gatherer cultural traditions of World Heritage properties, such as Kakadu National Park and Uluru-Kata Tjuta National Park for example. This also applied at the time of the inscription of both of these properties (as far as we aware, Tongariro National Park does not have a hunter-gatherer culture).

For all of these regions (Purnululu, Kakadu and Uluru-Kata Tjuta), as for many other parts of Australia, long-standing methodologies are in place to record these oral traditions - especially where these have an intangible component. Anthropologists, linguists and, in some cases, specifically qualified archaeologists or ranger staff undertake the work. Recording is facilitated by the fact that to the Indigenous community, a value which we consider is intangible is in fact tangible. For example, the landscape of Purnululu National Park is, to the Indigenous community, a fully interpreted cultural feature which is tangible rather than intangible.

Recording can only be undertaken if the appropriate custodians give the necessary permissions to document appropriate aspects. Where information is made available it is to culturally appropriate persons only or, selectively disseminated as deemed necessary by the custodians of that knowledge. This is a crucial part of traditional methods of protecting knowledge of a secret/sacred or otherwise restricted nature.

These living cultural traditions (incorporating both tangible and intangible elements) are able to be fully sustained through oral tradition, even when this tradition suffers what appears to be considerable disturbance. Such disturbance would include traditional owners not always having continuous access to their traditional lands and where population size has fallen significantly due to the impacts of non-Indigenous contact. This is shown by the strong cultural survivals in many parts of Australia - Kakadu National Park and Uluru-Kata Tjuta National Park being notable World Heritage-listed examples. Many other communities in Australia could also be cited. The traditional owners of Purnululu National Park, like these others, would strongly assert that their culture has survived, will continue to survive and is sustainable. To imply otherwise to such peoples, who have maintained 'the Law' and its features against all the odds, is disrespectful of their ability to manage their own cultural knowledge. The Indigenous community would also strongly assert that the extent to which their culture survives and is sustainable is not a function of community size or location.

Work has been already undertaken to record relevant aspects of the oral tradition of the Park's traditional owners. This includes the documentation of the living cultural tradition, and traditional owners, of the Park as part of the lodgment of claims for Native Title (the Native Title process is still in train for this region). This information, along with the identification of the traditional owners, has not been widely disseminated and this might have been why it did not appear to be evident at

the time of assessment. The Purnululu Aboriginal Corporation indicated that they did not regard it as culturally appropriate to release the full extent of such information for consideration by the World Heritage Committee or the ICOMOS assessor. The Purnululu Aboriginal Corporation also determined that the particular information documented for Native Title purposes should remain confidential because of the ongoing legal issues involved in a Native Title process.

Information included as part of lodgment of claims for Native Title, and Native Title hearings before the Federal Court, has an explicit focus on maintenance of traditional culture and relationships to land. All cultural forms and productions come under scrutiny including language, material culture, religious knowledge and ceremonial practices, use of indigenous plant and animal foods and patterns of movement through traditional lands. Documentation of this information for the area exists, but will be released, as deemed necessary and appropriate for park management purposes under the direction of traditional owners and their representative bodies through the established mechanisms. One thing is clear, the traditional owners of the Park consider that significant cultural values extend across the Park and that belief should be respected rather than subject to third party inquiry and interpretation.

Development of the Management Plan

In terms of the incorporation of the living cultural tradition of the Park into the Park's management regime, this had already begun to take place under the former management system. Now that co-management is in place this now sees incorporation of the relevant cultural material into the management of the Park. This occurs through a number of formal structures - the Park Council, the Native Title process, the return of people to live in the Park and their greater ability to undertake traditional practices, and the revision of the Management Plan.

The importance of developing management plans for protected areas in places where a strong hunter-gatherer culture still exists, incorporating both tangible and intangible elements, are becoming more widespread in Australia. Of particular note are the management plans - and associated relevant cultural planning processes - found in Kakadu National Park and Uluru-Kata Tjuta National Park. Such planning requires a carefully measured process involving strong community participation and consultative processes. Imprudent and insensitive management plan preparation time frames can cause considerable resentment and prove counterproductive in moving to a mutually shared outcome. Australia has had much experience with this approach and considers these procedures to be highly effective. We are not aware of another country which has such strong expertise in this work - especially involving World Heritage properties which reflect these types of cultural traditions.

The process has already begun for Purnululu National Park. At Attachment A we show the Draft Plan of Action for the Management Plan. This reflects best practice approaches, including those relating to intangible and tangible cultural values (information on an example of the latter process - as used for Uluru-Kata Tjuta National Park - is at Attachment B). You can see that the management planning process for the revised plan is well underway for Purnululu National Park, reflecting both work already undertaken and also the discussions with the PAC on the ways in which people would like to see the Park managed. The cultural managing planning process not only addresses sites of significance (both natural and cultural), but also respects the maintenance of cultural practices, particularly as regards the management

and appropriate use of information relating to specific aspects of significance, places and activities (including ritual and ceremony).

We have been advised by technical experts that the development of an updated Management Plan would be best served by undertaking the work in an integrated fashion - involving both natural and cultural values. In this way both types of outstanding universal values are considered in a more consistent and therefore a more efficient way. It is more timely, more practical and more appropriate to the nature of the values - the traditional owners, for example, do not differentiate natural from cultural values.

Given that IUCN and ICOMOS have identified natural and cultural outstanding universal values, and as we will be updating the Management Plan to integrate and acknowledge its mixed natural and cultural values, an inscription of the property for these mixed values by the World Heritage Committee at this time would not only appropriately acknowledge the overall significance of Purnululu, but it would have a significant impact in ensuring the cultural values are appropriately addressed in the updated Management Plan.

If I may add a personal note, I have been particularly heartened by the high level of support the nomination of Purnululu has secured with the Commonwealth, State and local governments and authorities fully committed to the nomination. The nomination would not have proceeded without the leadership and support of the traditional owners of Purnululu, and with the complexity of Native Title processes, inscription at this time for its mixed values will also send an important signal of international support for the local Aboriginal people with the protection of their globally significant heritage.

Yours sincerely

Bruce Leaver
First Assistant Secretary
Heritage Division
11 June 2003

Appendix A

Purnululu National Park
Managing Cultural Values
Draft Plan of Action

Background

While some aspects of the context for the management of cultural values at Purnululu National Park (the Park) are different to those at, for example, Uluṟu - Kata Tjuṯa National Park (traditional owners are only taking up residency within Purnululu National Park after a time being resident in neighbouring areas and the fact that the Park is managed by a State agency rather than the Commonwealth), many are the same. People still uphold the Law (*Ngarrangkarni*) and have a strong knowledge as to how it is instilled across the landscape - in what we would call cultural and natural places and values, they still speak language (part of the system of the Law) and the Park's natural and cultural features are acknowledged as having outstanding universal value.

Draft Plan of Action - planning foundation

The Australian Heritage Commission's 'Protecting Heritage Places - Information and Resource Kit' (the Kit) is the model for the Draft Plan of Action. At its core are ten steps to protect heritage places. Launched in 2001 and based on award-winning materials, the process used in the Kit has a strong foundation of three major and well-respected national heritage guides - 'Ask First: a guide to respecting Indigenous heritage places and values', the 'Burra Charter of Australia ICOMOS' and the 'Australian National Heritage Charter (Australian Heritage Commission and AIUCN).' The Kit has been widely used for heritage planning across Australia's states and territories.

It also forms the basis for a nationally-available online professional development course in heritage planning. The process in the Kit can be used to guide workshop programs and assist in structuring community-based plans. It can be used to deal with not only complex planning issues at places, but also the fundamental elements that are accessible to community and Indigenous groups. The Protecting Heritage Places process has been applied in a range of Indigenous contexts in Australia. It was the process on which the Uluṟu - Kata Tjuṯa National Park cultural planning was undertaken. In this case, the Kit was used to help plan a series of community-based meetings and workshops with the traditional owners and other relevant people which led to the development of an plan developed by the community with a high level of ownership. In the case of Purnululu, the details of the planning process will be developed around this core, but appropriate to the specific needs of the park.

Draft Plan of Action - 10 Steps to Protect Heritage Places

Step 1 'What is your heritage place' completed

This step has already been *completed* through the process of choosing the Park for nomination to the World Heritage List, including community consultation.

Step 2 'Who has an interest?' completed

People and agencies who have an interest in the cultural values of the Park *have been identified* as part of the general planning process for the Park and also the World Heritage nomination process.

Step 3 'What do you need to know?' underway

This step, which gathers sufficient information to identify important heritage values, has been *underway for some considerable time* through a range of recording work by agencies and groups representing traditional owners. The work, because of its nature, is ongoing and so is listed here as 'underway'.

Step 4 'Why is this place important?' completed

This establishes what the heritage values of the place are and ensures that the important elements of the place are not overlooked, or inadvertently damaged. In the case of a mixed site, such as the Park, it is particularly important to ensure that one set of values is not protected without considering the effect that proposals may have on other values. It is therefore best that the natural and cultural values of the Park are identified and managed in an integrated fashion.

A key outcome of the step is the development of a statement of significance. This has been *completed* for the outstanding universal values of the Park.

Step 5 'What are the issues?' underway

Identifying the key issues that affect the future of a heritage place - current and future, including the realities affecting management, develops a realistic view of what is possible to achieve for heritage protection. This step also includes a statement of the condition of the place.

Much of the work identifying and considering these issues has been *completed* as the process to develop joint management arrangements and the return of people to the Park has been introduced. Documentation of these issues will be completed for the Management Plan.

Step 6 'What do you want to achieve' underway

This step focuses on determining the future directions for managing a place, and the scope of heritage conservation activity. It is a list of management objectives or 'conservation policy'. The objectives are defined by focusing on the values of the place as outlined in the statement of significance, addressing the key management issues already identified and considering how the place would look in the future.

The traditional owners, through the laying down of the appropriate protection regimes for all types of place by *Ngarrangkarni* - from an individual site through to the cultural landscape, *already have* the knowledge of how they would wish to see these places protected. The Management Plan would list this information and these principles, as relevant (ie as culturally appropriate). This step would also determine, in consultation and discussion with the Indigenous community, whether additional measures are needed to fully protect places.

Step 7 'What do you need to do' underway

This is the step that many people want to complete as 'Step 1'. Instead, the other steps need to be completed first - leading to a course of action only after understanding significance and determining objectives for management. Strategies must be designed to retain the significance of the place. Strategies and actions depend on objectives and will vary from place to place. Good management is about finding appropriate and creative solutions for the situation at hand.

The transition to a joint-management regime has enabled people to *already develop views and beliefs* as to what should be listed as strategies. The strategies will be finalised for the Management Plan.

Step 8 'What is your plan' underway

The Management Plan is a record of all the seven steps above. It guides the protection of the place. Since much of the information for the above steps has already been gathered for the Park, material for the plan can be start to be put in place.

Step 9 'Do it!' underway

Planning has little effect if no action is taken. Taking action to implement a management plan is best done systematically, requiring good project management. Within the Park, with the process of joint management now implemented, traditional owner involvement in the management and protection of the values of the Park is *already underway*.

Step 10 'Review it!' awaits the development of the plan

Management plans should have built into them timeframes for when they can be checked for relevance. This is typically a major review after four or five years and, for such a review, all ten steps in the process should be revisited.

The meetings between traditional owners, Park and other management staff, Land Councils and Commonwealth staff reflect progress well into the completion of this process, as shown above.
The process of planning contributing to a revised plan of management:

- Provides a community-owned outcome which is strongly reflected in the revised plan;
- Gives a broad consideration of values, both tangible and intangible, which also specifically addresses the cultural landscape values recognised in the World Heritage inscription; and
- Provides definition of a suitably broad range of programs for the protection of all values, and the outline for a staged program to practically implement this.

Additional work on Tourism and Heritage as part of the planning process.

As well as the work described above, Purnululu National Park is to be used as a pilot for the integration of tourism and heritage in a planning framework. The Tourism and

Heritage Assessment Framework has been developed to address a need for a straightforward process that can assist in bringing together heritage and tourism planning in regions and at heritage places. The draft framework is piloted in this instance with Purnululu National Park and the Kimberley Region, Western Australia. The process will assist in:

-audits and preliminary assessments of tourism development potential in regions
-identification of tourism and heritage issues to be considered in management and regional planning
-development of regional heritage and tourism plans and action plans
-development of new heritage tourism products, and
-more effective planning for infrastructure development at heritage places.

Attachment B

An example of cultural landscape management
Uluṟu – Kata Tjuṯa National Park

The issue of integrating the management of intangible values with the management of other values has been the central concern of developing a revised approach to the cultural values associated with Uluṟu - Kata Tjuṯa National Park. In 1994, Uluṟu-Kata Tjuṯa became the second property in the world to be listed on the World Heritage List as a cultural landscape.

In 2000, a process was embarked upon to provide a firmer basis for the management of the cultural landscape values of the Park, and provide a practical means for integrating these into Park management planning processes.

A series of meetings and workshops were held in 2000-2001 with traditional owners and all key stakeholders with an interest in the management of the cultural landscape values of the Park. The main workshop saw one of the largest attendances by *Aṉangu* of any meeting or workshop in the Park since handback to traditional owners in 1985.

The process develop a new program to systematically plan, coordinate and undertake activities that are directly related to looking after the cultural significance of the Park and its cultural landscape values. The program is defined in *the Uluṟu- Kata Tjuṯa National Park Cultural Heritage Action Plan and Cultural Landscape Conservation Plan* (Uluṟu Kata Tjuṯa National Park Board of management and Parks Australia 2002), which acts as one of the detailed operational plans under the Plan of Management. This work will also much more strongly influence future revisions of the Management Plan.

Development of the Cultural Heritage Action Plan was based upon participatory and community-based planning approaches. These ensured that the approaches directly related to the aspirations and issues of traditional owners and associated *Aṉangu* communities.

According to the wishes of senior traditional owners, the process was also conducted in the context of the Joint Management arrangements for the Park that have been a guiding philosophy for park management since handback. The workshop and other meetings saw involvement of non-*Aṉangu* Park staff, representatives from responsible agencies and others knowledgeable about the conservation of cultural values in the Park and elsewhere.

Since its development, the Cultural Heritage Action Plan has an important guide for the Board of Management, Park managers, the *Aṉangu* Park staff and *Aṉangu*. It has enabled actions for the protection and management of both intangible and tangible park cultural values to be practically budgeted for, developed and implemented.

The Cultural Heritage Action Plan covers a broad area and sets out a range of practical measures to look after cultural values related to:

- *Tjukurpa* (traditional Law)
- sacred sites and story lines
- rock art sites and *Aṉangu* camping places
- the landscape – plants and animals

- rockholes
- recent *Anangu* and *Piranpa* stories and sites
- family history
- the wellbeing of the *Mutitjulu* and *Anangu* community
- proper ways of teaching and telling the stories to the next generation of *Anangu* and to the world
- joint management
- maintenance of World Heritage standards

Amongst many practical programs, important for delivering this cultural heritage program have been two computer-based systems that are practical tools to manage the documentation and information of the Cultural Heritage Program in two spheres:

> *Ara Irititja* (‘*Stories from long ago’*) - a computer system developed to manage information associated with people, make accessible archival information about people and their communities (oral history, photographs, film, document and traditional knowledge), and provide a storage mechanism for new information to be collected.
>
> Uluru - Kata Tjuta Site Management System - A web-interface system (available only on stand alone, non-networked systems) for management of information related to documentation of places (site records), oral history connected to places, condition assessments, monitoring points, site work proposals and site work records. The system manages and provides reports on all the work undertaken in relation to cultural heritage protection for specific places. This applies to rock art sites, rockholes, etc.

Having a soundly formulated and clearly stated plan, which is provided by the Cultural Heritage Action Plan, endorsed by the Board of Management with the implementation overseen by Aboriginal staff and Traditional owners has brought multiple benefits, some of which are:

- directing more resources into cultural heritage values management (both agency and non-agency sources),
- bringing management programs for cultural values to a level consistent with those used for natural values,
- providing a focus for *Anangu* park staff, a high level of ownership and a source of pride, and
- providing a practical means to more effectively integrate activities for management of cultural values into budget and work planning cycles.

Purnululu National Park (Australia)

No 1094

1. BASIC DATA

State Party: Australia

Name of property: Purnululu National Park

Location: Western Australia

Date received: 25 January 2002

Category of property:

In terms of the categories of cultural property set out in Article 1 of the 1972 World Heritage Convention, this is a *site.* In terms of *Operational Guidelines* para. 39, it is also be a *cultural landscape.*

[Note: The site is nominated as a mixed cultural and natural site. IUCN will assess the natural significances, while ICOMOS assesses the cultural significances.]

Brief description:

Purnululu National Park in Western Australia is closely associated with traditional owners whose origins in the area lie tens of thousands of years ago. The major natural features, notably the creeks, water-holes and Bungle Bungle Range, are not only parts of their environment and sources of their livelihood, but crucial places in their culture.

2. THE PROPERTY

Description

Purnululu National Park is in the East Kimberley Region of north Western Australia, in the drainage basin of, and some 400 km south of, Joseph Bonaparte Gulf.

Its title comes from the regional name in the Aboriginal Kija language for the sandstone of the Bungle Bungle Range (*see* below). The Park includes the whole of the Bungle Bungle Range (ca 45,000 ha), mainly at an elevation of 500-600 m. The Durack and Osmond Ranges rise to an elevation of 500 m. and more on its west; rocky terrain at 200-500 m elevation lie to its south and east.

The area proposed for inscription is the whole of the National Park (239,723 ha). Its southern and eastern boundaries respectively follow the Panton and Ord Rivers; its western boundary is of two lengths of straight line trending south-north and drawn without apparent reference to topography; and its northern boundary follows another river, Osmond Creek, until becoming another straight line, this time west-east.

This configuration excludes the junction of the two Rivers, which is in neither the core nor buffer Zones. The straight lines 'reflect cadastral rather than biophysical features and hence in some places they are difficult to define on the ground or to manage'. A buffer zone is provided by the Purnululu Conservation Reserve, a ca 1-10 km-wide, geometrically designed strip of land on the north and north-west only. No buffer zone on the other sides is proposed in this nomination.

The Park is located 'in the transition zone between the savannah and arid environments of tropical Australia'. The climate is of typically dry monsoonal character with two distinct seasons: hot, wet summers (the wet season) and warm, dry winters (the dry season). Mean annual rainfall is ca 600 mm, falling mainly between December-March. Run-off and evaporation ensure the presence of very little permanent surface water.

Aboriginal use of the area has been 'primarily focussed along the Ord River, Red Rock Creek and Osmond Creek', but occupation and use of natural resources has occurred widely. 'Aboriginal people sought out and used specific plants and animals throughout the [rocky landscape] while pastoralists took advantage of the grasslands of the sand plains and Ord River Valley.'

The inhabitants of and visitors to the Park, their lifeway and beliefs are crucial to this nomination.

The following are the key cultural qualities of the site. These include both tangible and intangible qualities:

Intangible cultural qualities:

- Association with Aboriginal cosmology;
- Association with Aboriginal land use;
- Reflection of Aboriginal languages;
- Association with Aboriginal knowledge.

Tangible cultural qualities:

- Archaeological sites;
- Rock art.

Intangible cultural qualities:

Association with Aboriginal cosmology: The Purnululu landscape is intertwined with the living religious traditions and beliefs of *Ngarrangkarni,* an indigenous Aboriginal belief system popularly referred to as 'Dreaming' or the 'Law'.

Ngarrangkarni is seen as a complex fusion of ancestral beings, the creation, events long past, laws, ceremonies and rituals – all underpinned by the idea that *Ngarrangkarni* formed the landscape and thus landscape formation is ongoing. Traditional owners see landscape features as reflecting ancestral beings and events, and the names given to features reinforce this connection. The landscape therefore is a living reminder of the presence and power of *Ngarrangkarni.*

Ngarrangkarni gave water to the land and shaped the country. Water was put in the country by the rainbow snake, *Kaleruny,* … [who] also gave people their languages.' Animals naturally feature strongly in this belief system: for example waterfalls and rapids, because they prevented fish from travelling further upstream, are seen as crocodiles turned into stone. 'People explain the features of the Purnululu region through narrative rather than definition.'

The process of creating and then melding with the landscape means there is an intimate association between people and the land, with the two becoming inseparable. In

this way, the landscape is a cultural artefact that buttresses the social and economic qualities of contemporary life.

Phyllis Kaberry, an anthropologist who worked with the Aboriginal women of the East Kimberley region of the 1930s, describes in her words and those of her informants, how people think of *Ngarrangkarni*:

'[She] does not view her country as so much geological strata, as so much sand, stone and spinifex. The boulders and the pools are Ngarrangkarni; that is, they belong to the past and to the totemic ancestors. When this word is used it always implies unquestionable finality on the subject at issue; Ngarrangkarni stamps a practice as legal; it invokes a religious sanction for its performance.'

Association with Aboriginal land use:

- Traditional land ownership:

Aboriginal people in Purnululu and East Kimberley region have strong systems of traditional land ownership, which continue to be practised despite the substantial disruption caused by European settlement. These systems are similar to those found elsewhere in Aboriginal societies.

Traditional ownership of land is much more than a question of geography. The societies of East Kimberley can, like other Aboriginal societies, be termed 'religious societies' as land, and indeed all aspects of society, are thought of in spiritual and religious terms rather than material ones.

On its own, traditional ownership of land is not the only important factor in rights to land. The ways in which people look after this land is important as well, including knowledge of appropriate ritual and belief systems, the continuing performance of ritual cycles, acquaintance with major sites and site complexes, possession of sacred objects and general continuing interest in the area.

- Linking natural features to personal identity – Narraku:

All of the varying natural features associated with the watercourses – rock pools, rocks, and trees – are named and closely linked to social and economic activities.

Natural features are also connected to personal identity. The name of a landscape feature may be given to a person and the term *narraku* refers to the relationship between the landscape and person thus created.

- Seasonal migrations:

Seasonal migrations were complex and linked to judicial use of fire to maintain ecological diversity and the desire to optimise variety in diet, through harvesting the considerable ecological resources – both plants and animals – at the best time of year.

Prior to European contact, the people of the Purnululu region, like other Aboriginal people in Australia, had developed strategies for managing the environment in such a way that it was maintained as a sustainable system. People recognised the interconnections of species through food chains, understood the actions of the seasons on resources, and intervened in ecological relationships through the use of fire, selective gathering and hunting, food taboos, and religious ritual. Women practiced a selective harvesting of resources that recognised that plants and other resources are self-generating and must not be overused. Not all of a resource was harvested, so that sufficient would be available next time the area was harvested.

- Hunting and gathering:

Purnululu reflects a persistent hunting and gathering tradition linked to the particular 'transitional' climate of the area. The traditions are thus different from hunting and gathering traditions in other parts of Australia, such as in the Kakadu Park with its monsoon climate and Uluru-Kata Tjuta national park in the desert regions.

Hunting and gathering in Purnululu was, and still is, characterised by a response to a rich ecological diversity. In the rainy season, berries, fruits, wild-honey ('sugarbag'), frogs and white ant larvae are plentiful, in addition to game and fish. In winter, lily-roots and seeds, yams, tubers, nuts, grass seeds, pandanus and baobab nuts are collected by the women, and later in September grubs are found in river-gums, and lily-roots are dug from the mud of the drying water of river beds or billabongs. Fish, game, reptiles, echidna and birds are secured by men most of the year round, although at some seasons they are better in quality that at others.

- Exchange networks:

Barter was a significant factor in Aboriginal economy and one that was linked to specific places in the landscape. The widespread exchange network, called *winan*, stretched 600 km from west to east Kimberley and linked in to system in the Western desert. Item exchanged included tools, weapons, raw materials and foodstuffs. Gathering places such as Ngirriyiny on the Ord River apparently used to attract large numbers of participants and were in effect markets.

Reflection of Aboriginal languages: Four languages were spoken throughout this region: Kija and Miriwoong, connected to the western and northern parts of the Park, and Malngin and Jaru to the southern and eastern parts. The latter two are members of the Pama-Nyungan linguistic family that is spoken throughout the desert regions, including by the Anangu of Uluru-Kata Tjuta, while the former two are members of the Jarrakan language family.

The distribution of these two distinct language families mirrors the transition between arid desert and monsoonal savannah environments and thus reflects major social, religious and cultural differences between the two groups.

Tangible cultural qualities:

Archaeological sites: The traditional owners of the middle Ord Valley assert that their connection to their country extends back to the time during which the features of the landscape were first formed. Results of archaeological research support the argument for a long and continuous occupation of this part of northern Australia, extending back tens of thousands of years.

At Lake Argyle, less than 100 km downstream from the Purnululu National Park, radiocarbon dating demonstrates occupation of the Ord Valley for at least the past 20,000 years. The evidence also infers the seasonal occupation of the rock shelters based on the presence of fragments of goose (*Anseranas semipalmata*) eggshell in the Miriwun

deposits. As *Anseranas semipalmata* breed and lay eggs during the wet season, it is suggested that the uplands were perhaps occupied during the wet seasons and riverine areas during the dry season.

Rock art: The rock art at Purnululu has yet to receive research attention equivalent to that given to other rock art sites in Australia. A three month survey in 1988 recorded over 200 sites. The paintings depict a range of animals including crocodiles, turtles, fish, kangaroos and emus. As well as human and snake-like figures, the sites also include stencil of hands, mostly in red ochre and also representation of boomerangs and spears.

Paintings 'are usually maps of their own country, or of country to which they are related, giving them the authority to depict it. Paintings may also illustrate a story…'. The rock art may well have accumulated over a long time but dating it scientifically has not so far been attempted in a systematic programme. It is known that some images were made just a few decades ago.

The 'Turkey Creek artists', whose art originated in the discontent and frustration of Aboriginal people at not being able to visit their own country, demonstrated in the 1970s the living nature of this artistic tradition in expressing relationships between people and landscape. The presence of examples of the local art in galleries through Australia and in private collections elsewhere, suggests that others find in it considerable significance: the Purnululu 'artistic expression of the connections between, land, myth and history is now recognised as providing a unique contribution to the development of international art movements [and in trying] to best express the connection between humanity and land…'.

History

Human activity in the area has occurred over some 40,000 years. Radiocarbon dating places the earliest known occupation of the Ord valley, downstream of the Park, some 20,000 years ago. Long-term use of the area is suggested by a plentiful archaeology, as yet incompletely discovered.

The first survey of the area was in July 1879. The first colonists arrived in the Middle Ord region in the mid-1880s. Gold was discovered 1885 but stock raising became the main activity. 'By June 1884 the first mob of 4,000 cattle were brought into the Ord River grasslands…' 6,000 followed the following year. By 1902 there were some 47,000 cattle.

Overstocking of cattle, which led to over-grazing 'set in train the destructive process of massive landscape erosion', a process which saw the Aboriginal population involved in unpaid seasonal labour on pastoral stations, while their natural food resources were diminished. The indigenous population decreased by perhaps as much as 50%.

Form 1967 procedures to reverse this process were started. Control of stock and re-vegetation programmes were put in place and the 1968 Pastoral Award stopped the abuse of Aboriginal labour. However, in moving people out of the cattle stations, the measures helped create new living sites – 'humpies' – which came to be characterised by social deprivation.

'From around 1985 onwards large numbers of cattle and donkeys (25,000 and 4,000 respectively)' were removed to reduce overgrazing still further. The National Park was created in 1987, when the area became uninhabited. The same year saw the start of a programme of protective burning to reduce wildfire and create mosaics of vegetation. By the mid-nineties, tourism had become a local feature, despite the difficulties of access, with ground-based visitors numbering ca 20,000 p.a. and perhaps the same number overflying the Park each year.

In spite of more than a 100 years of outside intervention, and the resulting severe changes in the landscape and in social structures, it is claimed in the nomination that Aboriginal people who live near Purnululu still retain communal memories of traditional land management practices, and of *Ngarrangkarni* associations, and still use the landscape for harvesting wild food and for social gatherings.

Management regime

Legal provision:

The Park and Reserve are owned by the Government of Western Australia.

Amendments to the Conservation and Land Management Act 1984 are currently under negotiation to allow the Park and Reserve to be vested with a Prescribed Body Corporate to hold native title on behalf of traditional owners. They are 'the registered Native Title claimants under the Commonwealth Native Title Act 1993 of an area that includes the area proposed for nomination'. Two different groups of 'traditional owners' have claimed this land.

Technically, all traditional owners have recently lost their legal claim to the land in a court case. Nevertheless, they aspire to joint management of the Park and the transfer of its ownership to them.

Since the nomination was submitted, and pending the completion of legislative changes, a Deed of Agreement between the Department of the Environment and Heritage and the Purnululu Corporation has been signed. This document allows for the formation of a Purnululu Park Council to provide 'meaningful input for the traditional Aboriginal custodians in relation to the park'.

It is envisaged in the nomination that, in the future, the Dept. of Conservation and Land Management would manage the property on behalf of this Purnululu Park Council, a body made up of traditional owners and the Department. Until the Council is set up, it is not clear what proportion of the eight members of the Council will be Aboriginal traditional owners, how they will be involved proactively in the management of the Park, or whether new settlements will be set up in the Park – although this was envisaged in the nomination.

The Middle Ord Region is in the Australian Heritage Commission's Register of the National Estate. The National Park was created in 1987 and upgraded to class A in 1988. If inscribed, the Park would be additionally protected under the Environment Protection and Biodiversity Conservation Act (EPBC Act) 1999, which covers World Heritage properties in Australia. It requires

that a management plan be prepared and implemented, consistent with the World Heritage Convention and the Australian World Heritage Management Principles.

Management structure:

The Park and Reserve are managed by the Department of Conservation and Land Management, Western Australia.

The National Park Management Plan 1995-2005, currently under review, sets out seven specific goals. Cultural considerations come into three of them.

Overall, the Plan was clearly a good one for the National Park at the time of its compilation. It could now be said to be light in its treatment of the management of cultural values and in particular in the integration of traditional owners and their traditional practices into the forefront of management of the Park.

It is understood that the Plan is currently under review and will when completed, embrace both cultural resources of the past and current cultural change and its implications. The nomination dossier states that 'Where issues arise in relation to culturally sensitive areas, those issues are given high priority by … management.'

Surveys: The nomination says some surveys have been carried out but implies that monitoring is still to be put in place. Supplementary information provided by the State Party in September 2002, provides much enlarged information on the state of surveys and knowledge of the nominated area in terms of cultural processes. Lists of archaeological sites, sites on surface finds and rock shelters are listed in the document. Although a few *Ngarrangkarni* sites are listed, no methodology is suggested for recording the intangible links between peoples and the landscape. Nor is there mention made of the involvement of oral historians or ethnographers to begin compiling data on the crucially important relationship between Aboriginal traditional owners and the landscape, so that there can be an understanding as to how to monitor this fragile intangible heritage.

Traditional owners: A key aspect of this nomination and of management of the area is the role of traditional owners. Many aspects of their culture, history and aspirations are discussed but two fundamental matters seem to be treated with some ambiguity.

Neither the nomination nor its supporting documents state how many people are embraced by the term 'traditional owners'. The impression given is that they are no more than a few dozen. The size of the population is clearly crucial to the viability and sustainability of the landscape as a living cultural landscape. This points needs clarification.

Nor does the nomination say where these traditional owners now live. The nomination infers that the Park is uninhabited and that the local people were moved out at the creation of the Park in 1987. It is stated that traditional owners hope to establish new settlements in the park, but no details as to how this process will be managed are given, although it is understood that the process will be part of the advice given by the Purnululu Park Council, once it is established.

It would have been helpful if this significant matter could have been addressed more clearly – at least in terms of aspirations. If Purnululu is to be sustained as a living landscape, then the relationship between traditional owners and that landscape is fundamental and ideally should be based on a close physical inter-dependence.

Resources:

The Park is funded on a ratio of 5:9 by public funds and revenue it raises itself, to a total of 324620 $ p.a. Much of current income comes from landing fees.

Considerable increases are in mind to upgrade management in the event of inscription. The Park staff consists of two permanent rangers and a seasonal visitor centre manager.

Justification by the State Party (summary)

Aboriginal people have lived in the East Kimberley Region for at least the last 20,000 years. The Park provides exceptional testimony to this hunter-gatherer cultural tradition, particularly its riverine features… Fire has been, and continues to be, an important tool in Aboriginal management of this environment.

Ngarrangkarni (popularly the 'Dreaming' or the 'Law'), handed down through countless generations, continues to be the guiding principle in the living traditions and beliefs of Purnululu's traditional owners.

The cultural landscape is significant because its people and traditions have survived despite the impact of colonisation, showing a resilience at a time when such cultures everywhere have become vulnerable.

If included on the World Heritage List, Purnululu will enhance its comprehensiveness and complement other Australian World Heritage properties, especially Uluru-Kata Tjuta and Kakadu National Parks.

3. ICOMOS EVALUATION

Actions by ICOMOS

A joint IUCN/ICOMOS mission visited the property in August 2002.

Conservation

Conservation history:

Managed sustainably by traditional owners for tens of thousands of years, the nominated area became subject to moderate to severe degradation, including erosion, from the 1880s onwards as a result of mineral and agricultural exploitation, notably cattle-grazing. The effects of this phase are still present, both in the landscape and among the traditional landowners.

1987 the National Park was created. In 1995 the *Management Plan 1995-2005* was exceptionally framed, as distinct from other National Parks, 'to ensure the involvement of the Aboriginal traditional custodians in the ongoing management of the Park' (Preface, p. i).

State of conservation:

The nomination says that 'the present state… is a result of the historic pressures of pastoralism and overgrazing and the current pressures of tourism'. On the other hand elsewhere in then nomination it is implied that the cultural landscape sustained by the Aboriginal people is still visible. Perhaps it would be truer to say that cultural landscape still exists as the perceived link between people and the landscape even though few or no people live in the area and much change has been inflicted over the past one hundred years or so.

'The current pressures of tourism affecting the present conservation of the property are focussed on the friable sandstone gorges, not the more resilient black soil plans, sand plains and grasslands affected historically by cattle.' Basic steps like hardening paths and distributing camping grounds are mitigating tourism impacts and have probably stabilised the situation.

Risk analysis:

The following risks have been identified:

- Natural disasters
- Visitor pressure
- Lack of occupants*
- Loss of traditional knowledge*
- Mining*

[* These are not detailed in the nomination]

These are dealt with in turn:

Natural disasters: Fire, floods and other disasters have been addressed by the production of emergency action plans.

Visitor pressure: The current campsites approach full capacity at times. '…tourism has the potential to affect values.' Although numbers of visitors are low compared to many other World Heritage sites, the fragility of the area makes it extremely sensitive to them. One policy is to promote aerial access for day visitors, to contain the demand for overnight stays and consequential infrastructural developments; but increasing air traffic may increasingly impair 'the feeling of wilderness experienced by many visitors' and create an aural threat.

It may be necessary to limit visitor numbers at peak times. Meanwhile, to constrain visitor numbers and retain the wilderness nature of the Park, it is policy to maintain land access by unpaved roads suitable for 4-wheel drive vehicles. Pressure to upgrade the road for normal vehicles is, however, constant. Internal roads and some tracks may also need to be upgraded. This issue will be addressed in the review for the current Park plan in 2005.

High pressure from visitors on footpaths is leading to some degradation of paths. Upgrading is likely to take place. Visitor facilities are also expected to be upgraded to meet visitor's rising expectations.

Lack of occupants: Although not specifically listed in the nomination as a threat, clearly any diminution in the number of people who consider themselves to be traditional owners of the area, to such a level as to make the traditional management of the park unviable, would be a serious threat. It is not yet clear how the numbers of people associated with the park will be sustained – but clearly this is part of the on-going negotiations with traditional owners, and the final form of agreement has yet to be determined.

Loss of traditional knowledge: This theme likewise was not highlighted as a threat. Nevertheless the integrity of the cultural landscape as a living landscape would be severely compromised if the local owners were no longer the oral custodians of traditional knowledge.

Mining: This threat was not articulated in the nomination. In response to an enquiry into whether or not existing controls over mining will be sufficient to protect cultural and natural qualities, Environment Australia has said that the EPBC Act provides protection for 'World Heritage Values' that are contained in the property and in conjunction with the Mining Act 1978 will provide sufficient protection.

Authenticity and integrity

The present state of the landscape in Purnululu raises issues connected with authenticity and integrity. The nomination acknowledges that the landscape has suffered from the results of mining and of agricultural over-exploitation by settlers. Thus the physical landscape overall as it stands cannot considered to be entirely authentic in connection with the cultural qualities put forward as contributing to its overall significance. Rather what the nomination is suggesting is that the inherent qualities of the landscape are discernable and are capable of restoration to a condition approaching that which pertained before the arrival of settlers, through the re-introduction of traditional land-use practices. One such example is the implementation of an appropriate fire regime based on traditional Aboriginal fire management combined with the use of traditional knowledge and skills, to further ecosystem recovery of the sand and black soil plains.

On the other hand many of the intangible qualities associated with the landscape, such as the practice of *ngarrankarni* and knowledge of ethno botany, are still relatively intact – albeit attenuated through the movement of traditional owners to the outside of the park.

The practice of hunting and gathering has also diminished through the extended distances between where people live and the park, although it is understood that agreement is to be negotiated on acceptable levels of extraction of natural resources in the future.

Similarly the fact that the park is no longer lived in diminishes its cultural qualities. However it seems to be the stated intention to encourage new settlement in the park, once a satisfactory regime of partnership management has been put in place.

Overall, the dynamic relationship between the aboriginal owners and the park is still there but operating at a much less intense level than previously. If this relationship is to be strengthened in the future, in order to reinforce the authenticity of the area, then proactive cultural management will be needed to ensure that the owners do

not become park keepers or that traditional knowledge becomes atrophied.

Comparative evaluation

Of 730 World Heritage sites, only 3 represent hunter-gather societies, at Kakadu, Uluru (both in Australia) and Tongariro (New Zealand). Given the hundreds of thousands of years in which hunter-gathering was the only way of life for humanity, the sparsity of its representation of the World Heritage List could be said to reflect poorly on the credibility of that List. In evaluating surviving sites, then clearly scarcity or rarity are factors. However it cannot be argued that all surviving hunter-gather sites, because of their scarcity, are of universal value.

Most surviving hunter-gatherer societies are in Australia, 'the last continent populated by hunter-gatherers to experience and survive colonisation'. The evaluation of such sites is therefore mainly focused within one country.

Already two sites are inscribed within Australia. How is Purnululu culturally differentiated from the existing World Heritage sites?

The ICOMOS 1994 evaluation of Uluru 'noted several major differences between [Uluru and Kakadu] regions … they exemplify cultural adaptations to opposite poles of an ecological continuum. [Purnululu] originates in a related cultural tradition but represents an adaptation to an intermediate point on this ecological continuum. Different to the cultures of the tropics and the desert, Purnululu uniquely represents thousands of years of hunter-gatherer adaptation to a riverine and upland ecosystem.'

The geographical difference is also manifest in cultural manifestations. The Purnululu *Ngarrangkarni* is similar in philosophy and concept to the *tjukurpa* of Uluru but it is 'different in form and vision, with a different ecological and cultural well-spring. The differences are manifest in the very different artistic representations …'.

Purnululu can therefore be considered a prime example of hunter-gathering societies whose cultural traits reflect geographical traits intermediate between the tropics and the desert within Australia.

Further afield in, for instance, North America, central Borneo, the Philippines, hunter-gather peoples tend to live in well-watered areas. While closer parallels may exist unnoted, there do not seem to be direct analogues for the hunter-gatherers of the Purnululu region outside Australia.

On grounds of rarity, this property would seem to have an a priori case for inscription both in itself and on comparative grounds in general. On grounds of overall significance, in comparison with other hunter-gather sites, Purnululu is seen as being a unique cultural response to a local environment.

Outstanding universal value

General statement:

The Purnululu National Park is of significance for the way it testifies to the traditions of a hunter-gatherer society which still exists and whose way of life has a very long time-depth.

There is evidence that Aboriginal people have lived in the East Kimberley Region of Purnululu for at least 20,000 years. Their descendents still live near the park and are strongly associated with the landscape through traditions of extracting wild produce and through their indigenous religious philosophy, *Ngarrangkarni*, which invests the landscape with ancestral associations, and layers of meaning. Material testimony to this long tradition is found in hundreds of archaeological sites, including rock art sites, scattered across the park.

Purnululu is also of significance for the resilience its traditional owners have shown in the face of adverse impacts of colonisation.

Overall Purnululu is of outstanding universal value as one of the few remaining areas of the world where hunter-gathering lifestyles still persist and for its unique cultural response to the particular geophysical characteristics of the area.

Evaluation of criteria:

Purnululu is nominated under ***criteria iii, v*** and ***vi***:

Criterion iii: Purnululu clearly bears an exceptional testimony to a unique cultural tradition, if one considers the area not just as a reflection of the hunting and gathering way of life, but a particular (unique) cultural manifestation of that, related to the geography and climate of the area. In an area transitional between the arid interior of the continent and the wetter north, the cultural traditions show how people 'adapt to areas of significant environmental diversity', in this case a riverine culture with beliefs linking it 'to the time when the features of the landscape were first formed.

Criterion v: It is doubtful if the Purnululu area still exhibits a traditional human settlement or land use in its entirety, but continuance of cultural traditions, related to land-use is exhibited. In addition, the post-1920 Aboriginal experience under pastoralism is an important element of the nomination in that it demonstrates the effects of irreversible change, the responses generated, and the persistence of local traditions.

Criterion vi: Purnululu is directly and tangibly associated with the living religious traditions and beliefs of *Ngarrangkarni*, an outstanding example of indigenous Australian belief system, indissolubly at the core of the Aboriginal way of life.

4. ICOMOS RECOMMENDATIONS

Recommendation for the future

The nomination raises a number of key issues in relation to defining and sustaining cultural landscapes.

The nomination is put forward as a living cultural landscape, associated with hunting and gathering traditions and one that has an enormous time depth. It is however acknowledged that there has been a severe dislocation of the local processes – caused by the arrival of European settlers in the 1880s and the subsequent exploitation of the natural resources through cattle ranching. It moreover appears to be the case that the park is no longer lived in, with the remaining indigenous Aboriginal communities

living – apparently although this is not made clear – around the edges of the park.

Although the long negotiations over land rights at Purnululu have only recently come to a legal conclusion, it is the stated intention to integrate local people into the management of the park. How this will be achieved is still being debated but the signing of an agreement to set up a Purnululu Park Council is a significant step forward.

What is not clear however is whether the aim is to re-establish settlements in the park to allow traditional practices over a wide areas of the park to be re-established, or whether the spirit of a hunting and gathering economy is to kept going through ceremonial and social associations with the area, rather than economic ones. Either way a certain number of people will be needed in order to reach a sustainable system, which has a tangible impact on the ecology of the area. There is no discussion in the papers as to how this capacity will be evaluated or managed.

The second issue is connected with several of the key cultural qualities of the area. Many of the cultural qualities associated with Purnululu are intangible qualities. While those qualities can be understood and evaluated by outsiders (indeed that is what the nomination seeks to do), the qualities are entirely related to Aboriginal traditional knowledge, very little of which it seems has been recorded. How to sustain this knowledge and how to monitor success or otherwise with this process are not addressed in detail.

It would have been helpful to have had the need for the recording of oral history and sociological research noted. It would also seem to be the case that documenting the complex relationship between Purnululu and it indigenous inhabitants calls for innovative approaches and possibly innovative technologies. Aspirational aims connected to these issues would have helped to indicate commitment to a way forward.

Both these points will need to be addressed in the forthcoming review of the Management Plan, which overall will need to address the management of the property as a World Heritage site as well as a National Park and bring out much more strongly cultural issues. The nomination raises the interesting issue as to how to map a landscape valued largely for its intangible associations. The nomination says that the boundary (of the National Park which coincides with the nominated area) is 'difficult to define on the ground or to manage' (*Management Plan*, p. 5).

As the intangible qualities of Purnululu are closely linked to its natural qualities, it would be desirable to map associations and evaluate the most acceptable boundary in the light of the density of associations across the park. The World Heritage site may not in all instances coincide with the national park. Just over half of the length of the boundary of the nominated area does not have a Buffer Zone. In response to enquiries on this issue, Environment Australia have indicated that the EPBC Act provides protection not only within World Heritage areas but also 'outside a World Heritage property' and thus 'obviates the need to establish formal buffer zones around… each of Australia's World Heritage properties'. However it could be that part of the national park area could provide a Buffer Zone if the nominated area is seen to be smaller than the national park.

Recommendation with respect to inscription

That the nomination be ***deferred*** in order to allow the State Party to provide:

- An updated Management Plan;
- Clearer arrangements for the governance of the nominated site, particularly in relation to sustaining traditional Aboriginal communities in the Park;
- An approach to ways of sustaining intangible qualities;
- An appraisal of approaches to ethnographic, sociological and oral recording of intangible and tangible cultural traditions.

In assessing this nomination, ICOMOS has formed the view that the cultural and natural qualities of the site are so intrinsically linked as to be inseparable. It hence advises that, in order to recognise and sustain the complex interaction between the natural and cultural values of the site, consideration should be given to inscribing Purnululu only as a mixed site.

ICOMOS, March 2003

Parc national de Purnululu (Australie)

No 1094

1. IDENTIFICATION

État partie : Australie

Bien proposé : Parc national de Purnululu

Lieu : Australie-Occidentale

Date de réception : 25 janvier 2002

Catégorie de bien :

En termes de catégories de biens culturels telles qu'elles sont définies à l'article premier de la Convention du patrimoine mondial de 1972, le bien proposé pour inscription est un *site*. Aux termes de l'article 39 des *Orientations devant guider la mise en œuvre de la Convention du patrimoine mondial*, il s'agit également d'un *paysage culturel*.

[Note : Le site est proposé pour inscription en tant que bien mixte, en vertu des critères naturels et culturels. Cette évaluation ne portera que sur les valeurs culturelles, les valeurs naturelles faisant l'objet de l'évaluation de l'UICN.]

Brève description :

Le parc national de Purnululu, situé en Australie-Occidentale, est étroitement associé à ses propriétaires traditionnels, dont la présence dans la région remonte à des dizaines de milliers d'années. Les principales caractéristiques naturelles, en particulier les ruisseaux, les points d'eau et la chaîne des Bungle Bungle, sont non seulement des éléments de leur environnement et des moyens de subsistance, mais aussi des sites cruciaux de leur culture.

2. LE BIEN

Description

Le parc national de Purnululu est situé dans la région du Kimberley oriental, dans le nord de l'Australie-Occidentale, dans le bassin de drainage du golfe Joseph Bonaparte, à quelque 400 km de ce dernier.

Il tire son nom de celui du grès de la chaîne des Bungle Bungle dans la langue aborigène kija (voir ci-dessous). Le parc comprend la totalité de la chaîne des Bungle Bungle (environ 45 000 ha), dont l'altitude avoisine principalement 500-600 m. Les chaînes Durack et Osmond atteignent une altitude de 500 m et se situent plus à l'ouest ; le sud et l'est sont constitués de terrain rocheux de 200 à 500 m d'altitude.

La région proposée pour inscription est constituée de la totalité du parc national (239 723 ha). Ses frontières sud et est suivent respectivement les fleuves Panton et Ord ; sa limite ouest consiste en deux lignes droites orientées sud-nord, dessinées sans référence apparente à la topographie ; sa frontière nord suit, quant à elle, un autre cours d'eau, l'Osmond, avant de devenir une autre ligne droite, orientée cette fois ouest-est.

Cette configuration ne comprend pas la jonction des deux fleuves, située hors de la zone centrale comme des zones tampons. Les lignes droites « reflètent des caractéristiques cadastrales plutôt que physiques, elles sont donc difficiles à définir sur le terrain ou à gérer en certains endroits ». La réserve naturelle de Purnululu constitue une zone tampon, une bande de terres dessinée de façon géométrique, de 1 à 10 km environ, au nord et au nord-ouest uniquement. La proposition d'inscription ne fournit pas de zone tampon pour les autres côtés.

Le parc est situé « dans la zone de transition entre les environnements de savane et ceux arides de l'Australie tropicale ». Le climat présente les caractéristiques typiques d'un climat de mousson, avec deux saisons distinctes : des étés très chauds et humides (la saison des pluies) et des hivers chauds et secs (la saison sèche). Les précipitations annuelles moyennes avoisinent les 600 mm, et tombent principalement de décembre à mars. Du fait du ruissellement et de l'évaporation, les eaux de surface permanentes sont très faibles.

L'utilisation de la région par les Aborigènes est « essentiellement centrée sur le fleuve Ord, et les cours d'eau Red Rock et Osmond », mais l'occupation et l'usage des ressources naturelles ont débordé cette zone. « Les Aborigènes ont recherché et utilisé des plantes et des animaux spécifiques dans l'ensemble du [paysage rocheux], tandis que les éleveurs tiraient parti des prairies des plaines sableuses et de la vallée de l'Ord ».

Les habitants et visiteurs du parc ainsi que leurs modes de vie et croyances jouent un rôle crucial dans cette proposition d'inscription.

Les caractéristiques culturelles essentielles du site, tangibles et immatérielles, sont les suivantes.

- *Caractéristiques culturelles immatérielles :*

- Association avec la cosmologie aborigène ;

- Association avec l'utilisation des terres des Aborigènes ;

- Reflet des langues aborigènes ;

- Association avec le savoir aborigène ;

- *Caractéristiques culturelles tangibles :*

- Sites archéologiques ;

- Art rupestre ;

Ces caractéristiques sont examinées l'une après l'autre ci-dessous :

- *Caractéristiques culturelles immatérielles :*

- Association avec la cosmologie aborigène

Le paysage de Purnululu est étroitement mêlé aux traditions et croyances religieuses vivantes du *ngarrangkarni*, système aborigène de croyances communément appelé « Dreaming » ou « la Loi ».

Le *ngarrangkarni* est considéré comme une fusion complexe entre les ancêtres, la création, des événements du passé lointain, les lois, les cérémonies et les rituels, tous sous-tendus par l'idée que le *ngarrangkarni* a créé le paysage et que cette création se poursuit. Les propriétaires traditionnels considèrent les caractéristiques du paysage comme le reflet d'êtres et d'événements ancestraux ; les noms donnés à ces caractéristiques renforcent ce lien. Le paysage est donc un souvenir vivant de la présence et du pouvoir du *ngarrangkarni.*

Le *ngarrangkarni* a donné l'eau à la terre et façonné le pays. L'eau a été apportée au pays par le serpent arc-en-ciel, *Kaleruny*, (…) [qui] a également attribué leurs langues aux habitants. Les animaux tiennent bien sûr une place essentielle dans ce système de croyances : par exemple, les chutes d'eau et les rapides, parce qu'ils empêchaient les poissons de voyager en remontant le courant, sont considérés comme des crocodiles métamorphosés en pierre. « Les habitants expliquent les caractéristiques de la région de Purnululu par des récits plutôt que par des définitions. »

Le processus de création puis de fusion avec le paysage indique l'existence d'un lien intime entre les habitants et la terre, les deux devenant inséparables. Le paysage est ainsi un objet culturel qui fonde les caractéristiques sociales et économiques de la vie contemporaine.

Phyllis Kaberry, un anthropologue qui a travaillé sur les femmes aborigènes de la région du Kimberley oriental dans les années 1930, décrit par ses mots et ceux de ses interlocutrices la conception aborigène du *ngarrangkarni* :

« [Elle] ne voit pas son pays comme autant de strates géologiques, sable, pierres et spinifex. Les blocs rocheux et les étangs sont ngarrangkarni ; en d'autres termes, ils appartiennent au passé et aux ancêtres totémiques. Lorsque ce mot est utilisé, il implique toujours une finalité incontestable sur le sujet en question ; le ngarrangkarni approuve une pratique comme légale ; il invoque une sanction religieuse pour son exécution. »

- Association avec l'utilisation des terres des Aborigènes

Propriété traditionnelle de la terre : Les Aborigènes de la région de Purnululu et du Kimberley oriental possèdent des systèmes bien établis de propriété traditionnelle de la terre, toujours en pratique en dépit des perturbations importantes causées par le peuplement européen. Ces systèmes sont similaires à ceux qu'on retrouve ailleurs dans les sociétés aborigènes.

La propriété traditionnelle de la terre est bien davantage qu'une simple question de géographie. Les sociétés du Kimberley oriental peuvent être qualifiées de « religieuses », comme d'autres sociétés aborigènes, puisque la terre et tous les aspects de la société sont conçus en termes spirituels et religieux plutôt que matériels.

En soi, la propriété traditionnelle de la terre n'est pas le seul facteur important en matière de droits du sol. La manière dont les personnes prennent soin de la terre joue également un rôle majeur, notamment la connaissance des systèmes de rituels et croyances appropriés, le suivi continu des cycles de rituels, la connaissance des grands sites et des ensembles de sites, la possession d'objets sacrés et un intérêt général continu pour la région.

Relier des caractéristiques naturelles à une identité personnelle – le –narraku : Tous les différents attributs naturels associés aux cours d'eau – étangs rocheux, rochers et arbres – possèdent un nom et sont étroitement liés aux activités économiques et sociales.

Ils sont également liés à une identité personnelle. Le nom d'une caractéristique d'un paysage peut ainsi être attribué à une personne ; le terme *narraku* fait référence à la relation ainsi créée entre le paysage et la personne.

Migrations saisonnières : Les migrations saisonnières étaient complexes ; elles étaient liées à l'utilisation légale du feu pour maintenir la diversité écologique et au désir d'optimiser la variété du régime alimentaire, en récoltant les considérables ressources écologiques, végétales et animales, au meilleur moment de l'année.

Avant d'entrer en contact avec les Européens, les habitants de la région de Purnululu, comme les autres peuples aborigènes d'Australie, avaient élaboré des stratégies de gestion de l'environnement de manière à en faire un système stable et durable. Ils reconnaissaient les interconnexions entre les espèces dans les chaînes alimentaires, comprenaient les effets des saisons sur les ressources et intervenaient dans les relations écologiques par l'utilisation du feu, la cueillette et la chasse sélectives, les tabous alimentaires et les rituels religieux. Les femmes pratiquaient une récolte sélective des ressources, conscientes de leur autogénération et de la nécessité de ne pas les surutiliser. Certaines ressources n'étaient pas récoltées, de manière à rester disponibles pour la prochaine récolte.

Chasse et cueillette : Purnululu reflète une tradition persistante de chasse et de cueillette, liée au climat « transitionnel » de la région. Les traditions sont donc différentes de celles des autres régions d'Australie, comme le parc de Kakadu, au climat de mousson, et le parc national d'Uluru-Kata Tjuta, dans les régions désertiques.

La chasse et la cueillette à Purnululu étaient et demeurent caractérisées par une grande diversité écologique. À la saison des pluies, outre le gibier et le poisson, les baies, les fruits, le miel sauvage (« sac de sucre »), les grenouilles et les larves de fourmis blanches abondent. En hiver, les femmes récoltent des racines et graines de lys, des ignames, des tubercules, des fruits à coque, des graines d'herbes, des fruits du pandanus et du baobab et, plus tard, en septembre, elles ramassent des larves accrochées dans les eucalyptus et déterrent des racines de lys dans la boue des lits de rivières asséchés ou *billabongs*. Les hommes chassent et pêchent tout au long de l'année le poisson, le

gibier, les reptiles, les échidnés et les oiseaux, même si ceux-ci varient en qualité selon les saisons.

Réseaux d'échanges : Le troc tenait une place importante dans l'économie aborigène, et était associé à des lieux spécifiques du paysage. Un vaste réseau d'échanges baptisé *winan* s'étendait sur 600 km d'est en ouest du Kimberley, entretenant des liens avec le système du désert de l'Ouest. Les outils, les armes, les matières premières et les aliments figuraient au nombre des articles échangés. Les lieux de rassemblement tels que Ngirriyiny, sur l'Ord, attiraient apparemment de nombreux participants et fonctionnaient en réalité comme des marchés.

- Reflet des langues aborigènes

Quatre langues étaient parlées dans la région : le kija et le miriwoong dans les zones ouest et nord du parc, le malngin et le jaru dans les zones sud et est. Ces deux dernières appartiennent à la famille linguistique du pama-nyungan, parlée dans l'ensemble des régions désertiques, notamment par les Anangu d'Uluru-Kata Tjuta. Les deux autres langues font partie de la famille linguistique du jarrakan.

La distribution de ces deux familles linguistiques distinctes reflète la transition entre les environnements de désert aride et de savane de mousson, ainsi que des différences sociales, culturelles et religieuses majeures entre les deux groupes.

- *Caractéristiques culturelles tangibles :*

- Sites archéologiques

Les propriétaires traditionnels du centre de la vallée de l'Ord affirment que leurs liens avec le pays remontent à l'époque de la formation du paysage. Les résultats des recherches archéologiques confirment la thèse d'une occupation longue et continue de cette région du nord de l'Australie, datant de dizaines de milliers d'années.

Au lac Argyle, à moins de 100 km en aval du parc national de Purnululu, les datations au carbone 14 démontrent une occupation de la vallée de l'Ord remontant au minimum à 20 000 ans. On peut également conclure à une occupation saisonnière d'abris sous-roche d'après les fragments de coquilles d'œufs d'oie (*Anseranas semipalmata*) découverts dans des dépôts à Miriwun. L'*Anseranas semipalmata* s'accouple et pond pendant la saison des pluies, ce qui suggère que les hautes terres étaient peut-être occupées à la saison des pluies et les zones fluviales à la saison sèche.

- Art rupestre

L'art rupestre à Purnululu n'a pas encore bénéficié d'une attention équivalente à celle accordée aux autres sites de ce type en Australie. Une étude de trois mois en 1988 répertoriait plus de 200 sites. Les peintures représentent toute une gamme d'animaux, notamment des crocodiles, des tortues, des poissons, des kangourous et des émeus. Le site comporte également des silhouettes d'humains et de serpents, des mains peintes au pochoir, essentiellement à l'ocre rouge, ainsi que des représentations de boomerangs et de lances.

Les peintures sont « généralement des cartes de leur propre pays, ou de celui auquel ils sont liés, ce qui les autorise à le peindre. Elles peuvent également illustrer une histoire (…) ». L'art rupestre a pu s'accumuler pendant de longues années, mais aucun programme systématique de datation scientifique n'a encore été mis en œuvre. On sait que certaines images n'ont été peintes qu'il y a quelques dizaines d'années.

Les « artistes de Turkey Creek », dont l'art tirait sa source du mécontentement et de la frustration engendrés par l'interdiction faite aux Aborigènes de visiter leur propre pays, ont montré dans les années 1970 la nature vivante de cette tradition artistique en exprimant les relations entre les personnes et le paysage. Les exemples d'art local exposés dans les galeries de toute l'Australie et présents dans les collections privées du monde entier suggèrent que d'autres y trouvent un sens considérable : « il est désormais reconnu que l'expression artistique [de Purnululu] des liens entre la terre, les mythes et l'histoire apporte une contribution unique au développement des mouvements artistiques internationaux [et tente] d'exprimer au mieux la relation entre l'humanité et la terre (…) ».

Histoire

L'activité humaine dans la région existe depuis quelque 40 000 ans. Les datations au carbone 14 indiquent que la première occupation de la vallée de l'Ord, en aval du parc, remonte à quelques 20 000 ans. La grande richesse de vestiges archéologiques, qui restent en partie à découvrir, suggère que la région a été longuement habitée.

Les premières reconnaissances dans la zone eurent lieu en juillet 1879. Les premiers colons arrivèrent dans la région du Middle Ord au milieu des années 1880. En dépit de la découverte de gisements d'or en 1885, l'élevage devint l'activité principale. « Dès juin 1884, le premier troupeau de 4 000 bêtes fut convoyé vers les prairies de l'Ord (…) » ; 6 000 têtes de bétail s'y ajoutèrent l'année suivante. En 1902, la région comptait quelque 47 000 bêtes.

Le bétail en surnombre entraîna une surexploitation des pâturages et « initia un processus destructeur d'érosion intense du paysage », au cours duquel la population aborigène effectua un travail saisonnier non rémunéré dans les fermes, alors même que ses ressources alimentaires naturelles disparaissaient. On estime que la population autochtone a pu se réduire alors de 50 %.

À partir de 1967, des procédures furent lancées pour inverser ce processus. Des programmes de contrôle des troupeaux et de restauration de la végétation furent mis en place et le *Pastoral Award* de 1968 mis fin aux abus en matière de travail des Aborigènes. Toutefois, en déplaçant les personnes hors des fermes, ces mesures contribuèrent à créer de nouveaux lieux de vie, les *humpies* [sortes de huttes], bientôt devenus synonymes de dépossession sociale.

À partir de 1985 environ, un grand nombre de bovins et d'ânes (respectivement 25 000 et 4 000) furent retirés pour réduire encore la surexploitation des pâturages. Le parc national fut créé en 1987, lorsque la région devint

inhabitée. Cette même année, un programme de feux de protection visant à réduire les incendies de forêt accidentels et à créer des mosaïques de végétation fut lancé. Au milieu des années quatre-vingt dix, le tourisme était devenu une activité locale en dépit des difficultés d'accès ; le nombre de visiteurs par voie terrestre avoisinait les 20 000 par an, avec peut-être le même nombre de visiteurs survolant le parc chaque année.

En dépit de plus d'un siècle d'intervention extérieure et des fortes modifications du paysage et des structures sociales qui en ont résulté, la proposition d'inscription soutient que les Aborigènes qui vivent près de Purnululu conservent des souvenirs communautaires des pratiques traditionnelles de gestion des terres et des associations *ngarrangkarni,* et continuent à utiliser les terres pour récolter des aliments naturels et effectuer des rassemblements.

Politique de gestion

Dispositions légales :

Le parc et la réserve sont la propriété du gouvernement d'Australie-Occidentale.

Des amendements au *Conservation and Land Management Act 1984* sont actuellement en négociation, pour permettre au parc et à la réserve de se doter d'un *Prescribed Body Corporate* [entité en charge de la gestion du titre de propriété] détenant le titre natif au nom des propriétaires traditionnels. Ceux-ci sont les « demandeurs natifs enregistrés en vertu du *Commonwealth Native Title Act 1993* du titre natif d'une zone qui comprend la région proposée pour inscription ». Deux groupes distincts de propriétaires traditionnels ont réclamé ces terres.

Techniquement, tous les propriétaires traditionnels ont récemment perdu le procès dans lequel ils réclamaient ces terres. Ils aspirent néanmoins à participer à la gestion du parc et au transfert de sa propriété à leur bénéfice.

Depuis la soumission de la proposition d'inscription, et dans l'attente de la finalisation des amendements législatifs, un accord entre le ministère de l'Environnement et du Patrimoine et *Purnululu Corporation* a été signé. Ce document prévoit la création d'un Conseil du parc de Purnululu qui apportera « une contribution significative des gardiens traditionnels aborigènes concernant le parc ».

Il est envisagé dans la proposition d'inscription qu'à l'avenir, le ministère de la Conservation et de la Gestion des terres gère le bien au nom du Conseil du parc de Purnululu, constitué de propriétaires traditionnels et de membres du ministère. Jusqu'à la création de ce Conseil, le nombre d'Aborigènes sur les huit membres qu'il comptera ainsi que leur implication active dans la gestion du parc et l'installation éventuelle de nouveaux peuplements dans le parc ne sont pas déterminés, même si ce dernier point est envisagé dans la proposition d'inscription.

La région de Middle Ord est inscrite au registre des sites nationaux de la Commission du patrimoine australien. Le parc national fut créé en 1987 et passa en catégorie A en 1988. S'il est inscrit, le parc sera également protégé en vertu du *Environment Protection and Biodiversity Conservation Act (EPBC Act) 1999*, qui couvre les biens du Patrimoine mondial en Australie. Cette loi exige la préparation et la mise en œuvre d'un plan de gestion conforme à la Convention du patrimoine mondial et aux principes de gestion du patrimoine mondial australien.

Structure de la gestion :

Le parc et la réserve sont gérés par le département de la Conservation et de la Gestion des Terres d'Australie-Occidentale.

Le plan de gestion du parc national 1995-2005, en cours de révision, définit des objectifs spécifiques. Trois d'entre eux concernent des considérations culturelles.

Globalement, le plan était clairement adapté au parc national au moment de son élaboration. On pourrait aujourd'hui affirmer qu'il manque de profondeur dans son traitement de la gestion des valeurs culturelles, et en particulier de l'intégration des propriétaires traditionnels et de leurs pratiques au premier plan de la gestion du parc.

Il apparaît que le Plan est actuellement révisé et, qu'il portera, une fois finalisé, sur les ressources culturelles du passé et les changements culturels actuels ainsi que leurs implications. Le dossier de proposition d'inscription stipule que « En cas de problème concernant les domaines culturellement sensibles, ces questions seront traitées en priorité par (…) la gestion ».

- Études :

La proposition d'inscription indique que des études ont été menées, mais laisse entendre que le suivi reste à mettre en place. Des informations complémentaires fournies par l'État partie en septembre 2002 abordent beaucoup plus en détail l'état des études et des connaissances sur la région proposée pour inscription en termes de processus culturels. Le dossier comporte une liste des sites archéologiques, des découvertes des sites en surface et des abris sous-roche. Même si quelques sites *ngarrangkarni* sont répertoriés, aucune méthodologie n'est suggérée pour l'inventaire des liens immatériels entre les personnes et le paysage. Aucune mention n'est faite non plus de la participation de spécialistes de l'histoire orale ou d'ethnographes pour commencer à rassembler des données sur la relation cruciale entre les propriétaires traditionnels aborigènes et le paysage, afin de parvenir à un accord sur le mode de suivi de ce patrimoine immatériel fragile.

- Propriétaires traditionnels :

Le rôle des propriétaires traditionnels constitue une facette essentielle de la gestion de la région. De nombreux aspects de leur culture, de leur histoire et de leurs aspirations sont en débat, mais deux sujets fondamentaux semblent traités de manière assez ambiguë.

Ni la proposition d'inscription ni les documents qui l'étayent n'indiquent le nombre de personnes regroupées sous le nom de « propriétaires traditionnels ». L'impression donnée est qu'ils ne sont pas plus de quelques douzaines. Or, la taille de la population est cruciale pour la viabilité et la durabilité du paysage en tant

que paysage culturel. Ce point nécessite donc des éclaircissements.

La proposition d'inscription n'indique pas non plus le lieu de vie actuel de ces propriétaires traditionnels. Elle laisse entendre que le parc est inhabité et que les autochtones ont été déplacés lors de la création du parc en 1987. Elle affirme que les propriétaires traditionnels espèrent établir de nouveaux peuplements dans le parc, mais aucun détail n'est donné sur le mode de gestion de ce processus, même si celui-ci semble couvert par les recommandations du Conseil du parc de Purnululu lorsqu'il sera créé.

Un traitement plus clair de ce sujet essentiel, au moins en termes d'aspirations, aurait été utile. Si Purnululu doit demeurer un paysage vivant, la relation entre ses propriétaires traditionnels et ce paysage est fondamentale, et devrait idéalement se fonder sur une interdépendance physique étroite.

Ressources :

Le parc est financé, selon un rapport 5/9, par des fonds publics et des fonds qu'il lève lui-même, à hauteur de 324 620 $ par an. Une grande part des revenus actuels provient des taxes d'aéroport.
Un accroissement considérable de ce budget afin de mettre à jour la gestion est envisagé en cas d'inscription. Le personnel du parc est composé de deux gardes forestiers permanents et d'un responsable saisonnier du centre d'accueil.

Justification émanant de l'État partie (résumé)

Les Aborigènes vivent dans la région du Kimberley oriental depuis au moins 20 000 ans. Le parc apporte un témoignage exceptionnel de cette tradition culturelle de chasseurs-cueilleurs, en particulier dans ses rapports à l'eau (…) Le feu a été et demeure un outil important dans la gestion aborigène de cet environnement.

Le *ngarrangkarni* (communément »Dreaming » ou « la Loi »), transmis par d'innombrables générations successives, demeure le principe directeur des traditions et des croyances vivantes des propriétaires traditionnels de Purnululu.

Le paysage culturel est significatif car ses peuples et ses traditions ont survécu en dépit des effets de la colonisation, faisant preuve de capacités de résistance à une époque où ce type de culture traditionnelle est devenu vulnérable.

L'inscription de Purnululu sur la Liste du patrimoine mondial, améliorerait sa portée globale et complèterait les autres biens australiens du patrimoine mondial, en particulier les parcs nationaux d'Uluru-Kata Tjuta et de Kakadu.

3. ÉVALUATION DE L'ICOMOS

Actions de l'ICOMOS

Une mission conjointe ICOMOS-UICN a visité le bien en août 2002.

Conservation

Historique de la conservation :

Géré de manière durable par les propriétaires traditionnels pendant des milliers d'années, la région proposée pour inscription a été exposée à des dégradations modérées à sévères, notamment par l'érosion des années 1880 à nos jours, du fait de l'exploitation minérale et agricole, en particulier de l'action du bétail sur les pâturages. Les effets de cette phase sont encore présents, dans le paysage comme parmi les propriétaires traditionnels.

Le parc national a été créé en 1987. En 1995, le *plan de gestion 1995-2005* a été spécialement élaboré, se différenciant en cela des autres parcs nationaux, « pour assurer la participation des dépositaires traditionnels aborigènes à la gestion continue du parc' » (préface, p. i).

État de conservation :

La proposition d'inscription indique que « l'état actuel (…) résulte des pressions historiques de l'élevage et de la surexploitation des pâturages, ainsi que des pressions actuelles du tourisme ». Cependant, elle laisse supposer par ailleurs que le paysage culturel entretenu par les Aborigènes est toujours visible. Il serait peut-être plus exact d'affirmer que le paysage culturel existe toujours sous forme de lien perçu entre les habitants et le paysage, même si peu de personnes vivent dans la région et si d'importants changements lui ont été infligés tout au long de ce dernier siècle.

« Les pressions actuelles du tourisme qui affectent la conservation actuelle du bien sont centrées sur les gorges de grés friables et non sur les plaines de terre noire, les plaines sableuses et les prairies, plus résistantes, que le bétail a utilisées par le passé ». Des mesures élémentaires telles que le durcissement des chemins et la distribution des terrains de camping atténuent l'impact du tourisme et ont probablement stabilisé la situation.

Analyse des risques :

Les risques suivants ont été identifiés :

- Catastrophes naturelles
- Pression des visiteurs
- Absence d'habitants*
- Perte du savoir traditionnel*
- Exploitation minière*

Ces points ne sont pas détaillés dans la proposition d'inscription.
Chacune de ces questions est abordée ci-dessous :

- Catastrophes naturelles

Les plans d'action d'urgence élaborés traitent des incendies, inondations et autres catastrophes.

- Pression des visiteurs

Les terrains de camping actuels sont proches de leurs pleines capacités à certaines périodes : « (…) le tourisme peut potentiellement affecter les valeurs ». Même si le nombre de visiteurs est faible comparé à de nombreux autres sites du Patrimoine mondial, la fragilité de la région le rend extrêmement sensible à ceux-ci. Une politique consiste à promouvoir l'accès aérien pour des visites sur un jour, afin de limiter la demande de séjours nocturnes et les développements d'infrastructures nécessaires ; mais l'accroissement du trafic aérien risque de porter préjudice « à l'impression de nature sauvage qu'éprouvent de nombreux visiteurs » et de créer des nuisances sonores.

Il pourrait être nécessaire de limiter le nombre de visiteurs aux périodes d'affluence. Parallèlement, pour restreindre leur nombre et conserver la nature sauvage du parc, la politique consiste à maintenir un accès terrestre par des routes non goudronnées utilisables par des véhicules 4 x 4. Les pressions en faveur d'une amélioration de la route pour les véhicules ordinaires sont cependant constantes. Les routes internes et certaines pistes pourraient également nécessiter une amélioration. Cette question sera traitée dans la révision du Plan du parc actuel pour 2005.

L'affluence des visiteurs sur les sentiers pédestres entraîne une dégradation de ceux-ci. Une amélioration de ces sentiers sera probablement entreprise. Les installations destinées aux visiteurs devraient également être améliorées afin de répondre aux attentes croissantes de ces derniers.

- Absence d'habitants

Même si elle n'est pas spécifiquement répertoriée dans la proposition d'inscription comme une menace, il est évident que la diminution du nombre de personnes qui se considèrent comme propriétaires traditionnels de la région à un degré tel que la gestion traditionnelle du parc deviendrait impossible constituerait une menace grave. On ne sait pas précisément comment le nombre de personnes associées au parc sera maintenu, mais il est clair que cette question fait partie des négociations en cours avec les propriétaires traditionnels ; la forme finale de l'accord reste encore à déterminer.

- Perte du savoir traditionnel

Ce sujet n'a pas non plus été mis en avant comme une menace. Néanmoins, l'intégrité du paysage culturel en tant que paysage vivant serait gravement compromise si les propriétaires locaux n'étaient plus les dépositaires oraux du savoir traditionnel.

- Exploitation minière

La proposition d'inscription n'évoque pas clairement cette menace. Interrogé sur le caractère suffisant ou non des contrôles existants de l'exploitation minière afin de protéger les propriétés culturelles et naturelles, *Environment Australia* a déclaré que la loi EPBC protégeait les « valeurs du Patrimoine mondial » du bien, et, en conjonction avec le *Mining Act 1978*, fournirait une protection suffisante.

Authenticité et intégrité

L'état actuel du paysage de Purnululu soulève des questions relatives à l'authenticité et à l'intégrité. La proposition d'inscription reconnaît que le paysage a souffert de l'exploitation minière et de la surexploitation agricole des colons. Le paysage physique global dans son état actuel ne peut donc pas être considéré comme entièrement authentique, en matière de caractéristiques culturelles soulignées comme contribuant à son importance générale. La proposition d'inscription suggère plutôt que les propriétés inhérentes au paysage sont discernables et peuvent être restaurées pour atteindre un état proche de celui antérieur à l'arrivée des colons, par la réintroduction de pratiques traditionnelles d'utilisation des terres. Citons par exemple, la mise en œuvre d'un système d'incendies approprié fondé sur la gestion traditionnelle du feu par les Aborigènes, combinée à l'utilisation des connaissances et compétences traditionnelles, pour restaurer l'écosystème des plaines sableuses et de terre noire.

En revanche, de nombreuses caractéristiques immatérielles associées au paysage, par exemple la pratique du *ngarrankarni* et la connaissance de l'ethnobotanique, demeurent relativement intactes, même si le déplacement des propriétaires traditionnels hors du parc leur a porté atteinte.

La pratique de la chasse et de la cueillette a également diminué du fait de l'accroissement des distances entre le lieu d'habitation des Aborigènes et le parc. Il semble toutefois qu'un accord devrait être négocié sur les niveaux acceptables d'exploitation des ressources naturelles à l'avenir.

De la même manière, le fait que le parc ne soit plus habité réduit ses qualités culturelles. Cependant, l'intention déclarée semble être d'encourager un nouveau peuplement dans le parc, lorsqu'un régime satisfaisant de gestion en partenariat aura été instauré.

Globalement, la relation dynamique entre les propriétaires aborigènes et le parc demeure, mais à un niveau beaucoup plus faible qu'auparavant. Si cette relation devait être à l'avenir renforcée pour accroître l'authenticité de la région, une gestion culturelle dynamique serait nécessaire afin d'assurer que les propriétaires ne deviennent pas les gardiens du parc ou que la savoir traditionnel ne s'atrophie pas.

Évaluation comparative

Sur les 730 sites du Patrimoine mondial, seuls 3 représentent des sociétés de chasseurs-cueilleurs, ceux de Kakadu, Uluru (tous deux en Australie) et Tongariro (Nouvelle-Zélande). Compte tenu des centaines de milliers d'années durant lesquelles la chasse et la cueillette étaient le seul mode de vie de l'humanité, leur faible représentation dans la Liste du patrimoine mondial ne plaide guère en faveur de sa crédibilité. Pour l'évaluation des sites subsistants, il est clair que la rareté est un facteur à prendre en compte. Toutefois, on ne peut soutenir que tous les sites de chasseurs-cueilleurs qui subsistent présentent une valeur universelle du seul fait de leur rareté.

La plupart des sociétés de chasseurs-cueilleurs qui perdurent se trouvent en Australie, « le dernier continent peuplé par des chasseurs-cueilleurs qui ait connu la colonisation et survécu à celle-ci ». L'évaluation de ces sites est donc essentiellement centrée sur un seul pays.
Deux sites australiens sont déjà inscrits. Comment Purnululu se différencie-t-il culturellement des sites du Patrimoine mondial existants ?

L'évaluation d'Uluru par l'ICOMOS en 1994 « a noté des différences majeures entre les régions [d'Uluru et de Kakadu] (…) elles donnent un exemple d'adaptations culturelles à des pôles opposés d'une continuité écologique. [Purnululu] tire sont origine d'une tradition culturelle liée mais représente une adaptation à un point intermédiaire de cette continuité écologique. Différent des cultures des tropiques et du désert, Purnululu représente de manière unique des milliers d'années d'adaptation des chasseurs-cueilleurs à un écosystème fluvial et de terres élevées ».

La différence géographique est également manifeste dans les expressions culturelles. Le *ngarrangkarni* de Purnululu est similaire en termes de philosophie et de concept au *tjukurpa* d'Uluru, mais il est « différent dans sa forme et ses visions, avec une forme distincte de source écologique et culturelle. Les dissemblances sont manifestes dans les représentations artistiques bien distinctes (…) ».

Purnululu peut donc être considéré comme un exemple de premier plan des sociétés de chasseurs-cueilleurs dont les caractéristiques culturelles reflètent des traits géographiques intermédiaires entre les tropiques et le désert en Australie.

Dans d'autres régions plus éloignées, par exemple en Amérique du Nord, au centre de Bornéo ou aux Philippines, des peuples de chasseurs-cueilleurs vivent dans des régions humides. Si des parallélismes non observés peuvent exister, aucune société directement analogue à celle des chasseurs-cueilleurs de la région de Purnululu ne semble exister hors d'Australie.

Pour des raisons de rareté, ce bien semblerait constituer *a priori* un cas prioritaire d'inscription, en lui-même et pour des motifs comparatifs en général. Pour des raisons d'importance générale, en comparaison avec d'autres sites de chasseurs-cueilleurs, Purnululu est considéré comme une réponse culturelle unique à un environnement local.

Valeur universelle exceptionnelle

Déclaration générale :

Le parc national de Purnululu est significatif pour son témoignage sur les traditions d'une société de chasseurs-cueilleurs qui perdure et dont le mode de vie remonte à des temps très anciens.
Il existe des preuves de la présence des Aborigènes dans la région du Kimberley oriental de Purnululu depuis au moins 20 000 ans. Leurs descendants, qui vivent toujours à proximité du parc, sont fortement associés au paysage par leur traditions de récolte de produits naturels et leur philosophie religieuse autochtone, le *ngarrangkarni*, qui investit le paysage d'association ancestrales et de strates de sens. Des témoignages importants de cette longue tradition se retrouvent dans des centaines de sites archéologiques, notamment d'art rupestre, disséminés dans le parc.

Purnululu est également significatif pour la résistance dont ont fait preuve ses propriétaires traditionnels face aux effets néfastes de la colonisation.

Globalement, Purnululu présente une valeur universelle exceptionnelle en tant que l'une des quelques régions qui subsistent dans le monde où les modes de vie des chasseurs-cueilleurs perdurent, et pour sa réponse culturelle unique aux caractéristiques géophysiques spécifiques de la région.

Évaluation des critères :

Purnululu est proposé pour inscription sur la base des critères iii, v et vi :

Critère iii : Purnululu apporte clairement un témoignage exceptionnel sur une tradition culturelle unique, si l'on considère la région non pas seulement comme le reflet du mode de vie des chasseurs-cueilleurs, mais aussi comme une expression particulière (unique) de celui-ci, lié à la géographie et au climat. Dans une région de transition entre l'intérieur du continent aride et le nord plus humide, les traditions culturelles montrent comment les habitants « s'adaptent à des régions aux environnements fortement diversifiés », dans ce cas une culture fluviale, avec des croyances qui l'associent « à l'époque où les caractéristiques du paysage ont été créées ».

Critère v : On doute du fait que la région de Purnululu offre encore un établissement humain ou une occupation du territoire traditionnels dans sa globalité, mais elle présente une continuité des traditions culturelles liées à l'occupation du territoire. En outre, l'expérience des Aborigènes dans l'élevage après les années 1920 est un élément important de la proposition d'inscription car elle démontre les effets d'un changement irréversible, les réponses générées et la persistance des traditions locales.

Critère vi : Purnululu est directement et matériellement associé aux traditions et croyances religieuses vivantes du *ngarrangkarni*, un exemple exceptionnel du système de croyances indigène australien, indissolublement au centre du mode de vie aborigène.

4. RECOMMANDATIONS DE L'ICOMOS :

Recommandations pour le futur

La proposition d'inscription soulève quelques questions essentielles relatives à la définition et au maintien des paysages culturels.

La proposition d'inscription est présentée en tant que paysage culturel, associée à des traditions de chasse et de cueillette et remontant à des temps extrêmement anciens. Il est cependant reconnu que les processus locaux ont été gravement bouleversés par l'arrivée des colons européens dans les années 1880 et par l'exploitation consécutive des ressources naturelles par l'élevage de bovins en liberté. Il apparaît en outre que le parc n'est plus habité, et que les

communautés aborigènes qui subsistent - apparemment, bien que ce point ne soit pas clair - vivent dans la périphérie du parc.

Bien que les longues négociations sur les droits de propriété des terres de Purnululu n'aient abouti que récemment en justice, l'intention déclarée est d'intégrer les autochtones à la gestion du parc. Les modalités en sont encore débattues, mais la signature d'un accord créant un Conseil du parc de Purnululu constitue une avancée importante.

L'objectif n'est toutefois pas clair : s'agit-il de réinstaller les peuplements dans le parc pour permettre un rétablissement des pratiques traditionnelles dans une vaste zone du parc, ou de maintenir l'esprit d'une économie fondée sur la chasse et la cueillette par le biais de liens culturels et cérémoniels avec la région, plutôt que par des voies économiques ? Quelle que soit l'option choisie, un certain nombre de personnes seront nécessaires à l'instauration d'un système durable qui ait un impact tangible sur l'écologie de la région. Le dossier n'indique pas comment ce nombre sera évalué ou géré.

La deuxième question concerne plusieurs caractéristiques culturelles essentielles de la région. Nombre des traits culturels associés à Purnululu sont immatériels. Si elles peuvent être comprises et évaluées par des intervenants extérieurs (et c'est là l'objectif de la proposition d'inscription), ces caractéristiques sont entièrement liées aux connaissances traditionnelles des Aborigènes, dont un très faible nombre semble avoir été consigné. Comment maintenir ces connaissances et assurer le suivi avec succès si ce processus n'est pas traité en détail ?

Il aurait été utile de noter la nécessité d'enregistrer l'histoire orale et d'effectuer des recherches sociologiques. Il semble également que la documentation sur les relations complexes entre Purnululu et ses habitants autochtones nécessite des approches et peut-être des technologies novatrices. La formulation des objectifs souhaités en la matière aurait contribué à indiquer une volonté de progresser.

Ces deux points devront être traités dans le prochain examen du plan de gestion, qui devra de manière générale aborder la gestion du bien en tant que site du Patrimoine mondial et parc national, et mettre bien plus en avant les questions culturelles. La proposition d'inscription soulève la question intéressante de l'établissement d'une carte d'un paysage dont la valeur réside largement dans des associations immatérielles. La proposition d'inscription indique que les délimitations (du parc national, qui coïncident avec la région proposée pour inscription) sont « difficiles à définir sur le terrain ou à gérer » (*Plan de gestion*, p. 5).

Les caractéristiques immatérielles de Purnululu étant étroitement liées à ses traits naturels, il serait souhaitable de dresser une carte des associations et d'évaluer les limites les plus acceptables au vu de la densité de celles-ci dans le parc. Le site du Patrimoine mondial ne coïnciderait pas nécessairement avec le parc national. Un peu plus de la moitié de la longueur des limites de la région proposée pour inscription ne dispose pas de zone tampon. Interrogé à ce sujet, *Environment Australia* a indiqué que la loi EPBC protégeait non seulement les zones du Patrimoine mondial, mais aussi « l'extérieur d'un bien du Patrimoine mondial », de sorte qu'il « n'est pas nécessaire d'établir des zones tampons formelles autour (…) de chacun des biens du Patrimoine mondial d'Australie (…) ». Toutefois, une partie du parc national pourrait fournir une zone tampon si la région proposée pour inscription s'avérait plus petite que le parc national.

Recommandation concernant l'inscription

Que l'examen de la proposition d'inscription soit ***différé*** afin de permettre à l'État partie de fournir :

- Un plan de gestion mis à jour ;

- Des arrangements plus clairs concernant l'administration du site proposé pour inscription, en particulier concernant le maintien de communautés aborigènes dans le parc ;

- Une approche sur les façons de conserver les caractéristiques immatérielles ;

- Une évaluation des approches en matière d'inventaires ethnographique, sociologique et oral des traditions culturelles tangibles et immatérielles.

En examinant cette proposition d'inscription, l'ICOMOS en est venu à la conclusion que les caractéristiques culturelles et naturelles du site étaient étroitement liées au point d'être inséparables. Il conseille donc que, afin de reconnaître et de soutenir l'interaction complexe qui existe entre les valeurs naturelle et culturelle du site, il serait nécessaire de considérer l'inscription de Purnululu uniquement en tant que bien mixte.

ICOMOS, mars 2003

PURNULULU NATIONAL PARK

AUSTRALIA

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

PURNULULU NATIONAL PARK (AUSTRALIA) - ID N° 1094

1. DOCUMENTATION

i) **IUCN/WCMC Data Sheet:** 5 references

ii) **Additional Literature Consulted:** State Party nomination document **Nomination of Purnululu National Park,** Environment Australia 2002, plus a September 2002 supplementary information document and attachments; **Bungle Bungle Range, Purnululu National Park, East Kimberley, Western Australia: a guide to rocks, landforms, plants, animals and human impacts,** D. Hoatson et. al Commonwealth of Australia 1997; **Watching the grass grow (vegetation regeneration Purnululu NP) CALM Landscape 13** (2): 23-27, Behn, G. et. al., 1997; **Assessment of the vertebrate fauna of the Bradshaw (Juliki) Field Training Area, Northern Territory,** Fisher, A. & Woinarski, J., 2002, Northern Territory Parks and Wildlife Commission; **Karst Geomorphology and Hydrology**, Ford, D. and Williams, P. 1989; **Purnululu National Park World Heritage Cultural Values,** Kirkby, I & Williams N. 2001, Unpublished report to Environment Australia; **Dictionary of Karst and Caves**, Lowe, D. and Waltham, T. 2002, British Cave Research Association; **Geology and landforms of the Kimberley,** Tyler, Ian 2000, CALM 2000; **Quartzite Karst in southeastern Venezuela, International Journal of Speleology, 2: 309-314,** White, W.B., Jefferson, G.L. and Haman, J.F. 1966; **A survey of the wildlife and vegetation of Purnululu (Bungle Bungle) National Park and adjacent area,** Woinarski, J.C.Z. 1992, CALM, Research Bulletin 6; **Proceedings of the Asia-Pacific Forum on Karst Ecosystems and World Heritage,** Wong, T. et al. 2001, UNESCO/IUCN Miscell. Pub; **A global review of solutional weathering forms on quartz sandstones,** Earth-Science Reviews 42:137-160.Wray, R.A.L. 1997; **Tower karst in sandstone: Bungle Bungle massif, Northwestern Australia,** Young, R.W. 1986. *Z. Geomorph. N.F. 30(2):189-202*; **Sandstone landforms of the tropical East Kimberley region. Northwestern Australia**, *J. Geology 95: 205-18.* 1987; **Quartz etching and sandstone karst: examples from the east Kimberleys, Northwestern Australia.** Z. Geomorph. N.F. 32(4): 409-23, 1988.

iii) **Consultations:** 5 external reviewers. On site consultations with Environment Australia; CALM; CSIRO; Traditional Aboriginal Owners, Purnululu Aboriginal Corporation (PAC) and the Council's anthropologist. Pre- and post-visit consultations with IUCN/WCPA experts; Melbourne University; CALM; Kimberley Land Council, Broome; CALM anthropologist; Shire of Hall's Creek; Ord-Bonapart Program, Kununurra; and Aboriginal & Torres Strait Islanders Council.

iv) **Field Visit:** Paul Dingwall (IUCN), Kevin Jones (ICOMOS), August 2002.

2. SUMMARY OF NATURAL VALUES

The nominated property is the 239,723 ha Purnululu National Park (PNP) (IUCN Category II), located some 300 km south of Kununurra in the East Kimberley region of the State of Western Australia. Together with the adjacent 79,602 ha Purnululu Conservation Reserve (PCR), the park was created in 1987 out of the Ord River Regeneration Reserve, established in 1967 to overcome the effects of land degradation following more than 50 years of pastoral farming. The park comprises four ecosystems:

- The deeply dissected Bungle Bungle Range composed of Devonian-age quartz sandstone eroded over a period of 20 million years into a series of beehive-shaped towers or cones, whose steeply sloping surfaces are distinctly marked by regular horizontal bands of dark-grey cyanobacterial crust (single-celled photosynthetic organisms). The towers, many of which are remarkably symmetrical, are most numerous and impressive on the eastern and southern flanks of the massif. They also occur as small isolated clusters arising from the surrounding plain and studding the eastern summit of the massif, the latter possibly relict from an earlier tower-forming period. On the southern flanks, the towers are cut by a labyrinthine system of very narrow gullies separated by flat-floored, mainly streamless, depressions opening out on to the plain.

- The grassy Ord River valley system on the eastern and southern border regions of the park, draining two tributaries from the south and three from the north of the uplands.

- The broad sand plains extending between the uplands and the river, composed of infertile black soils with open woodland and grasses.

- The more extensively wooded limestone ridges to the west, and neighbouring Osmond Range to the north.

The region experiences a dry monsoonal climate characterised by two contrasting seasons: a very hot, wet summer (November-March) which receives all the annual rainfall (600 mm) usually as erratic, intense and localised thunderstorms, and a warm, dry winter (April-October). There is little dry season stream flow or permanent water except for pools in the main river and well-sheltered gorges, or at springs in permeable rocks.

The park's vegetation reflects its transitional location between the northern tropical savannah (Torresian) and inland arid desert (Eyrean) biogeographical regions. Some 17 vegetation communities are recognised according to moisture availability, ranging from closed forests in the gorges and valleys, through open forests in riparian areas and open woodlands of drier areas to stunted shrublands and grasses in the driest uplands and surrounding plains. The dominant vegetation is open woodland and spinifex (spiny hummock grass) grassland with many eucalypts, acacias and grevilleas, notably silver leaf bloodwood, and rough leaf range gum. The closed forest communities, which are extensions of northern monsoonal forests, include palms, ferns and orchids. In all, 653 plant species are recorded from the Purnululu area, including 628 higher plants (of which 597 are native), 17 ferns and fern allies and 8 species of lower plants.

The diversity of animals in PNP also reflects the mixing of tropical and desert species. The recorded fauna of the park and surrounds totals 298 species of vertebrates, including 149 birds, 81 reptiles, 41 mammals, 15 fish and 12 frogs. Among the arid land animals are skinks, monitor lizard and short-eared wallaby, while the wet area representatives are varieties of frog, the pale field rat and large-footed mouse-eared bat. The last of these exemplifies species at the southernmost (inland) limit of their range, while others such as the desert mouse and

nocturnal burrowing skink reach their northern limit in Purnululu. The park also harbours rare animals such as the grey falcon, and seasonally migrating birds.

3. COMPARISONS WITH OTHER AREAS

The term *karst* is used in the nomination document and some of the supporting references to describe the erosional sandstone features found in PNP. At least one other reference, Hoatson *et al.*, refutes the karst description, and one reviewer has referred to the "somewhat confused" scientific discussion on the issue of sandstone karst. It is therefore worth briefly reviewing the issue. The term *karst*, and the phenomenon to which it refers, has a very long and complex history extending over many centuries and many cultures. Essentially, *karst is a land system that has been shaped, at least largely, by chemical solution* (Ford and Williams 1989: 1, 29, 43; Lowe and Waltham, 2002: 22-23, 33). But as in virtually all geomorphic processes, solution rarely occurs in isolation from other processes. Thus, other forms of erosion including mechanical removal of particles often accompany it, and usually the two or more processes involved are well integrated. Much of the confusion arises from the fact that many textbook discussions, and even some definitions of the term link it with limestone – the most frequent occurrences are in limestone or other carbonate rocks (indeed the word 'karst' derives from the limestone regions of the Balkans). It is also common to emphasise the place of caves, even though there are many occurrences of karst in a wide range of rocks that do not include caves.

White et al. (1966) first demonstrated the occurrence of karst in quartzites and quartzitic sandstones. It is now widely recognised that both quartz and amorphous silica are soluble in water, particularly at high temperatures. However, solution is much slower than in many other rocks such as the carbonates, gypsum and salt. Amorphous silica, which often forms the 'cement' in siliceous sandstones, is more soluble than crystalline quartz, and it is the amorphous form that has been dissolved at PNP and so liberated the sand grains for mechanical erosion.

A global review of 26 quartz sandstone landscapes (Wray 1997) reveals many karst features such as tower fields, especially in tropical regions. The best-documented and most spectacular tower karst is found on the surface of the flat-topped table mountains (or tapuis) of the Canaima National Park World Heritage site in Venezuela. While this is the most imposing cavernous sandstone region in the world, including the presence of 10 of the 12 deepest caves, the karst features are confined to solution on joints and fissures, producing deep, vertical shafts. Similar sandstone karst landscapes are well-displayed on the Chimanimanie Highlands on the Zimbabwe/Mozambique border, which has the deepest caves in Africa, up to 350 m deep, and in the Vila Velha region of S. Brazil. Sandstone karst with towers and caves is also found in the immense tablelands of the Central African Republic; the Tibetsi region of Chad; in S. Nigeria, in the Saharan region of E. Niger and in South Africa's Cape Peninsula. None of these are currently within strictly protected areas or World Heritage sites. The Wulingyuan Scenic & Historic Interest Area of China, a World Heritage site, has spectacular sandstone karst features but these form a so-called "ruiniform" relief, comprising angular pillars and pinnacles in vertically-jointed terrain, unlike the cone-shaped towers of PNP. Similar landscapes also exist in the nominated Three Parallel Rivers of Yunnan Protected Areas in China, also being considered by the Committee at its 27th session. Another area of eroded sandstone, of much greater extent and variety, exists in the National Parks of the Canyonlands of Arizona and Utah, USA. However, this is a "high desert," with elevations ranging from 1,000 metres to over 2,000 metres above sea level.

Within Australia itself, particularly in the north, there is also a large area of sandstone tower karst including the:

- flat-topped, ruiniform relief of the Arnhem Land Plateau, Northern Territories;
- irregular towers in the Burt Ranges, Spirit Hill, Elephant Hill and Hidden valley, northeast of Kununurra, Western Australia;
- symmetrical hills of Watarrka National Park and Keep River National Park, Northern Territories;
- small (6 m high) towers in horizontally bedded quartz sandstones of North Queensland; and
- towers (or "pagodas") in Monolith Valley south of Sydney, New South Wales.

However, in the above cases the tower karst is smaller in scale and different in terms of geological make-up and landform evolution from that in PNP. PNP owes its distinctive character to the great age and continuing stability of the Western Australian shield and to the character of the lithology. The dominant rounded hill landforms, often described slightly inaccurately as tower-karst, but better termed cone-karst, are in fact at a relatively mature stage of the karst cycle and are by far the best example of this landform in quartzitic sandstone, virtually to the point of being unique. They are present probably because (a) they have been formed over a period of 20 million years (or perhaps longer) and (b) the liberation of sand grains by solution of the amorphous silica, followed by the removal of the sand by monsoonal rains, has accelerated the process of erosion. Further, the stabilising effects of the cyanobacterial crusts have probably supported and maintained the shape of the hills, and this also appears to be a unique feature amongst quartzitic karsts.

Topographically, quartzitic karst landscapes are very similar to those in carbonate rocks, though a systematic comparison has not been made. Thus, the Bungle Bungle topography is similar to the limestone tower karst of Australia's West Kimberley region. Although karst landscapes are represented in 41 existing World Heritage natural, cultural and mixed sites (Wong et al. 2001), with only two exceptions (Canaima and Wulingyuan) they are developed in carbonate rocks. Although the Bungle Bungle Range has features similar to many other areas of the world, its distinctiveness derives from its scale and the specificity of its geomorphic evolution. It is this that justifies its claim to outstanding universal geological and conservation value.

4. INTEGRITY

4.1. Site integrity

The nominated property includes the full extent of the Bungle Bungle massif, the park's predominant natural feature. The massif is also well-buffered by protected land on all sides, including sand plains within the park, and extensive riverine country and ranges of the Purnululu Conservation Reserve (PCR) to the west. The PCR is reported as having natural and cultural values of national importance, and it is managed consistently with the national park. In fact, it includes a greater diversity of landforms and vegetation than the park, with more permanent water, and is likely to have significant prehistoric settlement sites. The long-term objective of incorporating the PCR into the park should be pursued to completion. Priority should also be given to expanding the park into the surrounding pastoral country to add important natural and cultural assets, such as the historic Ord River Station to the east, and to provide better buffering and boundary delimitation.

The existing park boundaries are not ideal, being mainly water courses rather than watershed boundaries. This potentially allows incursion of undesirable impacts from neighbouring areas in catchments upstream of the park, such as waste effluent from mining activities. Regional environmental and land use regulations, and Australia's *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), appear to be capable of minimising these impacts. As fencing of the property is not feasible, there is an on-going problem in controlling wandering stock and other pests that relies heavily on co-operation of neighbouring landowners. The forthcoming renewal of pastoral leases in 2015 presents an opportunity to add pastoral lands to the park or buffer zones. Leaseholders and the Hall's Creek Shire authorities are sympathetic to this, and the park authorities should undertake surveys and planning, and complete the land transfer negotiations, as soon as possible.

There are no permanent inhabitants in the PNP. Seasonal occupation of special Living Lease Areas by traditional owners is commencing and will expand in the future.

4.2. Management

The nominated property is public land with strong legal security of protection. PNP and the adjacent PCR are owned and administered by the State Government of Western Australia under the 1984 Conservation and Land Management Act. Legally the nominated property is a Class A Reserve for the purpose of national park, vested in the Conservation Commission of Western Australia. The legally complex and highly litigious issues surrounding native title to land and joint management are evolving rapidly. Despite a recent ruling effectively extinguishing native title to land comprising PNP, the State Government has signaled an intention to amend the legislation in order to secure traditional ownership of land and establish full joint management arrangements under a Park Council representative of traditional owners and the Department of Conservation and Land Management. Living Area leases in the park for some traditional owners have recently been signed with the Purnululu Aboriginal Corporation (an incorporation giving legal identity to indigenous communities and eligibility to receive government funds). The authorities intend to establish more of these leases and extend the same ownership and management arrangements to the adjacent conservation reserve. The Purnululu traditional owners actively support the World Heritage nomination for the park. Recent correspondence from the State Party (letter dated 13 February 2003) advises that a Deed of Agreement has been signed between the Western Australian Minister for the Environment and Heritage and the Purnululu Aboriginal Corporation. The Deed relates to the involvement of the Purnululu Aboriginal Corporation in the management of the Park and brings forward the introduction of effective joint management arrangements.

Federal legislation also applies in the case of Australian World Heritage properties. The EPBC Act, parts of which apply immediately upon nomination, can prohibit actions having significant impact on World Heritage values, and has oversight of management plan preparation and implementation. A legally binding management plan exists for the nominated property, and is currently undergoing mid-term review, particularly to improve the provisions for management of cultural heritage.

Several additional issues require management attention as outlined in the following paragraphs.

4.3. Access, roads and aircraft movements

Land-based public access to PNP is problematic, requiring a three hour drive via a single, privately owned 4WD track that is closed during the four-month wet season. Upgrading the track is required to reduce difficulties and hazards. Negotiations are currently underway with local authorities and pastoral lessees to provide a legally gazetted road. The 50km of internal vehicle tracks in the park are rough and dusty and require sealing. Upgrading is also required

for the seven walking tracks and associated parking areas at the most popular tourist attractions, to improve ease of access, visitor safety and interpretation facilities. Rockfalls, treefall, flooding and heat exposure present varying degrees of risk to visitor safety and require more management intervention. Management of aircraft movements is a significant issue. The majority of day-visitors enter the park by air through a single airstrip and associated helipad, and many others experience the park by aerial overflights. Existing rules relating to flight paths and times appear to be containing problems at current demand levels but, as visitor numbers rise, ensuring public safety and retaining noise levels within tolerable limits will require vigilance, monitoring and research.

4.4 Visitor numbers and impacts

Although visitor numbers have risen steadily in the 15 years since the park was established, they remain low at around 20,000 per year, and are not likely to increase dramatically in the short term, given the remoteness and land access difficulties. The high proportion of aerial access and use keeps environmental and social impacts to a minimum, and the long wet season allows recovery of sites impacted during the short (2-month) peak visitor season. The current management policy of "hardening" existing visitor facilities, with a low-key approach to scale and design standards, should avoid increased impacts. Pressure from tourist operators to open new visitor sites is appropriately resisted at present but it will inevitably increase, and will require care to avoid undesirable impact on natural and cultural values and sites.

4.5 Staffing, funding and facilities

Staffing and funding are barely adequate for current operations and well short of levels required under World Heritage standing. However, the nomination document indicates that there will be a substantial increase in staff and finance if the site is inscribed. The present complement of one ranger-in-charge, an assistant ranger and a (seasonal) visitor centre manager would need to be increased by at least four fully trained rangers plus several maintenance staff, and aboriginal officers to service an expanded cultural heritage management and interpretation programme. Longer-term consideration is also required to supplementing, or replacing, the rudimentary visitor centre and ranger station with an improved facility, preferably sited at the main park access point on the Great Northern Highway. Significant increases would be required to park budgets, which currently rely heavily on revenues from entrance fees and aircraft and tourist safari concessions. Park authorities estimate that upgrading facilities such as staff accommodation would require some AUD $3 million per year for three years, plus an annual operating grant of about AUD $400,000.

4.6 Wild animal and pest control

Control of animal pests remains a major park management problem. A principal reason for establishing the park was to halt the effects of vegetation depletion, weed invasion, accelerated soil erosion, and river siltation and flooding due to overgrazing by cattle and feral animals. Removal of some 25,000 cattle and 4,000 donkeys since 1985 has made improvements, and a monitoring and assessment programme is underway. However, stock from neighbouring pastoral stations still gain access, with consequent impacts on boundary riverbeds and riparian vegetation, and on water quality especially at waterholes in the dry season. In the absence of fences, regular mustering and removal of animals are required and there are provisions for prosecuting owners of straying cattle and for the destruction of unbranded stock. The park boundaries need to be re-set to include a substantial buffer into pastoral leases on all sides of the park, particularly in the south and east to better protect the Ord River. More effort is required to the limited amount of weed control and mechanical treatment of soil, to promote regeneration of native grasses and shrubs. Native birds,

mammals and reptiles are directly impacted by feral cats, and current research and control plans must be resolutely continued to minimise this threat.

4.7 Mining

Mineral exploration and mining are prohibited in the PNP, but operations in neighbouring catchments create potential problems. In the PCR, abutting the park, current prospecting (mainly for copper) indicates the absence of economic deposits. However, unless strictly controlled, waste water from mining the Panton deposit (mainly platinum) in the Ord River catchment upstream from the park could affect water quality in the park. The nomination document also notes that the *Mining Act of Western Australia* provides for the excision of conservation areas for mining with agreement of both Houses of Parliament, and the nomination document notes that this has happened five times in 10 years.

However, existing Commonwealth legislation appears adequate to prevent serious impacts from occurring, through provisions of the EPBC Act which can over-ride State legislation and invoke review by Commonwealth ministers and a Commonwealth-initiated environmental impact assessment process where World Heritage values are threatened. This has been confirmed in a letter to IUCN from the State Party subsequent to the field inspection. The State Party also advises that the application of the EPBC Act to areas outside the boundaries of the World Heritage property "obviates the need to establish formal buffer zones around the entire boundary of each of Australia's World Heritage properties" (letter dated 13 February 2003).

4.8 Fire management

Fire is a natural phenomenon in the Purnululu landscape and a major management issue of regional importance. Prolific vegetation regrowth following removal of grazing pressure, coupled with the demise of aboriginal patch burning, has increased the incidence and destructive influence of large-scale wildfires (a major wildfire in September 2002 burned some 100,000ha, including half the area of the Bungle Bungle range, resulting in the temporary closure of the park to visitors). The current review of fire management to replace fire reduction policies with a strategic fire protection programme, including traditional patch burning, is commendable and should be implemented.

5. ADDITIONAL COMMENTS

Aboriginal Australians have occupied the Ord River region for some 40,000 years, concentrating along rivers and gorges affording permanent food and water resources. Rock shelters beneath cliffs were other important living areas for people moving seasonally between the plains and uplands. This is a hunter-gatherer culture, with two main tribal groupings and their economic networks, and four main languages, mixing in the area. The people, referred to as traditional owners, have a strong attachment to land and natural resources, expressed through religious philosophy (Narrangkarni or "the Law"); the use of shared names linking individuals to geographical features (narraku), a detailed system of ecological knowledge and use of plants and animals; and the material evidence from hundreds of archaeological sites including rock art sites, stone quarries, burial sites and artefact scatter. Attachment to land has enabled the aboriginal people to survive the impact of colonisation by pastoralists.

The Kimberley region was one of the last parts of Australia occupied by non-aborigines who began arriving in the mid-1880s, taking up 50,000 to 300,000 ha leases on native lands. To retain connection to their land the aborigines became a pastoral labour force, and by the beginning of the 20th century there were some 50,000 head of cattle on the Ord River

grasslands. The influx of miners following the 1885 Hall's Creek gold rush brought profound social changes with the introduction of diseases and violence, and destruction of traditionally occupied land through overgrazing and soil and river erosion. Cultural dispossession continued when aborigines were compelled to leave the cattle stations from 1968 and settle in camps on the fringes of towns.

PNP no longer exhibits traditional settlement and use. There has been serious disruption and dislocation of the aborigine community, and some reduction in their knowledge of the land. However, clear evidence of a continuing association with their native country is manifest in:

- Schooling of young people in language and traditional knowledge.
- Community-initiated surveys of archaeological and cultural resources, and associated mapping and database development.
- Negotiation of living lease areas in the park for seasonal occupation.

The new joint management arrangements, guided by the Purnululu Aboriginal Corporation, will provide for an improved cultural management programme staffed by traditional owners, and negotiated agreements for continuance of extraction and use of natural resources. In turn, improved cultural heritage management will contribute to enhanced biodiversity protection.

6. APPLICATION OF WORLD HERITAGE CRITERIA

PNP has been nominated under natural criteria (i), (ii) and (iii).

Criterion (i) Earth's history and geological features

The claim to outstanding universal geological value is made for the Bungle Bungle Range. The Bungle Bungles are, by far, the most outstanding example of cone karst in sandstones anywhere in the world and owe their existence and uniqueness to several interacting geological, biological, erosional and climatic phenomena.

The sandstone karst of PNP is of great scientific importance in demonstrating so clearly the process of cone karst formation on sandstone - a phenomenon recognised by geomorphologists only over the past 25 years and still incompletely understood, despite recently renewed interest and research. The Bungle Bungle Ranges of PNP also display to an exceptional degree evidence of geomorphic processes of dissolution, weathering and erosion in the evolution of landforms under a savannah climatic regime within an ancient, stable sedimentary landscape. IUCN considers that the nominated site meets this criterion.

Criterion (ii): Ecological processes

The outstanding biodiversity value of PNP is claimed on three principal grounds: representation of the diversity of Australian biota, an unusual combination of tropical and desert biota, and evidence of adaptation and evolution in Australian biota. The Purnululu region contains an interesting representation of biota within the transition zone between northern (monsoonal) and central (arid) biogeographical realms of Australia.

However, with the incompleteness of biological surveys in PNP (especially for reptiles and invertebrates) and the absence of any rigorous national or international comparative analysis, the overall significance of PNP species and ecosystems is difficult to determine. Rather than outstanding, the biota appear to be no more than typical and representative of a broad zonal biogeographical transition between arid and monsoonal Australia extending continent wide.

Many of the key elements of this are likely to be also protected in existing World Heritage sites such as Kakadu National Park and Uluru-Kata Tjuta National Park. The claim to outstanding universal biological value cannot, therefore, be substantiated at this time. IUCN does not consider that the nominated site meets this criterion.

Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance

Although PNP has been widely known in Australia only during the past 20 years and it remains relatively inaccessible, it has become recognised internationally for its exceptional natural beauty. The prime scenic attraction is the extraordinary array of banded, beehive-shaped cone towers comprising the Bungle Bungle Range. These have become emblematic of the park and are internationally renowned among Australia's natural attractions. The dramatically sculptured structures, unrivalled in their scale, extent, grandeur and diversity of forms anywhere in the world, undergo remarkable seasonal variation in appearance, including striking colour transition following rain. The intricate maze of towers is accentuated by sinuous, narrow, sheer-sided gorges lined with majestic *Livistona* fan palms. These and the soaring cliffs up to 250 m high are cut by seasonal waterfalls and pools, creating the major tourist attractions in the park, with evocative names such as Echidna Chasm, and Frog Hole, Piccaninny and Cathedral Gorges. The diversity of landforms and ecosystems elsewhere in the park are representative of the larger region, and lack a unique aesthetic quality, but provide a sympathetic visual buffer for the massif.

The powerful aesthetic experience of the Bungle Bungles has aroused huge interest among the public, and the ranges figure prominently in national and international advertising of Australia's tourist attractions, matching the prominence of the Uluru-Kata Tjuta National Park. Photographers and travel writers include the Bungle Bungles among the world's natural wonders, some describing them as Australia's equivalent of the Grand Canyon. IUCN considers that the nominated site meets this criterion.

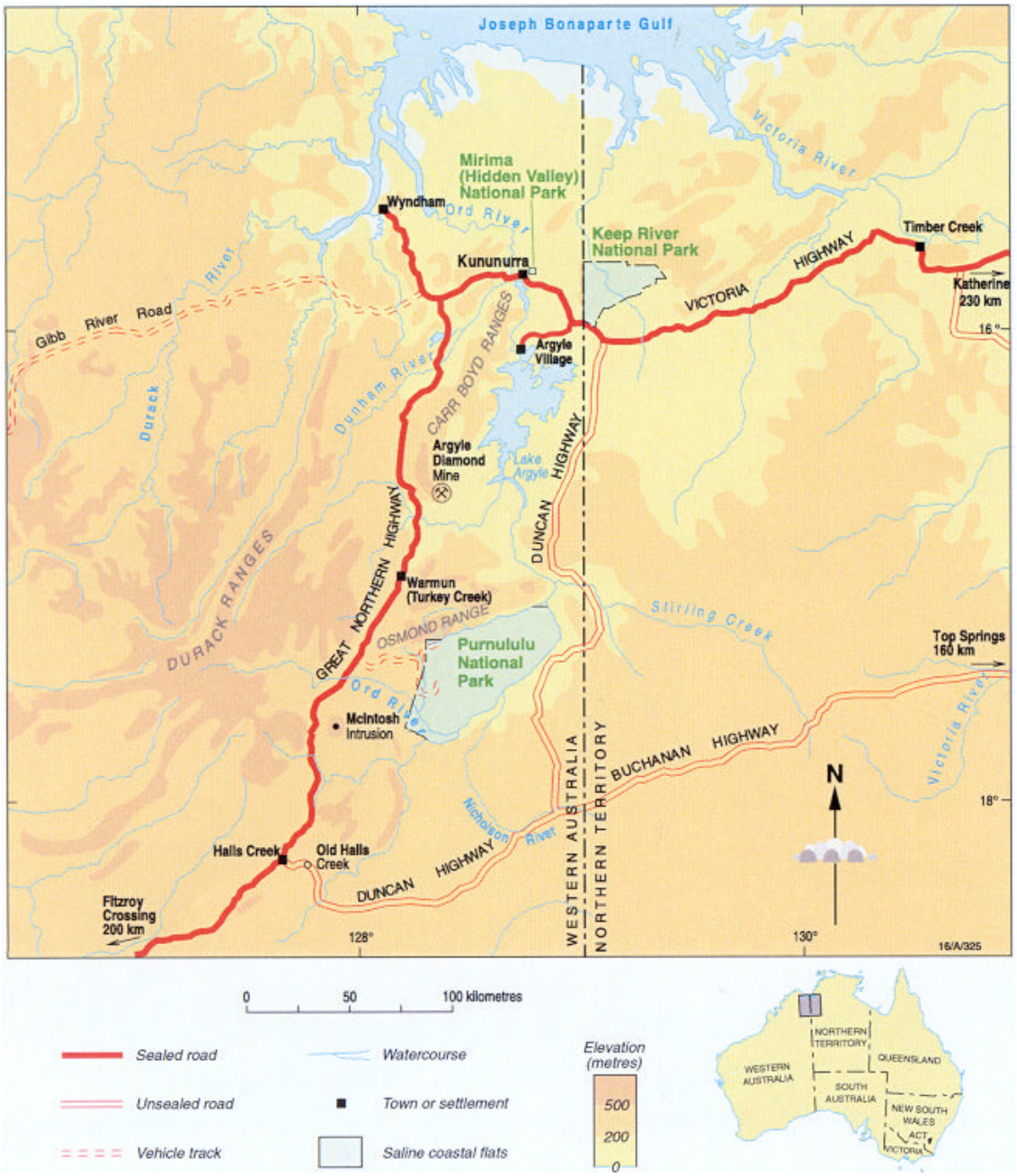
7. RECOMMENDATIONS

IUCN recommends that the Committee **inscribe** Purnululu National Park on the World Heritage List under natural criteria (i) and (iii).

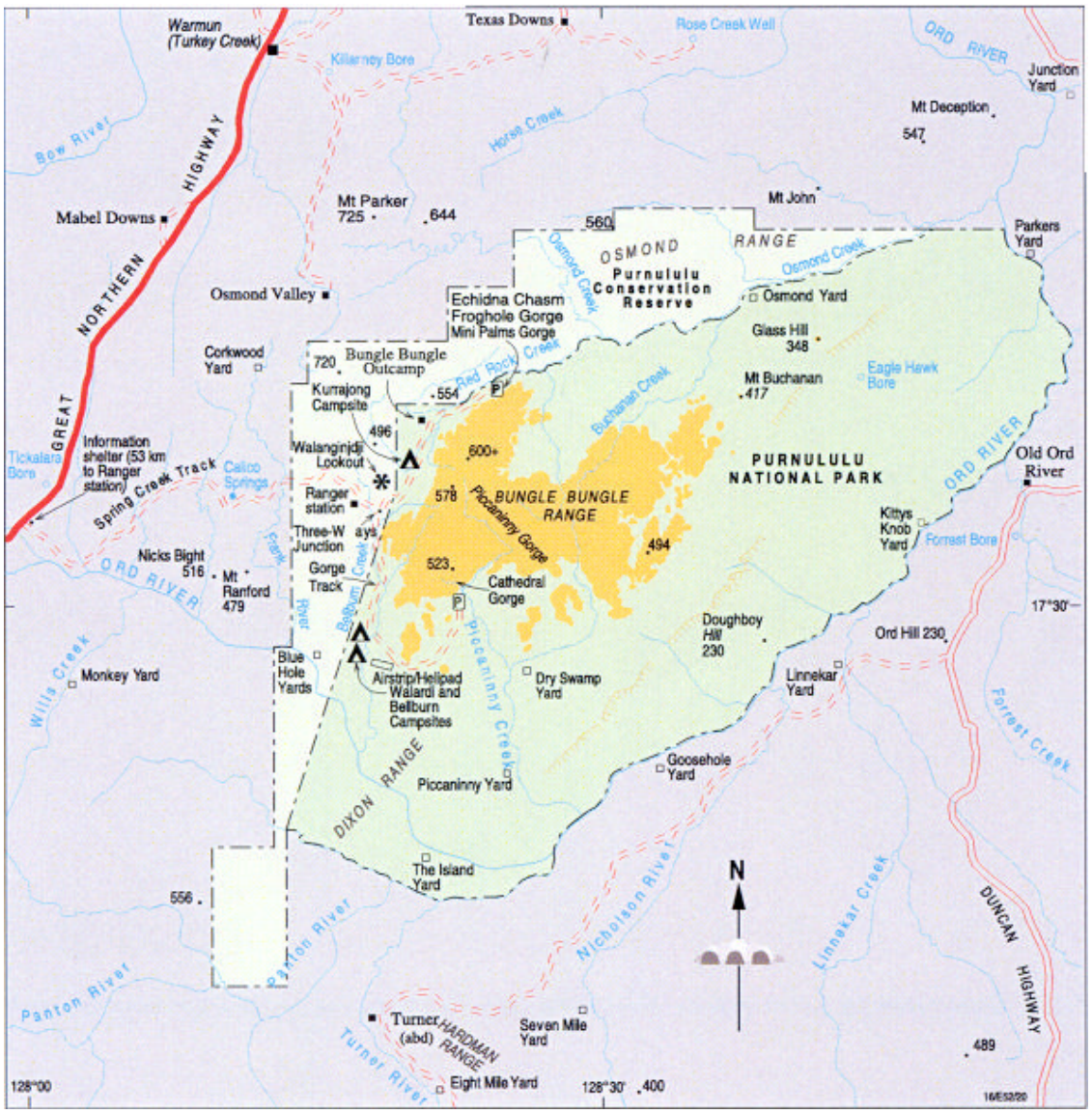
Furthermore, IUCN recommends that the Committee request the State Party:

i. to ensure that any mining activities outside or adjacent to the World Heritage site, including within catchments that flow into the World Heritage site, would be subject to the application of the *Environmental Protection and Biodiversity Conservation Act* and the highest standards of environmental assessment, planning, management and monitoring;
ii. to give priority to incorporating the Purnululu Conservation Reserve into the park and expanding the park into the surrounding pastoral country to add important natural and cultural assets, and to provide better buffering and boundary delimitation;
iii. to significantly increase funding and staffing for the site, in order to improve natural and cultural heritage management; to minimize the impacts of grazing animals and invasive species; to upgrade staff and visitor facilities; and to continue negotiations that will lead to improved access to the park, while taking great care to avoid undesirable impacts from increased visitation on the natural and cultural values of the site; and
iv. to provide a detailed report on progress with these issues in two years time.

Map 1: General Location of Site



Map 2: Detailed Map of Site



CANDIDATURE AU PATRIMOINE MONDIAL – ÉVALUATION TECHNIQUE DE L'UICN

PARC NATIONAL DE PURNULULU (AUSTRALIE) – ID N° 1094

1. DOCUMENTATION

i) Fiches techniques UICN/WCMC: 5 références

ii) Littérature consultée: State Party nomination document **Nomination of Purnululu National Park,** Environment Australia 2002, plus a September 2002 supplementary information document and attachments; **Bungle Bungle Range, Purnululu National Park, East Kimberley, Western Australia: a guide to rocks, landforms, plants, animals and human impacts,** D. Hoatson et. al Commonwealth of Australia 1997;**Watching the grass grow (vegetation regeneration Purnululu NP) CALM Landscape 13** (2): 23-27, Behn, G. et. al., 1997; **Assessment of the vertebrate fauna of the Bradshaw (Juliki) Field Training Area, Northern Territory,** Fisher, A. & Woinarski, J., 2002, Northern Territory Parks and Wildlife Commission; **Karst Geomorphology and Hydrology**, Ford, D. and Williams, P. 1989; **Purnululu National Park World Heritage Cultural Values,** Kirkby, I & Williams N. 2001, Unpublished report to Environment Australia; **Dictionary of Karst and Caves**, Lowe, D. and Waltham, T. 2002, British Cave Research Association; **Geology and landforms of the Kimberley,** Tyler, Ian 2000, CALM 2000; **Quartzite Karst in southeastern Venezuela, International Journal of Speleology, 2: 309-314,** White, W.B., Jefferson, G.L. and Haman, J.F. 1966; **A survey of the wildlife and vegetation of Purnululu (Bungle Bungle) National Park and adjacent area,** Woinarski, J.C.Z. 1992, CALM, Research Bulletin 6; **Proceedings of the Asia-Pacific Forum on Karst Ecosystems and World Heritage,** Wong, T. et al. 2001, UNESCO/IUCN Miscell. Pub; **A global review of solutional weathering forms on quartz sandstones,** Earth-Science Reviews 42:137-160.Wray, R.A.L. 1997; **Tower karst in sandstone: Bungle Bungle massif, Northwestern Australia,** Young, R.W. 1986. *Z. Geomorph. N.F. 30(2):189-202*; **Sandstone landforms of the tropical East Kimberley region. Northwestern Australia**, *J. Geology 95: 205-18.* 1987; **Quartz etching and sandstone karst: examples from the east Kimberleys, Northwestern Australia.** Z. Geomorph. N.F. 32(4): 409-23, 1988.

iii) Consultations: cinq évaluateurs indépendants. Consultations sur place avec Environnement Australie; CALM; CSIRO; propriétaires traditionnels aborigènes; Purnululu Aboriginal Corporation et l'anthropologue du Conseil. Consultations pré- et post-mission avec des experts de la CMAP/UICN; université de Melbourne; CALM; Kimberley Land Council, Broome; l'anthropologue du CALM; Comté de Hall's Creek; Programme Ord-Bonaparte, Kununurra; et Aboriginal and Torres Strait Islanders Council.

iv) Visite du site: Paul Dingwall (UICN), Kevin Jones (ICOMOS). Août 2002.

2. RÉSUMÉ DES CARACTÉRISTIQUES NATURELLES

Le site proposé est le Parc national de Purnululu (PNP) (Catégorie II de l'UICN), d'une superficie de 239 723 ha, situé à environ 300 km au sud de Kununurra, dans la région du Kimberley oriental (état

d'Australie-Occidentale). Avec la Réserve de conservation de Purnululu (RCP) adjacente qui couvre 79 602 ha, le parc a été créé en 1987 dans la Réserve de régénération du fleuve Ord établie en 1967 pour contrer les effets de la dégradation des sols après plus de 50 ans d'agriculture pastorale. Le parc comprend quatre écosystèmes:

- Le massif profondément déchiqueté des Bungle Bungle, composé de grès quartzique du Dévonien, érodé pendant 20 millions d'années. Il en reste un ensemble de tourelles ou de cônes en forme de ruches aux flancs raides, dont la surface est distinctement striée de bandes horizontales régulières de croûte gris foncé de cyanobactéries (organismes photosynthétiques unicellulaires). Les tourelles, dont beaucoup sont remarquablement symétriques, sont plus nombreuses et plus impressionnantes sur les flancs est et sud du massif. On les trouve aussi en petits groupes isolés, s'élevant au-dessus des plaines environnantes et ponctuant le sommet oriental du massif, ce dernier étant peut-être une relique d'une période antérieure de formation de tourelles. Sur les flancs sud, les tourelles sont coupées par un labyrinthe de ravines très étroites séparées par des dépressions au fond plat, pratiquement sans cours d'eau, qui s'ouvrent sur la plaine.

- La vallée herbeuse du fleuve Ord dans les régions limitrophes est et sud du parc, draine deux affluents du sud et trois autres, du nord des hautes terres.

- Les vastes plaines sableuses qui s'étendent entre les hautes terres et le fleuve, composées de sols noirs stériles et de zones boisées et herbeuses ouvertes.

- Les crêtes de grès beaucoup plus boisées de l'ouest et le massif Osmond voisin, au nord.

La région connaît un climat de mousson sec caractérisé par deux saisons contrastées: un été très chaud et humide (novembre-mars) pendant lequel elle reçoit toutes les précipitations annuelles (600 mm), généralement sous forme d'orages imprévisibles, intenses et localisés et un hiver sec et chaud (avril-octobre). En saison sèche, il y a peu d'écoulement d'eau ou d'eau permanente, à l'exception de mares dans le fleuve principal et les gorges bien abritées ou de sources dans les roches perméables.

La végétation du parc reflète son emplacement dans la zone de transition entre les régions biogéographiques de la savane tropicale du nord (torresienne) et du désert aride intérieur (eyrienne). On trouve environ 17 communautés végétales, selon l'humidité disponible – des forêts denses des gorges et des vallées aux broussailles rabougries et herbes des hautes terres et des plaines environnantes plus sèches, en passant par les forêts ouvertes des zones riveraines et les zones boisées ouvertes des régions plus sèches. La végétation dominante est constituée de zones boisées ouvertes et de prairies de spinifex (touffes d'herbes épineuses) avec de nombreux eucalyptus, acacias et grévillées, notamment le *silver-leaf bloodwood* et le *rough leaf range gum*. Les communautés forestières fermées, qui sont des extensions des forêts de mousson septentrionales comprennent des palmiers, des fougères et des orchidées. En tout, 653 espèces de plantes sont recensées dans la région de Purnululu, y compris 628 plantes supérieures (dont 597 sont indigènes), 17 fougères et plantes apparentées et 8 espèces de plantes inférieures.

La diversité de la faune du PNP reflète aussi le mélange d'espèces tropicales et désertiques. La faune recensée dans le parc et les environs compte 298 espèces de vertébrés dont 149 oiseaux, 81 reptiles, 41 mammifères, 15 poissons et 12 grenouilles. Parmi les animaux des terres arides, on trouve des scinques, le varan et le wallaby à oreilles courtes, tandis qu'une diversité de grenouilles ou le murin à grands pieds représentent les zones humides. Le murin est parmi les espèces qui se trouvent à la limite méridionale extrême (à l'intérieur des terres) de leur aire de répartition, tandis que d'autres espèces, telles que la souris du désert et le scinque fouisseur nocturne atteignent leur limite septentrionale à Purnululu. Le parc accueille aussi des animaux rares comme le faucon gris et, périodiquement, des oiseaux migrateurs.

3. COMPARAISON AVEC D'AUTRES SITES

Le terme *karst* est utilisé dans le texte de la proposition et dans certaines des références d'appui pour décrire les structures gréseuses issues de l'érosion que l'on trouve dans le PNP. Une autre référence au moins, Hoatson *et al.*, réfute la description karstique et un évaluateur fait référence à la discussion scientifique «quelque peu confuse» sur la question du karst gréseux. Il vaut donc la peine de passer brièvement la question en revue. Le terme *karst*, et le phénomène auquel il se rapporte, ont une histoire longue et complexe qui s'étend sur de nombreux siècles et concerne de nombreuses cultures. Essentiellement, *le karst est une forme de relief qui a été façonné, du moins en grande partie, par dissolution chimique* (Ford et Williams 1989: 1, 29, 43; Lowe et Waltham, 2002: 22-23, 33). Mais, comme dans presque tous les processus géomorphologiques, la dissolution est rarement isolée d'autres processus. Ainsi, d'autres formes d'érosion, y compris l'érosion mécanique des particules, l'accompagnent souvent et, en général, deux processus ou plus sont bien intégrés. Une bonne partie de la confusion provient du fait que de nombreux ouvrages de référence et même certaines définitions du terme associent celui-ci au calcaire – les occurrences les plus fréquentes sont, en effet, dans le calcaire ou dans d'autres roches carbonatées (de fait, le mot «karst» est originaire des régions calcaires des Balkans). On met souvent aussi l'accent sur les cavités bien que le karst soit souvent présent dans une vaste gamme de roches qui ne présentent pas de cavités.

White *et al.* (1966) ont été les premiers à démontrer la présence de karst dans les quartzites et les grès quartziques. On reconnaît aujourd'hui généralement que tant le quartz que la silice amorphe sont solubles dans l'eau, particulièrement à de hautes températures. Toutefois, la dissolution est beaucoup plus lente que pour beaucoup d'autres roches telles que les carbonates, le gypse et le sel. La silice amorphe qui forme souvent le «ciment» dans les grès siliceux est plus soluble que le quartz cristallin et c'est la forme amorphe qui a été dissoute au PNP et qui a donc libéré des grains de sable pour l'érosion mécanique.

Une étude mondiale de 26 paysages de grès quartzique (Wray, 1997) révèle de nombreuses caractéristiques karstiques telles que les champs de tourelles, en particulier dans les régions tropicales. Le karst à tourelles le mieux connu et le plus spectaculaire se trouve à la surface des montagnes au sommet plat (ou tepuis) du Parc national et Bien du patrimoine mondial de Canaima au Venezuela. Bien qu'il s'agisse de la région de grès caverneux la plus imposante du monde, avec 10 des 12 grottes les plus profondes, les caractéristiques karstiques sont confinées à la dissolution des joints et des fissures, ce qui produit des puits verticaux profonds. Des paysages de karst gréseux semblables sont bien illustrés sur les hauts plateaux de Chimanimanie, à la frontière du Zimbabwe et du Mozambique, où l'on trouve les grottes les plus profondes d'Afrique (jusqu'à 350 m de profondeur) et dans la région de Vila Velha au sud du Brésil. Le karst gréseux à tourelles et grottes est également présent dans les immenses terres tabulaires de la République centrafricaine, dans la région du Tibesti au Tchad, dans le sud du Nigéria, dans la région du Sahara de l'est du Niger et dans la péninsule du Cap en Afrique du Sud. Aucun de ces sites n'est actuellement à l'intérieur d'aires intégralement protégées ou de biens du patrimoine mondial. La région d'intérêt panoramique et historique de Wulingyuan en Chine, un bien du patrimoine mondial, présente des caractéristiques de karst gréseux spectaculaire mais qui forment un relief dit «ruiniforme», comprenant des piliers angulaires et des pinacles, à la différence des tourelles de forme conique du PNP. Il existe des paysages semblables dans les Aires protégées des trois fleuves parallèles du Yunnan, site proposé par la Chine et dont la candidature sera examinée par le Comité à sa 27e session. On trouve une autre région de grès érodés beaucoup plus vaste et plus variée dans les parcs nationaux des canyons de l'Arizona et de l'Utah, aux États-Unis. Toutefois, il s'agit d'un «désert d'altitude» avec des élévations de 1000 à plus de 2000 m au-dessus du niveau de la mer.

En Australie, en particulier dans le nord, il existe aussi de nombreux exemples de karst gréseux à tourelles:

- le relief à sommet plat et ruiniforme du plateau de la Terre d'Arnhem, Territoire du Nord;

- les tourelles irrégulières du massif Burt, de Spirit Hill, Elephant Hill et Hidden Valley, au nord-est de Kununurra, Australie-Occidentale;

- les collines symétriques du Parc national de Watarrka et du Parc national de la rivière Keep, Territoire du Nord;

- les petites (6 m de haut) tourelles qui se trouvent dans les couches horizontales de grès quartzique du nord du Queensland; et

- les tourelles (ou «pagodes») de la vallée des Monolithes au sud de Sydney, Nouvelle-Galles du Sud.

Toutefois, dans tous les cas mentionnés ci-dessus, les tourelles karstiques sont plus petites que celles du PNP et différentes du point de vue de la composition géologique et de l'évolution du relief. Le PNP doit son caractère particulier à son grand âge et à la stabilité permanente du bouclier d'Australie-Occidentale ainsi qu'au caractère de la lithologie. Les collines arrondies dominantes, souvent décrites quelque peu à tort comme du karst à tourelles, mais qu'il vaudrait mieux appeler karst à cônes, se trouvent en fait à une étape relativement mâture du cycle karstique et sont, de loin, le meilleur exemple de cette forme de relief de grès quartzique : on pourrait pratiquement considérer qu'elles sont uniques. Elles doivent probablement leur existence d'une part au fait qu'elles ont été formées sur une période de 20 millions d'années (ou peut-être plus) et, d'autre part, à la libération de grains de sable par dissolution de la silice amorphe, suivie du lessivage du sable par les pluies de la mousson, qui a accéléré le processus d'érosion. En outre, les effets stabilisateurs de la croûte de cyanobactéries ont sans doute soutenu et maintenu la forme des collines ce qui apparaît également comme une caractéristique unique du karst quartzique.

Au niveau topographique, les paysages de karst quartzique sont très semblables à ceux des roches carbonatées bien qu'une comparaison systématique n'ait pas été réalisée. En conséquence, la topographie des Bungle Bungle est semblable aux karsts calcaires à tourelles de la région du Kimberley occidental, en Australie. Bien que les paysages karstiques soient représentés dans 41 biens du patrimoine mondial naturels, culturels et mixtes (Wong *et al.*, 2001), à deux exceptions près (Canaima et Wulingyuan), ces paysages se sont formés dans des roches carbonatées. Le massif des Bungle Bungle a des caractéristiques semblables à celles de bien d'autres régions du monde, mais sa particularité tient à son échelle et à la spécificité de son évolution géomorphologique. C'est cela qui justifie la valeur universelle exceptionnelle du point de vue de la géologie et de la conservation.

4. INTÉGRITÉ

4.1 Intégrité du site

Le bien proposé comprend tout le massif des Bungle Bungle, la caractéristique naturelle prédominante du parc. Le massif est entouré de terres protégées de tous les côtés, y compris des plaines de sable dans le parc et la zone riveraine importante et les montagnes de la Réserve de conservation de Purnululu (RCP) à l'ouest. La RCP aurait, semble-t-il, des caractéristiques naturelles et culturelles d'importance nationale et elle est gérée en harmonie avec le parc national. En fait, on y trouve des formes de relief et une végétation plus diverses que dans le parc, des eaux plus permanentes et il pourrait y avoir d'importants sites préhistoriques. Il serait bon de mener à bien l'objectif à long terme d'intégration de la RCP dans le parc. La priorité devrait également être donnée à l'élargissement du parc dans la zone pastorale environnante afin d'ajouter un atout naturel et culturel important tel que la Station historique du fleuve Ord, à l'est. Cela permettrait, en outre, de renforcer la protection et la délimitation du parc.

Les limites actuelles du parc ne sont pas idéales, car elles suivent essentiellement des cours d'eau plutôt que les limites de bassins versants. Cette situation peut donner lieu à une incursion d'effets non souhaités d'activités qui se déroulent dans les bassins versants en amont du parc, tels que des effluents provenant de l'exploitation minière. Les règlements régionaux sur l'environnement et l'utilisation des terres ainsi que la *Loi de 1999 sur la protection de l'environnement et la conservation de la biodiversité* (Loi EPBC) de l'Australie semblent cependant en mesure d'atténuer ces impacts. Comme il n'est pas possible de clôturer le bien, il est difficile de contrôler le bétail errant et d'autres nuisances : le règlement de ce problème chronique dépend essentiellement de la coopération des propriétaires voisins. Le renouvellement des concessions pastorales, en 2015, offre l'occasion d'ajouter des terres pastorales au parc ou aux zones tampons. Les concessionnaires et les autorités du comté de Hall's Creek y sont sensibles et les autorités du parc devraient entreprendre des études ainsi qu'une planification pour mener à terme, dès que possible, les négociations de transfert de terres.

Il n'y a pas de résidents permanents dans le PNP. Les propriétaires traditionnels commencent une occupation saisonnière de zones concessionnaires d'habitation autorisée et cette forme d'occupation devrait augmenter à l'avenir.

4.2 Gestion

Le site proposé fait partie du domaine public et jouit d'une protection juridique solide et sûre. Le PNP et la RCP contiguë appartiennent au gouvernement de l'état d'Australie-Occidentale et sont administrés par le gouvernement aux termes de la Loi de 1984 sur la conservation et l'aménagement du territoire. Légalement, le site proposé est une réserve de Classe A, à vocation de parc national, placée sous la responsabilité de la Commission de la conservation d'Australie-Occidentale. Les questions juridiques extrêmement complexes et litigieuses qui ont trait au droit des autochtones à la terre et à la cogestion évoluent rapidement. Malgré un jugement récent qui a éteint les droits des autochtones sur les terres composant le PNP, le gouvernement de l'état a indiqué son intention d'amender la législation afin de garantir la propriété traditionnelle de la terre et d'établir des dispositions de cogestion intégrale, sous l'égide d'un Conseil du parc représentant les propriétaires traditionnels et le Département de la conservation et de l'aménagement du territoire. Récemment, des zones concessionnaires d'habitation autorisée dans le parc ont été accordées à la Purnululu Aboriginal Corporation pour certains propriétaires traditionnels (la Purnululu Aboriginal Corporation est une entité qui donne une identité juridique aux communautés autochtones et le droit de recevoir des fonds du gouvernement). Les autorités ont l'intention de créer d'autres concessions de ce genre et d'étendre les dispositions sur la propriété et la gestion à la réserve de conservation adjacente. Les propriétaires traditionnels de Purnululu soutiennent activement la proposition d'inscription du parc sur la Liste du patrimoine mondial. L'État partie indique, dans une lettre récente (datée du 13 février 2003), qu'un accord a été signé entre le ministre d'Australie-Occidentale de l'Environnement et du Patrimoine et la Purnululu Aboriginal Corporation. Le document porte sur la participation de la Purnululu Aboriginal Corporation à la gestion du parc et prévoit l'introduction de dispositions de cogestion réelle.

La législation fédérale s'applique aussi aux biens du patrimoine mondial australiens. La Loi EPBC, dont certaines parties s'appliquent immédiatement au moment de l'inscription, peut interdire des activités qui ont des incidences importantes sur les valeurs de patrimoine mondial et contrôle la préparation et la mise en œuvre des plans de gestion. Il existe, pour le bien proposé, un plan de gestion juridiquement contraignant qui fait actuellement l'objet d'une étude à moyen terme, notamment pour améliorer les dispositions de gestion du patrimoine culturel.

Plusieurs autres questions relevant de la gestion nécessitent une attention comme indiqué dans les paragraphes suivants.

4.3 Accès, routes et mouvements aériens

L'accès public terrestre au PNP est problématique : il faut faire trois heures de route sur une piste unique et privée, prévue pour les véhicules tout-terrain et fermée durant les quatre mois de la saison

humide. Il est impératif d'améliorer cette piste pour réduire les difficultés et les dangers. Des négociations sont actuellement en cours avec les autorités locales et les concessionnaires pastoraux afin de construire une route publique. Les 50 km de pistes du parc sont accidentés et poussiéreux et doivent être améliorés. Il est aussi nécessaire d'améliorer les sept sentiers de randonnée et les zones de parking associées, dans les lieux les plus touristiques, afin d'améliorer l'accès, la sécurité des visiteurs et l'équipement d'interprétation. Les chutes de roches et d'arbres, les inondations et l'exposition à la chaleur présentent différents degrés de risques pour la sécurité des visiteurs et nécessitent une plus grande intervention de gestion. La gestion des mouvements aériens est aussi une question importante. La plupart des visiteurs qui passent une journée au parc arrivent par avion ou hélicoptère sur la seule piste et sa plate-forme d'hélicoptère. Beaucoup d'autres visitent le parc en le survolant. Les règles actuelles concernant les couloirs aériens et la durée des survols semblent limiter les problèmes au niveau de la demande, mais à mesure que le nombre de visiteurs augmentera, il faudra garantir la sécurité du public et maintenir le niveau acoustique dans des limites tolérables et, pour cela, exercer vigilance et suivi et mener des travaux de recherche.

4.4 Nombre de visiteurs et impacts

Bien que le nombre de visiteurs ait augmenté régulièrement depuis la création du parc il y a 15 ans, il reste de l'ordre de 20 000 par an et ne devrait pas augmenter de manière spectaculaire à court terme vu l'isolement du parc et les difficultés d'accès par voie terrestre. L'accès et la visite du parc se faisant surtout par voie aérienne les impacts environnementaux et sociaux restent bas et la longue saison des pluies permet aux sites touchés durant la courte saison de tourisme (deux mois) de récupérer. La politique de gestion actuelle, qui vise à améliorer les locaux existants pour les visiteurs selon une échelle et des normes de conception modestes, devrait éviter une aggravation des impacts. Les opérateurs de tourisme qui font pression pour ouvrir de nouveaux sites aux visiteurs ont été dûment éconduits jusqu'à présent mais les pressions augmenteront inévitablement et il faudra veiller à éviter les impacts non souhaitables sur les valeurs et les sites naturels et culturels.

4.5 Personnel, financement et activités

Le parc dispose d'un personnel et de ressources financières à peine suffisants pour assurer son fonctionnement actuel et bien loin du niveau requis pour un bien du patrimoine mondial. Toutefois, le texte de la proposition indique que si le site est inscrit, il y aura une augmentation substantielle du personnel et des ressources financières. Il y a actuellement un garde responsable, un garde assistant et un gestionnaire (périodique) du centre d'accueil des visiteurs. Il faudra au moins quatre gardes dûment formés et plusieurs employés pour l'entretien ainsi que des responsables aborigènes pour le programme d'interprétation et de gestion du patrimoine culturel qui sera renforcé. Il faudra aussi, à plus long terme, envisager de compléter ou de remplacer le centre d'accueil des visiteurs rudimentaire et le poste de garde par des locaux améliorés, situés de préférence au principal point d'accès du parc sur le Great Northern Highway. Des augmentations importantes du budget du parc seront requises car le budget dépend aujourd'hui fortement des recettes d'entrée et des concessions pour les aéronefs et les safaris touristiques. Les autorités du parc estiment que pour améliorer les locaux tels que les logements pour le personnel, il faudrait environ 3 millions de dollars australiens par an pendant trois ans, ainsi qu'une subvention de fonctionnement annuelle d'environ 400 000 dollars australiens.

4.6 Animaux sauvages et contrôle des nuisibles

Le contrôle des animaux nuisibles reste un grand problème pour la gestion du parc. Le parc a été notamment crée dans le but de mettre un terme à l'appauvrissement de la végétation, à l'invasion par des plantes non désirables, à l'érosion accélérée des sols et à la sédimentation des cours d'eau ainsi qu'aux inondations dues au surpâturage par le bétail et les animaux redevenus sauvages. Depuis 1985, le retrait d'environ 25 000 bovins et 4000 ânes a amélioré la situation et un programme de suivi et d'évaluation est en cours. Toutefois, le bétail des exploitations pastorales voisines a encore accès au parc, ce qui a des incidences sur les lits des rivières formant les limites et sur la végétation riveraine, ainsi que sur la qualité de l'eau, notamment dans les trous d'eau en saison sèche. En l'absence de

clôtures, il faut constamment surveiller et chasser les animaux. Certaines dispositions permettent de poursuivre les propriétaires de bétail errant et d'abattre les animaux non marqués. Les limites du parc doivent être déplacées afin d'inclure une zone tampon importante dans les concessions pastorales de tous les côtés du parc, en particulier au sud et à l'est pour mieux protéger le fleuve Ord. Il faut accélérer la lutte contre les plantes non désirables et renforcer le traitement mécanique des sols afin d'encourager la régénération des herbes et des arbustes indigènes. Les oiseaux, les mammifères et les reptiles indigènes sont directement victimes des chats harets et les plans actuels de recherche et de contrôle doivent se poursuivre résolument pour atténuer cette menace.

4.7 Exploitation minière

Dans le PNP, la prospection et l'exploitation minières sont interdites mais les activités d'exploitation dans les bassins versants voisins sont sources de problèmes possibles. Dans la RCP, qui jouxte le parc, les travaux de prospection actuels (essentiellement pour le cuivre), indiquent qu'il n'y a pas de gisements rentables. Toutefois, en l'absence de contrôle strict, les eaux usées de l'exploitation du gisement Panton (essentiellement pour le platine) dans le bassin versant du fleuve Ord, en amont du parc, pourraient affecter la qualité de l'eau dans le parc. Le texte de la proposition note également que la *Loi sur les mines d'Australie-Occidentale* prévoit l'ouverture de zones de conservation à l'exploitation minière avec l'accord des deux chambres du Parlement et ajoute que cela s'est produit cinq fois en 10 ans.

Toutefois, la législation actuelle du Commonwealth semble suffire pour empêcher de graves impacts. La Loi EPBC peut supplanter la législation d'un état et permet de demander un examen par les ministres du Commonwealth ainsi qu'un processus d'étude d'impact sur l'environnement sous l'égide du Commonwealth lorsque des valeurs du patrimoine mondial sont menacées. L'État partie l'a confirmé par lettre à l'UICN après la mission sur le terrain. L'État partie ajoute que l'application de la Loi EPBC aux zones qui se trouvent à l'extérieur des limites d'un bien du patrimoine mondial «rend inutile la création de zones tampons officielles autour du périmètre total de chaque bien du patrimoine mondial australien» (lettre datée du 13 février 2003).

4.8 Gestion du feu

Le feu est un phénomène naturel dans le paysage de Purnululu et un problème de gestion d'importance régionale. La repousse d'une végétation prolifique après élimination des pressions du pâturage, couplée à la disparition de la pratique de brûlis des aborigènes a augmenté l'incidence et l'influence destructrice d'incendies à grande échelle (un grand incendie spontané, en septembre 2002, a brûlé environ 100 000 ha, y compris la moitié de la région du massif des Bungle Bungle, entraînant la fermeture temporaire du parc aux visiteurs). L'étude en cours sur la gestion des feux pour remplacer les politiques de suppression du feu par un programme stratégique de lutte contre l'incendie, comprenant le brûlis traditionnel, est une bonne chose et devrait être appliquée.

5. AUTRES COMMENTAIRES

Les Aborigènes australiens occupent la région du fleuve Ord depuis environ 40 000 ans. Ils se sont concentrés le long des rivières et des gorges qui leur fournissaient une source permanente d'aliments et d'eau. Les abris rocheux, au-dessous des falaises, étaient d'autres zones d'habitat importantes pour ces populations qui se déplaçaient, selon les saisons, entre les plaines et les hautes terres. Ce sont des chasseurs-cueilleurs, avec deux groupements tribaux principaux et leurs réseaux économiques, et quatre langues principales, qui sont présents dans toute la région. Cette population, que l'on appelle aussi «propriétaires traditionnels», est unie à la terre et aux ressources naturelles par des liens très forts qui s'expriment dans la philosophie religieuse (Narrangkarni ou «la Loi»); l'utilisation de noms partagés, liant l'individu aux caractéristiques géographiques (narraku); un système précis de connaissances écologiques et d'utilisation des plantes et des animaux; et, sur le plan matériel, des centaines de sites archéologiques, y compris des sites d'art pariétal, des carrières de pierres, des sites

de sépultures et des artéfacts dispersés. L'attachement à la terre a permis aux populations aborigènes de survivre à l'influence de la colonisation par le pastoralisme.

La région du Kimberley fut une des dernières régions d'Australie colonisée par des non-Aborigènes qui commencèrent à y arriver vers le milieu des années 1880, et à s'approprier entre 50 000 et 300 000 ha de concessions sur les terres des Aborigènes. Pour maintenir leurs liens avec la terre, les Aborigènes sont devenus une force de travail pastoral. Au début du 20e siècle, il y avait environ 50 000 têtes de bétail dans les pâturages du fleuve Ord. L'arrivée des mineurs, après la ruée sur l'or de Hall's Creek en 1885, a provoqué des bouleversements sociaux profonds avec l'introduction de maladies, la violence, la destruction des terres traditionnelles par le surpâturage et l'érosion des sols et du fleuve. L'anéantissement culturel s'est poursuivi lorsque les Aborigènes ont été obligés de quitter les exploitations d'élevage, à partir de 1968, pour s'installer dans des camps à la limite des villes.

Il n'y a plus, dans le PNP, d'établissements et d'utilisations traditionnels. La communauté aborigène a subi de graves perturbations et a été disloquée de sorte que l'on constate un appauvrissement de ses connaissances de la terre. Toutefois, il est manifeste que les liens entre les Aborigènes et leur pays natal persistent:

- La scolarisation des jeunes se fait dans la langue et dans les connaissances traditionnelles.
- La communauté a lancé des études sur les ressources archéologiques et culturelles avec la préparation d'une cartographie et d'une base de données associée.
- Il y a eu des négociations concernant des zones concessionnaires d'habitation autorisée dans le parc en vue d'une occupation saisonnière.

Les nouvelles dispositions de cogestion, pilotées par la Purnululu Aboriginal Corporation, veilleront à la mise en place d'un programme de gestion culturel amélioré, doté d'un personnel traditionnel et d'accords négociés pour poursuivre l'exploitation et l'utilisation des ressources naturelles. En échange, la gestion améliorée du patrimoine culturel contribuera à renforcer la protection de la biodiversité.

6. APPLICATION DES CRITÈRES DU PATRIMOINE MONDIAL

Le PNP est proposé au titre des critères (i), (ii) et (iii).

Critère (i): histoire de la terre et processus géologiques

La valeur universelle géologique exceptionnelle est attribuée au massif des Bungle Bungle. Les Bungle Bungle sont, de loin, l'exemple le plus exceptionnel de karst gréseux à cônes dans le monde et doivent leur existence et leur caractère unique à plusieurs phénomènes géologiques, biologiques, érosifs et climatiques interdépendants.

Le karst gréseux du PNP a une grande importance scientifique car il démontre clairement le processus de formation de karst à cônes dans le grès – un phénomène qui n'est reconnu par les géomorphologistes que depuis 25 ans et qui n'est pas encore totalement compris malgré un intérêt et des travaux de recherche récemment renouvelés. Le massif des Bungle Bungle du PNP illustre aussi, à un degré exceptionnel, les processus géomorphologiques de dissolution, altération et érosion dans l'évolution d'un relief soumis à un régime climatique de savane, dans un paysage ancien et stable du point de vue sédimentaire. L'UICN considère que le site proposé remplit ce critère.

Critère (ii): processus écologiques

La valeur exceptionnelle du PNP pour la biodiversité est attribuée à trois raisons principales: représentation de la diversité du biote australien ; association peu courante des biotes tropical et de désert ; et illustration de l'adaptation et de l'évolution du biote australien. La région de Purnululu présente un exemple intéressant du biote de la zone de transition entre les domaines biogéographiques septentrional (de mousson) et central (aride) d'Australie.

Toutefois, vu que les études biologiques du PNP (en particulier pour les reptiles et les invertébrés) sont incomplètes et compte tenu de l'absence de toute analyse comparative nationale ou internationale rigoureuse, l'importance générale des espèces et des écosystèmes du PNP est difficile à déterminer. Le biote semble être plutôt typique et représentatif d'une large zone de transition biogéographique entre l'Australie aride et l'Australie de la mousson à l'échelle du continent plutôt que réellement exceptionnel. Bien des éléments clés se trouvent probablement aussi dans des biens du patrimoine existants tels que le Parc national du Kakadu et le Parc national Uluru-Kata Tjuta. La valeur biologique d'importance universelle exceptionnelle ne peut donc, pour le moment, être confirmée. L'UICN considère que le site proposé ne remplit pas ce critère.

Critère (iii): phénomènes naturels éminemment remarquables ou de beauté exceptionnelle

Bien que le PNP ne soit largement connu en Australie que depuis 20 ans et reste relativement inaccessible, il est reconnu au niveau international pour sa beauté naturelle exceptionnelle. La principale attraction panoramique est la gamme extraordinaire de tourelles coniques en forme de ruches et regroupées qui se trouvent dans le massif des Bungle Bungle. Ces tourelles sont devenues l'emblème du parc et sont un des attraits naturels de l'Australie célèbres au niveau international. Les structures sculptées de manière saisissante, sans égal à cette échelle, dans cette étendue et dans la grandeur et la diversité des formes où que ce soit dans le monde, subissent des variations saisonnières remarquables dans leur apparence, y compris des transitions de couleurs frappantes après la pluie. Le labyrinthe de tourelles est accentué par des gorges sinueuses, étroites, aux pentes raides, ourlées de majestueux palmiers *Livistona* en éventail. Ces caractéristiques et les falaises abruptes qui s'élèvent jusqu'à 250 m de haut sont coupées par des cascades et des mares saisonnières – important attrait touristique pour le parc – et répondent à des noms évocateurs tels que Echidna Chasm (le Chaos de l'Échidné), Frog Hole (le Trou de la Grenouille), Piccaninny et les Gorges de la Cathédrale. La diversité des reliefs et des écosystèmes, ailleurs dans le parc, est représentative de toute la région et n'a pas de qualité esthétique particulière mais constitue une toile de fond agréable pour le massif.

L'expérience esthétique puissante qu'offrent les Bungle Bungle a suscité un intérêt important du public et le massif est en bonne place dans la publicité vantant les attraits touristiques de l'Australie aux niveaux national et international, à l'égal du Parc national Uluru-Kata Tjuta. Photographes et écrivains considèrent les Bungle Bungle comme l'une des merveilles naturelles du monde et certains les décrivent comme l'équivalent australien du Grand Canyon. L'UICN considère que le site proposé remplit ce critère.

7. RECOMMANDATIONS

L'UICN recommande que le Comité **inscrive** le Parc national de Purnululu sur la Liste du patrimoine mondial au titre des critères (i) et (iii).

En outre, l'UICN recommande au Comité de demander à l'État partie:

i. de garantir que toutes les activités minières qui ont lieu à l'extérieur ou à proximité du bien du patrimoine mondial, y compris dans le bassin versant qui alimente le bien du patrimoine mondial, soient soumises à la *Loi sur la protection de l'environnement et la conservation de*

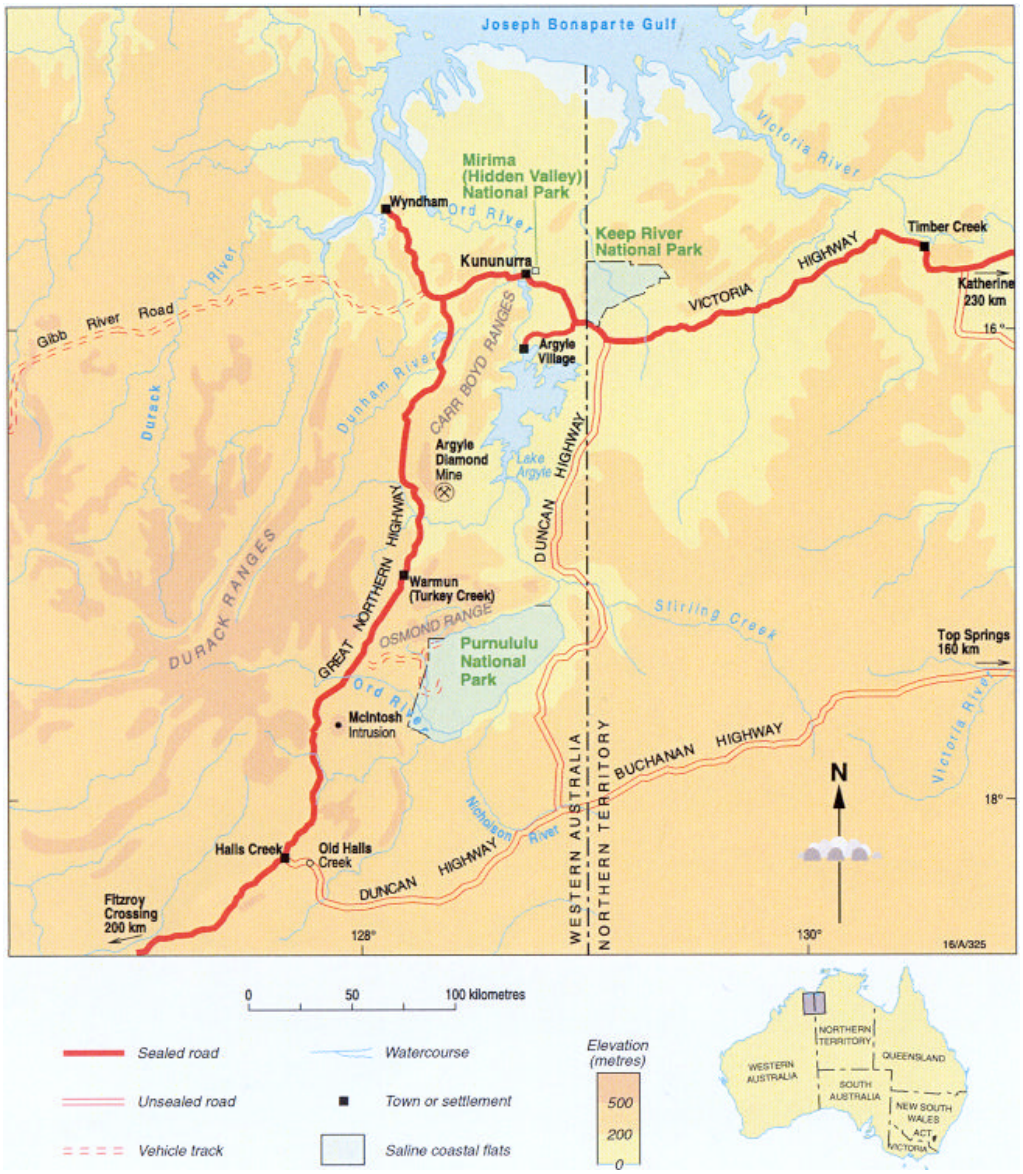
la biodiversité et que les normes les plus élevées soient appliquées en matière d'évaluation de l'environnement, planification, gestion et suivi;

ii. de donner la priorité à l'intégration de la Réserve de conservation de Purnululu dans le parc et à l'extension du parc dans le paysage pastoral voisin afin d'ajouter un atout naturel et culturel important et de fournir une meilleure zone tampon et de meilleures limites pour le parc;

iii. d'augmenter considérablement les ressources financières et humaines du site afin d'améliorer la gestion du patrimoine naturel et culturel et d'atténuer les impacts des herbivores et des espèces envahissantes; d'améliorer les aménagements pour le personnel et les visiteurs; et de poursuivre les négociations qui conduiront à améliorer l'accès au parc tout en prenant bien soin d'éviter les impacts indésirables d'un nombre de visiteurs accru sur les valeurs naturelles et culturelles du site;

iv. de fournir, dans deux ans, un rapport détaillé sur les progrès accomplis concernant ces questions.

Carte 1 : Localisation Générale du Site



Carte 2: Détail du Site