DEPT CONSERVATION AND LAND MANAGEMENT

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Conservation values of the Meentheena pastoral lease.

1. Background.

The Meentheena pastoral lease was listed for sale in mid 1996. At that time, a desk-top assessment of the conservation values of the lease was performed. This indicated that the area was of interest as a potential addition to the conservation estate of WA. However, no further action was taken as other acquisition options were considered to have higher priority.

Various circumstances lead to CALM becoming more interested in a detailed assessment of the Meentheena lease as a potential conservation reserve. These included the possibility that the State purchase the property to facilitate construction of the proposed 'Ripon Hills road' (Marble Bar to Woodie Woodie), and other acquisition options being resolved.

An inspection of the property was undertaken between 3-7 March 1996, by Dr Peter Kendrick (Regional Ecologist, CALM Karratha) and Mr Chris Muller (Regional Manager, CALM Karratha). The lessee, Mr Andrew Glenn, accompanied the CALM party for most of the visit, including a 2 hour aerial reconnaissance of the entire lease area.

2. Pastoral history.

Meentheena has been under pastoral lease for most of this century. The old Meentheena homestead, located 20 km south of the present homestead site, was destroyed by floods during the 1930's. The homestead was relocated at that time to its present position. However, for significant periods of time the station was not occupied on a permanent basis.

The Meentheena lease had for some time been operated as a part of the Mount Edgar lease, with Meentheena's homestead used as an outcamp. Both properties were purchased by the Glenn brothers in the late 1980's, who lived in separate homesteads. More recently, Tony Glenn (based at Mount Edgar) purchased Corunna Downs, and managed his Mount Edgar operation from there. The Glenn brothers have informally agreed to split the Meentheena / Mount Edgar lease between. The exact nature of this boundary is not formally determined, and some level of flexibility needs to be maintained in finalising boundary alignments.

The current lessees have been in occupation for about eight years. Meentheena, along with other leases in the area, was quarantined under the tuberculosis eradication program of the late 1980's, and was completely de-stocked. The present herd was established from scratch by the lessee.

Figure 1. Location of Meentheena pastoral lease, and the tenure of lands surrounding the lease. Vacant crown land is shaded green, and pastoral lease is shaded yellow. The Meentheena boundary is in red. Note that the western boundary is approximate only.

3. Location and road access.

Meentheena lies 230 kilometres ESE of Port Hedland, and 80 kilometres east of Marble Bar (Figure 1). Access is from the Marble Bar - Nullagine road, past the Mount Edgar homestead. The Nullagine - Marble Bar road is a major formed gravel road, while the Mount Edgar - Meentheena road is a graded track. Both are impassible after heavy rain, while the Nullagine River crossing close to Meentheena is often too deep to cross after rain.

The proposed Ripon Hills road will, if constructed, provide an all weather sealed road access across Meentheena, but not necessarily to the homestead. All other road access on the property is either by graded tracks or by unimproved tracks (not graded for many years; Figure 2).

There are two serviceable air strips at the Meentheena homestead. One is a large RFDS-sized strip (on the west side of the river), and a smaller strip close to the homestead east of the river. Both strips have two runways.

4. Adjacent lands.

Figure 1 shows the tenure of lands surrounding the Meentheena lease.

To the south and east lies a large area of vacant crown land. Aside from a small area of VCL on the northern boundary, the lease is bordered by pastoral leases.

The south western boundary is shared with Corunna Downs and Mount Edgar, which are managed from Corunna as a single unit. To the north west lies Eginbah, and to the north east lies Warrawagine.

Figure 2. Meentheena pastoral lease. The boundary is shown in red. Note that the western alignment is approximate only, as it conforms to un-mapped fences which are in some cases not completed.

The proposed Ripon Hills Road is indicated by the heavy dashed brown line. Roads marked in green are graded tracks. All other tracks are unimproved and are of generally low quality. Many of the tracks indicated on current topographic maps are no longer passible, and other tracks are present which are not marked.

Two air strips are indicated by yellow circles.

5. Physical and biological resources.

5.1 Climate.

Weather records have been kept at Marble Bar (80 km west) since the late 1800's. The weather and climate of Meentheena are probably similar to that of Marble Bar, which in turn is similar in general to elsewhere in the central Pilbara. Rainfall is low and erratic, falling mostly in January and February. Meentheena would receive an average annual rainfall of about 320mm, falling generally between December and March. However, this pattern is subject to great variation and unpredictability. Average maximum temperatures range from 22 ^{o}C in winter to 40^{o}C in summer, with average minimums from 8-24^{o}C.

5.2 General landforms.

Meentheena lies across two major geological units, the granites of the western part of the property and on the upper Yilgalong Creek, and the lower Proterozoic Fortescue Group rocks, predominantly sandstones, basalts, shales and dolomites.

Granite based landforms are characterised by sandplains, with emergent granite hills, domes and boulder piles. The appearance of these granite features varies, from the smooth rounded features in the west to the much more weathered appearance of the Yilgalong granites. The overall impression of the granite sandplains is of low relief, and a relatively featureless landscape broken only by occasional granite exposures.

Vegetation is primarily spinifex grasslands, often with very little overstorey at all. Water courses are shallowly dissected, with very little permanent water sources on them.

The rest of Meentheena is by contrast very rugged, with heavily dissected ranges and hills on both sides of the Nullagine River, and extending eastward to the Oakover River valley. The Fortescue Group rocks are a diverse and complex group, which together result in a rough, hilly landscape. The area is deeply dissected by various watercourses, including the Nullagine River, Yilgalong Creek, Elsie Creek, Police Creek, Stony Creek, Bookabunna Creek and others.

This country is better vegetated than the western sandplains, although vegetation is much denser within the valleys and gullies than on the rocky hill sides and tops. Major valleys can be densely vegetated, and most carry permanent or semi-permanent water sources. Some of these are quite scenic.

5.3 Surface geology.

Surface exposures on Meentheena are approximately one quarter Archaean and three quarters Proterozoic (estimated from the Nullagine 1:250 000 geological sheet, Hickman 1978). These correspond to the granite and Fortescue Group units discussed above. Figure 3 shows the distributions of these units (derived from Hickman 1978).

Four Archaean units are recognised, lying on the western and south eastern parts of the lease.

- Mount Edgar Batholith. Granitic rocks, mainly folded gneisses and migmatites, with felsic intrusions and minor granite exposures. Quaternary eluviums overlie the granitic base, which outcrop occasionally.

Figure 3. Physiographic diagram of the major geological units of the Meentheena area, taken from Hickman 1978. Note that the Meentheena boundary (in red) is only approximately marked.

- Yilgalong Granite. Folded gneisses and migmatites, with dolerite intrusions. Basically similar to the Mount Edgar units above.
- Kelly Belt. Basalts, with felsic volcanics.
- Mount Elsie Belt. Basalts, with felsic volcanics. These last two units are very minor in extent on the Meentheena lease, but represent the only mafic units in the area.

The Proterozoic units are a complex of basalts, dolomites, chert breccias, sandstones and conglomerates, limestones and minor exposures of dacite porphyry. These occupy the greater part of the lease, including the central area surrounding the Nullagine River. The Meentheena Carbonate member contains extensive outcrops of stromatolite fossils, which are of great geological heritage significance. These deposits, known as the Meentheena Carbonate, are currently under detailed investigation by Prof. S. M. Awramik (Department of Geological Sciences, University of California, Santa Barbara). The Meentheena Carbonate stromatolites appear to represent the oldest lake bed deposits known anywhere on earth, and the most ancient lake bed life form (2 700 million years old). The Meentheena outcrops are the best individual outcrops of this deposit anywhere in the Pilbara, with an outcrop pattern that allows detailed three-dimensional reconstruction of this ancient environment. Scientifically, these deposits are of international significance, and are the subject of ongoing field and laboratory investigations (pers. comm, Prof. S. M. Awramik).

The only geological unit present within already existing conservation reserves are the gneiss / migmatite units of the Mount Edgar and Yilgalong granitics. Minor exposures of granitic rocks are present in the north western parts of Millstream-Chichester National Park, and in western parts of Cane River Station, 400 - 600 km to the west. The variety of geological units present, and the generally high level of geological complexity on the Meentheena lease indicate a high level of biogeographic complexity.

Mining activity has occurred on Meentheena in the past, although little activity has occurred recently. The Twenty Ounce Gully and Yandicoogina Creek areas had numerous gold mines in them. Manganese and fluorite were also mined from Meentheena (from the Ripon Hills and just north of the Meentheena homestead respectively).

5.4 Soils.

No detailed descriptions of soils are available for this report at this time. However, soils appear to conform to the following general patterns.

Deep sandy soils of quaternary origin overly the granitic rocks of the Mount Edgar and Yilgalong granitic units. Within the range country surrounding the Nullagine River, soils are shallow and poorly developed.

5.5 Land systems.

Agriculture WA (Rangelands Survey Unit) are currently undertaking a survey of rangeland condition throughout the Pilbara. This work also involves mapping land systems at 1:250 000 scale. Unfortunately, this work is not yet undertaken for the Meentheena area. Results of the study should be available by the end of 1997.

5.6 Erosion.

No problem erosion was apparent during our visit. The granitic sand plains are not susceptible to erosion except under exceptional circumstances, and the hilly country along the river is overwhelmingly an erosion-derived landform. Major sediment movements within the river channels are normal following flood events, and these can result in dramatic changes after large floods. However, these events are considered to be natural processes and are not cause for concern.

5.7 Surface waters.

Meentheena pastoral operations depend almost entirely upon natural water sources. Four windmills are maintained for stock purposes in the western portion of the lease.

The hilly area around the Nullagine River has abundant permanent and semi-permanent waters. These include large, deep pools in the river, rockholes and springs of various sizes in minor creeks, and soakages. Many are used as stock watering points

6. Vegetation and flora.

6.1 Native flora.

The Meentheena lease lies within the Pilbara Region of Beard (1971), and contains elements of the Abydos Plain, George Range and Oakover Valley physiographic units (Figure 4). Beard's Oakover subunit contains Proterozoic volcanic and sedimentary rocks, while the Abydos Plain and George Range include the Archaean units. None of these major sub-units of Beard's Fortescue Region (the Pilbara biogeographic region of IBRA, the Interim Biogeographical Regionalisation of Australia) are represented elsewhere in existing conservation reserves.

Two major community types were recognised by Beard (1971). *Acacia* (*A. pyrifolia* and *A. inequilatera*) shrubs over *Triodia* (*T. pungens, T. wiseana*) hummock grasses occur over the sandy granitic country of the Mount Edgar and Yilgalong units. Eucalypt woodlands (*Eucalyptus leucophloeia* and *Corymbia* spp) over *Triodia* (*T. pungens, T. wiseana, T. basedowei*) hummock grasslands dominates the rocky Proterozoic units along the Nullagine River.

Riverine communities are typical of those found in such habitats throughout the Pilbara. Permanent pools and wetlands carry *Melaleuca argentia, Eucalyptus camaldulensis, Sesbania formosa,* and various aquatic species. Ephemeral water courses support coolibah woodlands (*E. victrix*) and acacia shrublands (*A. trachycarpa*).

These community types are well represented in Pilbara conservation reserves. However, the proximity of Meentheena to the Great Sandy Desert, the Oakover River and the coastal extension of the Northern Botanical Province makes it very likely that unique assemblages not represented in existing conservation reserves occur there.

Figure 4. A map of the natural regions and physiographic units of the Pilbara, taken from Beard 1971. The general area of the Meentheena pastoral lease is indicated in red. Note that this is only approximately indicated because of the scale of the map. Meentheena has representative areas of Abydos Plain, George Ranges and Oakover Valley physiographic units.

6.2 Weeds.

Three species of weed are naturalised in suitable habitat throughout the Meentheena lease. One is a declared weed, but all are naturalised throughout the Pilbara.

Buffel grass (*Cenchrus ciliaris*) grows along nearly every water course on the lease. It is very abundant on the Nullagine River floodouts, where it is the primary stock feed. In some areas a cooch grass (*Cynodon* sp.) is still dominant, although buffel is generally dominant elsewhere. Buffel has spread to some areas of suitable soils away from the rivers and creeks, including some small areas of crab-hole.

Kapok bush (*Aerva javanica*) has recently become very apparent along roads and tracks on the station, but has probably been present for a long time. It appears to be spreading slowly away from disturbed areas like graded track margins. Reasons for this sudden increase are unclear.

Mexican poppy (*Argemone ochroleuca*) is present in small numbers in the Nullagine River bed. It is widely distributed in the Pilbara in this habitat, and although a declared weed species, it is not controlled while it remains confined to water courses.

7. Fauna.

7.1 Native fauna.

No detailed information is known of the fauna of Meentheena, although it is likely to contain reptile, mammal and bird populations of significance. Proximity to the Oakover River and the Northern botanical Province ensures a high diversity of bird species, including species usually found in the tropics.

The brief field visit did identify some species of interest.

Mammals. A large number of native mammal species are potentially present on Meentheena, including dasyurid, rodent, macropod and bat species. These could include spectacled hare wallabies (*Lagorchestes conspicillatus*) and orange horseshoe bat (*Rhinonicteris aurantius*), both known to occur in country to the west of Meentheena (and not on conservation reserve). Dingos are present in small numbers, despite no aerial baiting or trapping being undertaken by the pastoral lessee.

Four species of interest were observed.

- bilbies (*Macrotis lagotis*); burrows and sightings by the Glenns.
- pebble mound mice (*Pseudomys chapmani*); active mounds.
- Rothschild's rock wallaby (*Petrogale rothschildii*); observed on cliffs.
- brush tailed possum (*Trichosurus vulpecula arnhemensis*); footprints.

Birds. Few bird species were observed during the visit of particular conservation significance. These included many spinifex birds (in mature spinifex communities), jabirus (known to nest along the Nullagine River), and northern emu wrens. However, the variety of habitats in the Meentheena area, and the proximity of the lease to both the Oakover River, the Great Sandy Desert and the rocky country of the Nullagine / Marble Bar mineral fields guarantees that the area will carry a large bird fauna. The large permanent waters along the Nullagine River provide important breeding areas for some aquatic species.

The current lessee claims to have sighted night parrots on the lease about four years ago, near Dingo Creek. This is a rugged, though well watered area and is a possible refuge area for this exceedingly rare (and possibly extinct) bird.

Reptiles. Pilbara olive pythons (*Morelia olivacea barroni*) and black headed pythons (*Aspidytes melanocephala*) are known to occur at the homestead. Woma (*Aspidytes ramsayi*) probably occur on the sandy country to the west, and near the Yilgalong Creek. The reptile fauna of the area will be very different to those of existing conservation reserves on the Pilbara, and is likely to contain undescribed species of reptile.

Fish. Casual observation suggests that the area has quite a rich fish fauna, concentrated in the Nullagine River. Species observed included spangled perch, rainbow fish, barred grunters and fresh water herring. Eels are also known from the river. Proper survey would no doubt add several more species.

7.2 Feral animals.

Pest species known to occur on Meentheena include donkey, camel and cat. Donkey and camel are subject to control by shooting, and are not in large numbers. Cats appear to be uncommon, possibly because of the presence of dingos. Wild horses appear to have been eradicated (or nearly so) from Meentheena.

8. CALM's inspection.

An inspection of the property was undertaken between 3-7 March 1997. The visit allowed for a number of vehicle traverses of roads and tracks on the station, and a 2 hour aerial reconnaissance of the entire lease. Ground and aerial traverses are shown on Figure 5.

8.1 Condition of the lease.

Pasture values on the lease at the present time are very good, due to the heavy rain fall this season. However, good pastures are concentrated into the river and creek valleys. Because of the nature of most of Meentheena country, stock do not use the majority of the land area. For this reason, conservation values over much of the area have not been compromised by cattle management.

8.2 Previous management.

The Meentheena lease has in the past suffered considerable neglect, and was 'mined' of cattle and improvements prior to the current lessee taking over. Roading, artificial watering points, yards, buildings and fences were either removed, destroyed or neglected.

Figure 5. Aerial and ground traverses covered during the March visit. The orange shows the route flown, at heights of less than 300 metres. The green line shows ground traverses, mostly by vehicle. The heavy dashed brown line indicates the proposed Ripon Hills Road alignment.

8.3 Fencing.

The current lessees have installed some internal fencing, and have partially fenced the boundary with Mount Edgar and Eginbah. Boundary fences do not follow cadastral alignments, but follow the most suitable topographic alignment. Where it is complete, this fencing is in good condition.

The major problem with fencing in this area is damage caused by flooding. However, because of the limited nature of the pastures available, and the generally rugged terrain, cattle from outside Meentheena are unlikely to wander into the lease in large numbers. Fence maintenance is shared between neighbouring stations.

8.4 Buildings.

Buildings on Meentheena are pretty basic. The homestead (on the east side of the river) is half iron shed and half bough shed, with a tin roof. A lock-up ATCO transportable is attached. A number of sheds (the old shearing shed etc are located on the west side of the river. None of these appear to be lock-up. No other serviceable buildings are present on the lease.

8.5 Roads.

A minimal number of roads are graded on the station (Figure 2). Other tracks are not maintained, although most have been graded at some time in the past.

The proposed Ripon Hills road will completely bisect the Meentheena lease along an east/west axis. This will provide all weather access into Meentheena, but not to the existing homestead. This road will be heavily used by industrial haulage and traffic to the aboriginal communities in the Great Sandy Desert, and increasingly by tourist traffic to areas like Rudall River National Park, Carawine Gorge and elsewhere on the Oakover River. The point at which this new road crosses the Nullagine River (Tumbinna Pool) will become a focus for recreation. The pool is permanent and deep, and has a large shady trees along both sides.

9. Assessment of Meentheena under IBRA criteria.

9.1 The 'IBRA' Report.

The development of a comprehensive representative conservation reserve system for Australia began in the mid 1980's, with the National Index of Ecosystems, providing a nationally accepted ecosystem classification. In 1989, this process was incorporated into the Environmental Resources Information Network, which lead to development of a national system of biogeographic regions.

Thackway and Cresswell (1995; An interim biogeographic regionalisation for Australia, IBRA) present the results of these studies, and develop a range of conservation planning attributes for assessing the conservation priorities for individual bioregions. These planning attributes included

- The reservation status of each IBRA region, as percentage area in reservation.

- The bias in comprehensiveness of existing reserved areas. High bias means that conservation reservation does not cover all sub-regions, or that many of the extensive ecosystems that characterise a region are excluded.

- Constraints and limitations to planning the nature reserve system.

- Opportunities for alternative conservation management measures, including land acquisition, voluntary agreements and planning options.

- Determining priorities for filling gaps in the nature reserve system

1.2 Results of the IBRA study relevant to the Pilbara.

The IBRA biogeographic region 'Pilbara' corresponds to Beard's (1975) Fortescue phytogeographic district. Of the 80 regions recognised throughout Australia, Pilbara is the fifteenth largest (179287 sqr km).

Between 1-5% of the Pilbara is currently within conservation reserve (reservation status Low to Moderate), with a high index of bias (few of the environments represented, or one or more important land systems not represented in current reservations). Dominant limiting factors for the Pilbara include extinction of critical weight range (CWR) mammals, fire, feral animals (fox and cat), weeds and grazing. Existing and potential alternative conservation measures identified are land purchase, voluntary agreements and planning instruments. The IBRA report notes that land purchase is essential for acquisition of a comprehensive nature reserve system in the Pilbara.

Of Beard's (1975) physiographic units of the Pilbara region, Meentheena falls on three which are currently entirely unrepresented in existing conservation reserves (Abydos Plain, George Range and Oakover Valley). The IBRA report notes that two of the four major components of the Pilbara bioregion are currently unrepresented in conservation reserves. Meentheena covers two of these (Abydos Plain and Oakover Valley).

The IBRA report clearly identifies the Pilbara as an area requiring additional conservation estate, and where land acquisition through purchase is essential.

10. Summary and recommendations.

Meentheena is representative of bioregions (major vegetation and geological units) which are currently not represented within the State's conservation reserve system. The area is not degraded by overstocking, and future road access into the area will be good. There is a strong possibility that threatened species of both fauna and flora will be detected within the area.

10.1 Recommendation.

That the State pursue the acquisition of the Meentheena pastoral lease, for the purposes of conservation and recreation. Once acquisition is confirmed, a management plan be prepared to detail management arrangements for the Meentheena lease.

10.2 Recommendation.

That as much of the western granite/sandplains (Beard's Abydos Plain) be retained as representative of this system. The division of this area between the lessees of Mount

Edgar and Meentheena should be undertaken to maximise the area of granite sandplain retained within the Meentheena area.

10.3 Recommendation.

That visitor management works be placed at the Tumbinna Pool locality at the time that the Ripon Hills Road is constructed, to minimise negative impacts of visitation and camping at the pool.

10.4 Recommendation.

That following acquisition, a full fauna / flora inventory survey be undertaken to properly assess the nature conservation values of the area.

References.

Beard, J S. 1971. Vegetation survey of Western Australia. Sheet 5, Pilbara, and explanatory notes. University of Western Australia Press, Perth.

Hickman, A H. 1980. Lithological map and stratigraphic interpretation of the Pilbara Block. Bulletin 127, Geological Survey of WA, Perth.

Thackway and Cresswell (1995; An interim biogeographic regionalisation for Australia, IBRA

Plate 1. Tumbinna Pool, Nullagine River, adjacent to the proposed crossing of the Ripon Hills road.

Plate 2 Tumbinna Pool, Nullagine River, upstream to the proposed crossing of the Ripon Hills road.

Plate 3. Tumbinna Pool, showing the Ripon Hills road trace line crossing the Nullagine River.

Plate 4. Un-named permanent pool on the Nullagine River, close to Police Creek. Rock wallabies and possums were present in the cliffs along the river.

Plate 5. Junction Pool, Nullagine River. A large permanent pool close to the southern boundary of Meentheena.

Plate 6. View southward from the top of hills south east of the Meentheena homestead. Nullagine River in the valley below. Hills are the Proterozoic rocks lying between the two Archaean Mount Edgar and Yilgalong granitic units .

Plate 7. View eastward from the top of hills south east of the Meentheena homestead. The Yilgalong granitic basin lies in the background, beyond the low ridge in the middle distance.

Plate 8. Baroona Hill on the Nullagine River, a sandstone conglomerate outcrop eroded by the river. The Nullagine River is visible close to the hill.

Plate 9. Permanent spring wetland in the hills south east of the Meentheena homestead. This reduces to a soakage during drought times, but never ceases to discharge some water to the creek and rockhole below.

Plate 10. Spinifex and *Acacia* sandplains of the Abydos Plains, in the western parts of Meentheena. Granite boulder hills (present in the middle distance) occasionally outcrop from the sandplain.

Plate 11. A stromatolite outcrop not far from Meentheena homestead. Extensive outcrops of stromatolite are present on Meentheena, in the vicinity of the Nullagine River.

Plate 12. Footprints believed to be those of brushtail possum (*Trichosurus vulpecula arnhemensis*), in mud near cliffs along the Nullagine River.