

AUSTRALIAN CENTRE FOR TROPICAL FRESHWATER RESEARCH

CAMEL CREEK MINE

ENVIRONMENTAL IMPACT ASSESSMENT

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ES/02

1. FLORA

The vegetation, in the area covered by the mine site, is open woodland dominated by Eucalyptus crebra (Narrow-leafed Ironbark) and E. normantonensis (Box). This is a very common community throughout this general area, although which species is locally dominant usually depends on the topography. E. normantonensis is dominant on the ridges (see Figure 1), although isolated trees of E. crebra and E. papuana may be present. On the lower slopes and drainage gullies, E. crebra is dominant, whilst along the watercourses, E. papuana (Ghost Gum), E. platyphylla (Cabbage or Poplar Gum), E. polycarpa (Grey Bloodwood), E. tereticornis (Forest Red Gum) and E. whitei (White's Ironbark) also occur together with Casuarina cunninghamiana (Black She-oak) and Lophostemon grandiflorus (Swamp Mahogany).

Shrubs and small trees occur mainly on the ridges and along the drainage channels. The dominants in this layer were: Acacia decora, A. hammondii, A. umbellata, Erythroxylum australe, Hovea longipes, Maytenus cunninghamii and Petalostigma banksii on the ridges; Acacia aulacocarpa, A. bidwillii, A. hammondii, Bursaria incana, Erythroxylum australe, Maytenus cunninghamii and Petalostigma pubescens were common along the creek.

Ground cover was sparse throughout. Many species could not be identified to species level because of the lack of reproductive structures; however, the grasses that appeared to be dominant throughout the study site were species of Aristida (Three-awned Grass), Eragrostis spp. (Love Grass) and Heteropogon contortus (Bunch Spear Grass).

All species recorded for the study site are listed in Appendix 1. None are rare or endangered.

Species most suitable for rehabilitation of the area would be the dominants Eucalyptus crebra and E. normantonensis, as well as any of the wattles present, as all these are well adapted to the harsh environment. Good natural recruitment of E. normantonensis was noted.

2. FAUNA

The faunal survey concentrated on the vertebrate fauna, although obvious invertebrates were noted. Methods included walking and driving over the entire study site (Figure 1) during two full days and about seven hours at night. During night-time observations a 55W spotlight was used from the

vehicle (three hours) or while walking (four hours). A small-scale trapping program was employed both nights using five Sherman and five Elliott traps (for possums, rats, etc.).

Consideration of the fauna must take into account the resources available. As the floral survey indicates, the study site did not have a great diversity of plants. The most notable feature was the lack of ground cover and the consequent substantial erosion of the ground surface and water courses, leading to widespread removal of topsoil. There was no running water on the sites, but standing water was available in one small and one large dam.

Invertebrates

Termites were the most obvious invertebrates on the site, and were active in most dead wood and in some live trees. Ants (four species noted) were not abundant. Wolf spiders were very abundant on the ground at night, as would be expected in the absence of ground cover. Other ground dwelling invertebrates noted were centipedes, native cockroaches and crickets, but all were in low numbers. Greater numbers of insects would be expected given greater ground cover; the bare soil of most of the site was not conducive to the development of most insect populations. Arboreal insects noticed were various leaf insects, caterpillars and cicadas. Four species of butterfly were observed, but the population numbers were low. Generally, therefore, the site was noteworthy only for its lack of invertebrate diversity compared with similar places which have not suffered intense grazing pressure and drought.

The two dams provided some contrast to the rather bleak terrestrial picture. Black Cow Dam, especially, had a rich biota. There were several macrophyte species noted, and the invertebrate fauna was rich. A full-scale survey was not attempted, but the following major taxa were noted: Dugesia (Platyhelminthes), various Oligochaeta, Physastra and Segnitila (Gastropoda), Alathyria (Bivalvia), Tasmanocoenis and ?Cloeon (Ephemeroptera), various Trichoptera, Chironomidae (Diptera), several Odonata, Veliidae and Gerridae (Hemiptera), various Coleoptera, and Macrobrachium australiense (Crustacea). In short, brief examination indicated a rich aquatic macroinvertebrate fauna, but without unexpected taxa. The most noteworthy animals were the mussel (Alathyria) and the shrimp (Macrobrachium), both of which are large, but common, inhabitants of freshwater bodies in the region. The mussel may be an important food source for water rats (see below) and the shrimp is probably eaten by fish and birds such as grebes and cormorants.

Vertebrates

Given the time available, most effort was put into

searching for birds and mammals. However, given the sparse ground cover and the intensive nature of the study, a good indication of the relative abundance and diversity of other groups was gained.

Fish were present in the dam in good numbers. As an aquatic survey was not done, no fish were captured for identification. However, given the apparently rich nature of the rest of the aquatic biota, and the presence of fish-eating birds (see below), it is likely that a substantial fish fauna is supported. It is unlikely that diversity is very high, given the ephemeral nature of the streams that drain the area.

Amphibians that were noted were the Cane Toad (Bufo marinus) (tadpoles in Bob's Dam) and one unidentified frog species calling at Black Cow Dam. No amphibians were found away from the dams.

Reptiles were surprisingly scarce. The usually common skinks were not present, and no other reptiles were seen. Site workers reported occasional sightings of snakes and "large lizards" (possibly goannas). No freshwater turtles were seen. The reptile fauna, therefore, was notable only for its absence.

The bird fauna was not so depauperate. The 42 species seen in the vicinity of the study area are listed in Appendix 2A. The list includes 13 species which are aquatic or partly so, and which are therefore dependent on the dams. Black Cow Dam supported all the aquatic species, while three species were recorded, in low numbers, at Bob's Dam.

Twenty-nine non-aquatic species were recorded. This total includes the Magpie Lark which was only seen near the dam and may in fact be confined to it during the dry season. The Emu was not seen on the study site but is included in the list as it was seen nearby, and was reliably reported from the site. Absent, or in low numbers, were species normally associated with well-grassed areas, such as quail, finches, doves (present in low numbers), wrens, etc. Surprisingly, no large raptors (such as the Wedge-tailed Eagle, and kites) were seen either on or near the site. Ground-feeding birds included the omnivorous Magpie, Crow, Apostlebird and Babbler, and the predatory Butcherbird and Kookaburra. Most other species were arboreal, feeding on nectar and flowers, seeds, and insects on leaves and bark. No unusual or unexpected species of birds were seen.

A quantitative census of birds was done by walking a transect through the site between 8.30 and 10 a.m., and counting all birds within 50m either side of the transect line. The transect was 1.8km in length, so the area covered was about 18ha. The species counts are shown in Appendix 2B. The density of arboreal species was rather low in comparison with some other areas of less disturbed woodland, particularly for ground-feeding birds other than the Magpie.

Despite considerable effort, only a very limited mammal fauna was recorded. The species seen on or close to the site are listed in Appendix 2C. Other species which may be added to the list include the Water Rat (Hydromys chrysogaster) (possibly in Black Cow Dam), and several species of microchiropteran bat. The list is noteworthy for its lack of small mammals (e.g. native rats and mice) and arboreal species (possums), none of which were trapped or seen. Of the species recorded, there was evidence only for the bats, Feral Pigs and possibly Echidna of more than one adult individual. The Rufous Bettong, identified from a photograph taken by the consultant archaeologist on the site, was carrying a joey in its pouch.

The site therefore supported a small sample of the species possible for this area of woodland, and only low population densities. No unusual species were recorded. The most environmentally significant mammal species present were non-native, namely the Feral Pig and the cattle, both of which cause substantial damage to the land.

Conclusion

No rare or threatened species were recorded. Non-aquatic animal populations were mostly of low density and low diversity. The depauperate nature of much of the fauna may be ascribed to the land degradation caused by drought and excessive impact of cattle. Future impact of the open cut mine will be of small long-term significance, if confined to the extent of the current proposal, which avoids damage to Black Cow Dam, and if full rehabilitation is effected. Destruction of Bob's Dam will be of little importance, and erosion-protection measures such as construction of small dams on water courses will improve the area greatly. It should be noted that the greatest impact on the wildlife of the general area may be caused by the increase in population associated with the mine. It is suggested that recreational activities that might cause direct impact (e.g. shooting) or indirect impact through land degradation (e.g. off-road driving) should be strongly discouraged.

3. SOILS

Soils, other than the creek alluvium, were relatively uniform throughout, chiefly varying in depth and presence or absence of the A horizon. In most cases the latter had been eroded so that either the parent rock or the clay subsoil was exposed. On the ridges, soil was almost non-existent so that the underlying lateritic rocks were exposed. Further down the slopes the soil depth increased. Here they were yellow-brown duplex soils often mottled with small ironstone nodules. All were either neutral or slightly acid. Along the creek, unstructured yellowish-brown alluvium was encountered. In the drainage channels the mottled duplex soils were grey-brown at the surface becoming yellowish-brown with depth; they were slightly acid.

Samples of soils from just below the surface were taken for analysis. The area included in the study was badly eroded, hence soil and grass cover were sparse. It is suggested that small dams be constructed at regular intervals along all drainage lines, both large and small, so as to reduce run-off and minimise erosion. These dams need not be elaborate; in some instances, a few logs and stones placed across the drainage line should be sufficient to break the velocity of storm rains and hold back debris. In general, the area does not appear suitable for the construction of contour banks, although small ones would probably be beneficial in some areas. As part of the rehabilitation, a series of small dams or banks along major drainage channels would reduce the effects of subsequent erosion considerably. They would also replace Bob's Dam which is to be destroyed by the mining operation. Some of these dams would need some rock fill at the base to prevent scouring. The subsequent accumulation of soil will encourage grass growth which in turn will help to bind the surface and so reduce erosion.

4. USE OF NATIVE SPECIES FOR REHABILITATION

Tree species most suitable for rehabilitation would be Eucalyptus crebra and E. normantonensis. It is unlikely that seeds or seedlings of these two species would be available from commercial sources. However, if seeds are collected in the field, then the Botany Department, James Cook University is prepared to grow them and provide well developed seedlings suitable for planting in the field. Establishment will be maximised if plantings are carried out at the onset of storms or the wet season. The seedlings would be provided at reasonable cost. Native grasses would soon seed into the area wherever soil was present. Some pasture grasses could be sown, seeds of which are readily available from commercial sources. It would be desirable to consult the property owner as to the species preferred.

APPENDIX 1. PLANT SPECIES LIST - GOLDEN ANT MINE SITE

- Trees. Casuarina cunninghamiana
 Eucalyptus crebra
 E. normantonensis
 E. papuana
 E. platyphylla
 E. polycarpa
 E. tereticornis
 E. platyphylla x tereticornis
 E. whitei
- Shrubs. Lophostemon grandiflorus
 Acacia aulacocarpa
 A. bidwillii
 A. decora
 A. hammondii
 A. holosericea
 A. umbellata
 Alphitonia excelsa
 Amorphospermum antiloquum
 Atalaya hemiglauca
 Bursaria incana
 Carissa ovata
 Capparis sp.
 Coelospermum reticulatum
 Denhamia oleaster
 Dodonaea lanceolata
 Erythroxylum australe
 ? Grevillea parallela
 Grevillea striata
 Grewia retusifolia
 Hakea lorea
 Hovea longipes
 Maytenus cunninghamii
 Persoonia falcata
 Petalostigma banksii
 P. pubescens
- Grasses, Herbs, Vines and Epiphytes
 Abelmoschus moschatus
 Aeschynomene sp.
 Aristida calycina
 Aristida spp.
 Bothriochloa sp.
 Capparia lasiantha
 Cheilanthes sp.
 Chrysopogon fallax
 Crotalaria mitchellii
 Cyperus sp.
 Dendrobium caniculatum
 Digitaria sp.
 Enneapogon sp.
 Eragrostis sp.
 Euphorbia microdenia
 E. tannensis
 Evolvulus alsinoides
 Fimbristylis sp.
 Flemingia sp.

Glycine sp.
Heteropogon contortus
Jasminum didymum
Ludwigia octovalvis
Oxalis sp.
Panicum spp.
Parsonsia lanceolata
Paspalidium sp.
Phyllanthus fuernrohrii
P. virgata
Pterocaulon sp.
Rhynchelytrum repens
Richardia brasiliensis
Ruellia sp.
Setaria sp.
Sida retusa
Solanum ellipticum
Spermacoe sp.
Tephrosia juncea
Vernonia cinerea
Waltheria indica
Wedelia sp.

Note - Other herbs and grasses will be present during the wet season.

APPENDIX 2. BIRDS AND MAMMALS OF GOLDEN ANT MINE SITE

A. BIRD LIST

Dromaius novaehollandiae (Emu)
Tachybaptus novaehollandiae (Australasian Grebe)*
Pelecanus conspicillatus (Australian Pelican)*
Anhinga melanogaster (Darter)*
Phalacrocorax melanoleucas (Little Pied Cormorant)*
Egretta alba (Great Egret)*
Platalea regia (Royal Spoonbill)*
Cygnus atratus (Black Swan)*
Anas superciliosa (Pacific Black Duck)*
Anas gibberifrons (Grey Teal)*
Chenonetta jubata (Maned Duck)*
Nettapus coromandelianus (Cotton Pygmy-goose)*
Falco berigora (Brown Falcon)
Fulica atra (Coot)*
Charadrius melanops (Black-fronted Plover)*
Geopelia placida (Peaceful Dove)
Phaps chalcoptera (Common Bronzewing)
Trichoglossus haematodus (Rainbow Lorikeet)
Platycercus adscitus (Pale-headed Rosella)
Centropus phasianinus (Pheasant Coucal)
Ninox novaeseelandiae (Boobook Owl)
Dacelo novaeguineae (Laughing Kookaburra)
Merops ornatus (Rainbow Bee-eater)
Coracina novaehollandiae (Black-faced Cuckoo-shrike)
Coracina papuensis (White-bellied Cuckoo-shrike)
Myiagra rubecula (Leaden Flycatcher)
Rhipidura fuliginosa (Grey Fantail)
Pomatostomus temporalis (Grey-crowned Babbler)
Smicrornis brevirostris (Weebill)
Gerygone olivacea (White-throated Gerygone)
Daphoenositta chrysoptera (Varied Sitella)
Philemon corniculatus (Noisy Friarbird)
Philemon citreogularis (Little Friarbird)
Entomyzon cyanotis (Blue-faced Honeyeater)
Manorina melanocephala (Noisy Miner)
Melithreptus alboocularis (White-throated Honeyeater)
Pardalotus striatus (Striated Pardalote)
Struthidea cinerea (Apostlebird)
Grallina cyanoleuca (Magpie-lark)
Cracticus nigroocularis (Pied Butcherbird)
Gymnorhina tibicen (Australian Magpie)
Corvus orru (Torresian Crow)

B. BIRD NUMBERS COUNTED ALONG 1.8KM X 100M TRANSECT

Brown Falcon	1
Pale-headed Rosella	2
Laughing Kookaburra	2
Black-faced Cuckoo-shrike	1
White-bellied Cuckoo-shrike	1
Leaden Flycatcher	2
Grey Fantail	1
Weebill	2
Blue-faced Honeyeater	2
Noisy Miner	11
White-throated Honeyeater	3
Striated Pardalote	2
Pied Butcherbird	1
Australian Magpie	5
Torresian Crow	1

C. LIST OF MAMMALS

Tachyglossus aculeatus (Echidna)
Petrogale inornata (Unadorned rock wallaby)
Macropus giganteus (Eastern grey kangaroo) (skull and
droppings only)
Aepyprymnus rufescens (Rufous bettong)
Pteropus scapulatus (Little red flying fox)
?Oryctolagus cuniculus (Rabbit) (reported locally)
Sus scrofa (Feral pig)

Figure 1. Sketch map of the flora and fauna study area showing approximate positions of major features. Light stippling shows a) ridges, with associated thin soils and characteristic plant species; and b) areas where typical water-course flora and alluvial deposits occurred (see text).

