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NOTES ON THE VEGETATION AND FLORA OF ROCKY POOL, GASCOYNE RIVER

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ABSTRACT

An account is given of the flora and vegetation immediately surrounding Rocky Pool (24°45'S, 114°08'E), a semi-permanent pool located in a constriction of the Gascoyne River.

Plant collections made in 1975 and 1977 have resulted in 59 species of flowering plants being recorded for the area. The Cadjeput (*Melaleuca leucadendron*) and the River Gum (*Eucalyptus camaldulensis*) are the two species best adapted to surviving in the river bed during flood periods. They form a narrow belt of open, riverine forest upstream and downstream from Rocky Pool. The vegetation is otherwise restricted to annual and herbaceous perennial species which can re-invade the alluvial floodplain after floods. Some species appear to be transported onto the floodplain by wildlife watering at Rocky Pool. On the lateritised Toolonga Calcilutite abutting Rocky Pool, shrub species are more common than elsewhere. Five aquatic species are recorded.

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INTRODUCTION

The Gascoyne River is the second largest river in Western Australia and has a catchment area of 79,000 sq. km. The river flows west through the southern end of the Kennedy Range and across broad flood plains to Rocky Pool (lat. 24°45'S, long. 114°08'E). From here the main channel continues west emptying into the sea near Carnarvon (lat. 24°53'S, long. 113°40'E). (Fig. 1). There are numerous distributary streams forming anabranches which may flow during river floods.

Rocky Pool, 60 km from the mouth of the river, is located at a constriction in the river. It has been formed by the river incising its own flood plain to a depth of between 6 and 9 m, exposing cliffs of sedimentary formations which form the abutments (Figs. 2 and 3). It is a semi-permanent pool which remained full throughout 1967 following cyclonic rain in January and light winter rains (Allen, 1972).

Flows in the Gascoyne River are intermittent. There have been about 90 flows during the period 1906 to 1970 (65 years). During this period the river has failed to flow within a year on twelve occasions. The longest known period without river flow was 3-3/4 years during the period 1911 to 1914. There is no reliable information on the duration of river flows but they are known to range from a few days to about six months (Allen, 1972).

Because of the need for irrigation water at Carnarvon, primarily for banana and vegetable crops on the alluvial flats and adjoining river channel, several sites, including Rocky Pool have been investigated as proposed dam sites (Baxter, 1967 a and b; Allen, 1972).

In October 1975 and June 1977 plant collections were made from an area of 50 m surrounding Rocky Pool and notes made on the vegetation. At both times water was present and being utilised by a wide variety of water birds.

CLIMATE

Carnarvon lies between the winter rainfall area to the south and the summer rainfall area to the north (Gentilli, 1959). It is typified by warm to hot summers modified by strong, reliable sea breezes and by a moderate to warm winter when most of its rainfall is usually received.

The mean annual rainfall at Carnarvon is about 215 mm which is somewhat greater than is received in the rest of the Gascoyne River basin. It comes from cyclones and thunderstorms in summer and from occasional rainbearing depressions in winter. As a consequence, rainfall may vary widely from year to year.

The warmest month is February, and the coolest is July, with mean maxima of 31.2°C and 22.1°C (88.1°F and 71.1°F) and minima of 22.1°C and 10.9°C (71.7°F and 51.6°F) respectively. The average annual evaporation is about 2050 mm which exceeds rainfall tenfold. (Data supplied by Commonwealth Bureau of Meteorology).

GEOLOGY

Rocky Pool lies within the Gascoyne Sub-Basin of the Carnarvon Sedimentary Basin. The Sub-Basin contains sedimentary rocks of Palaeozoic, Mesozoic and Cainozoic age separated by regional unconformities (Condon, 1968).

The geology of the Rocky Pool area has been detailed by Baxter (1967 a & b) and Allen (1972) as part of water supply investigations.

Rocky Pool lies between outcrops of lateritised Toolonga Calcilutite (lime mudstone) of Mesozoic age. The river channel, which averages 600 m in width, is reduced to 75 m between these outcrops (Allen, 1972). The rocks extend underneath the channel forming an impermeable base to the river-bed sand.

Unconsolidated Quaternary sediments overlie the Mesozoic rocks. In the vicinity of Rocky Pool these are red to yellow-brown, medium to coarse, gravelly sands deposited in the river channel. The river bed is composed mainly of coarse sand (Fig. 3) whereas the alluvial plain away from the river consists of indurated, red-brown muds deposited by flooding, with some small sandy channels. Silt-covered islands are frequent immediately upstream of Rocky Pool and towards the mouth of the river. They appear to result from deposition of silt on high banks of sand which subsequently became fixed by vegetation and have later been partially eroded and isolated as islands.

VEGETATION

The banks of the river are lined by River Gums (*Eucalyptus camaldulensis*) in a zone about 60 m wide (Fig. 4). Occasionally they may form broader zones especially where benches incised in the clayey silt are developed by the river. The trees tend to protect and stabilize the banks during floods. Occasionally River Gums grow in the river bed and on the silt-capped islands, but the most common species growing here is the Cadjeput (*Melaleuca leucadendron*). This species forms dense stands immediately upstream from Rocky Pool and around some semi-permanent pools, but elsewhere is more scattered. In general, fewer trees appear to grow in the river bed downstream from Rocky Pool compared with upstream.

During floods, the massive volume of water and debris flowing down the river undermines and uproots many large trees as well as scouring out other

vegetation (Fig. 5). In many instances, particularly along the river banks, the River Gums are not killed but their trunks lie parallel to the ground. The trunk then gives rise to numerous adventitious shoots which form a dense coppice-like regrowth. Eventually, these branches give rise to what appear to be several individual trees forming an avenue along the banks (Plate 6). In ensuing flood years many of these branches are forced into contact thus leading to natural grafting within an individual tree (Fig. 7).

As would be expected, the vegetation of the river channel sands is scarce and limited to those opportunistic species which can re-invade after the water dries up, as is shown, for example, by the large number of Asteraceae recorded for the area (see annotated list). Also, as the river dries up, numerous birds and cattle water at Rocky Pool and would be responsible for transporting seeds onto the flat.

On the lateritised Toolonga Calcilutite abutting Rocky Pool, shrubby species such as *Cassia helmsii*, *Melaleuca glomerata* and *Crotalaria cunninghamii* are more common than in the river bed or on the alluvial flats.

The permanent water of Rocky Pool supports a dense growth of the aquatics *Najas tenuifolia*, *Myriophyllum verrucosum*, *Potamogeton javanicus*, *P. pectinatus* and a species of *Chara*.

An annotated list of species collected from Rocky Pool is included. Voucher specimens for all species are housed at PERTH.

ACKNOWLEDGEMENTS

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ROCKY POOL ANNOTATED SPECIES LIST

* indicates introduced species.

MONOCOTYLEDONAE

CYPERACEAE

Cyperus vaginatus R.Br.
Erect caespitose sedge to 1 m, inflorescences brown; in alluvial sand fringing permanent water.

LILIACEAE

**Asphodelus fistulosus* L.
Erect herb to 30 cm, flowers white; in alluvial sand.

NAJADACEAE

Najas tenuifolia R.Br.
Submerged aquatic, leaves coarse toothed; common.

POACEAE

**Cenchrus ciliaris* L.
Erect perennial, inflorescences dense, purplish; in alluvial sand.

Eragrostis japonica (Thunb.) Trin.
Erect annual to 50 cm; in alluvial sand.

Eriachne aristidea F. Muell.
Caespitose perennial to 50 cm; in alluvial sand.

POTAMOGETONACEAE

Potamogeton javanicus Hassk.
Aquatic, lower leaves linear, submerged, upper leaves broad, floating, inflorescence emergent.

Potamogeton pectinatus L.
Submerged aquatic, forming dense meadow with *Chara* sp. and *Myriophyllum verrucosum*.

DICOTYLEDONAE

AIZOACEAE

Glinus lotoides Loefl.
Prostrate grey herb, flowers greenish; in river bed in alluvial sand.

AMARANTHACEAE

Alternanthera nodiflora R.Br.
Sprawling herb, flowers white; in alluvial sand.

Ptilotus macrocephalus (R.Br.) Poir.
Erect much-branched herb to 1 m; in alluvial sand.

Ptilotus chamaecladus Diels
Erect much-branched herb to 50 cm, densely flowering, flowers pink; in alluvial sand.

APIACEAE

Daucus glochidiatus (Labill.) Fish., Mey. & Avé-Lall.
Erect herb to 20 cm; in alluvial sand.

ASTERACEAE

Angianthus aff. *strictus* (Steetz) Benth. (KFK 4674)
Herb to 25 cm, flowers white; in alluvial sand.

Angianthus sp. (KFK 4657)
Ephemeral herb to 7 cm, flowers orange; in alluvial sand.

Brachycome ciliaris (Labill.) Less.
Dense herb to 30 cm, flowers violet; in alluvial sand.

Brachycome iberidifolia Benth.
Herb to 10 cm, flowers white to violet; in alluvial sand.

Calotis breviradiata (Ising) Davis
Herb to 30 cm, flowers yellow; in alluvial sand.

**Centaurea melitensis* L.
Erect herb to 40 cm, flowers yellow; in alluvial sand.

Centipeda cunninghammii (DC.) A.Br. & Aschers
Erect herb to 18 cm, flowers white; in alluvial sand.

Flaveria australasica Hook.
Erect herb to 1 m, flowers orange; in alluvial sand.

Gnephosis eriocephala (A. Gray) Benth.
Annual herb to 4 cm, flowers yellow; in alluvial sand.

Helichrysum apiculatum (Labill.) D. Don
Annual herb to 50 cm, flowers yellow; in alluvial sand.

Myriocephalus aff. *nudus* A. Gray (KFK 4658)
Herb to 12 cm, flowers yellow; in alluvial sand.

Pluchea rubelliflora (F. Muell.) Druce
Erect herb to 50 cm, flowers mauve; in alluvial sand.

Pluchea squarrosa Benth.
Erect herb to 50 cm, flowers pink to red; in alluvial sand.

Podolepis microcephala Benth.
Annual herb up to 30 cm, divaricately branched, flowers orange; in alluvial sand.

Pterigeron liatroides (Turcz.) Benth.
Erect, branched herb to 50 cm, flowers pink; in alluvial sand.

Pterocaulon sphacelatum (Labill.) F. Muell.
Erect herb to 50 cm, inflorescences globular, flowers white, tinged pink; in alluvial sand.

Waitzia citrina (Benth.) Steetz
Ephemeral herb to 25 cm, flowers deep yellow; in alluvial sand.

BORAGINACEAE

Heliotropium curassavicum L.
Prostrate, succulent plant, flowers white; in alluvial sand.

CAESALPINIACEAE

Cassia helmsii Symon
Erect, much-branched shrub to 1 m; flowers yellow, scented; in lateritised silt stone.

CAMPANULACEAE

Wahlenbergia sp. (KFK 4678)
Erect herb to 50 cm, flowers blue; in alluvial sand.

CHENOPODIACEAE

Dysphania plantaginella F. Muell.
Erect herb to 10 m, inflorescences cylindrical, green; in alluvial sand.

CONVOLVULACEAE

Convolvulus erubescens Sims
Creeper, leaves linear, flowers white; in lateritised siltstone and alluvial sand.

Ipomoea muelleri Benth.
Trailing ephemeral, flowers pink; in alluvial sand.

GENTIANACEAE

Centaurium spicatum (L.) Fritsch
Erect herb to 30 cm, flowers pink; in alluvial sand.

GOODENIACEAE

Scaevola spinescens R.Br.
Much-branched shrub to 50 cm, flowers white; on indurated lime mudstone.

HALORAGACEAE

Myriophyllum verrucosum Lindl.
Emergent aquatic, leaves whorled, common.

MALVACEAE

Sida sp. (KFK 6332)
Much-branched shrub to 40 cm, flowers yellow; on indurated lime mudstone.

MYRTACEAE

Eucalyptus camaldulensis Dehn.
Trees to 15 m, bark white, smooth, flowers white; in alluvial sand.

Melaleuca glomerata F. Muell.
Erect compact shrub to 50 cm, sterile; on indurated lime mudstone.

Melaleuca leucadendron (L.) L.
Erect tree to 15 m, paper bark, flowers white; in alluvial sand.

PAPAVERACEAE

**Argemone mexicana* L.
Annual herb to 1 m, leaves glaucous, flowers yellow; in alluvial sand.

PAPILIONACEAE

Crotalaria cunninghamii R.Br.
Erect shrub to 1 m, leaves grey/green, flowers green; on indurated lime mudstone.

Indigofera monophylla DC.
Erect shrub 50 cm, flowers red; in alluvial sand.

Mirbelia sp. (KFK 4661)
Dense shrub to 50 cm, flowers orange; on indurated lime mudstone.

Psoralea leucantha F. Muell.
Erect shrub to 1.5 m, leaves grey/green, flowers white in racemes; in alluvial sand.

Sesbania cannabina (Retz.) Poir. var. *cannabina*
Shrub to 60 cm, flowers yellow; in alluvial sand.

Vigna lanceolata Benth.
Creeper, flowers pale yellow; in red clay soil; in alluvial sand.

PORTULACACEAE

Calandrinia sp. (KFK 4675)
Herb, leaves fleshy, flowers pink; in alluvial sand.

PRIMULACEAE

**Anagallis arvensis* L. var. *caerulea* Gouan
Spreading herb, flowers blue; in alluvial sand.

SCROPHULARIACEAE

Morgania floribunda Benth.
Erect herb to 30 cm, flowers violet blue; in alluvial sand.

Stemodia grossa Benth.
Erect viscid herb to 50 cm, flowers deep blue; in alluvial sand.

SOLANACEAE

Datura leichhardtii F. Muell.
Erect shrub to 1 m, flowers white, fruit globular, covered in numerous prickles; in alluvial sand.

Nicotiana occidentalis Wheeler
Herb to 25 cm, basally rosetted, flowers white; in alluvial sand.

**Solanum nigrum* L.
Erect much branched herb, flowers white, mature berries black; in alluvial sand.

STACKHOUSIACEAE

Stackhousia viminea Sm.
Herb to 25 cm, flowers yellow; in alluvial sand.

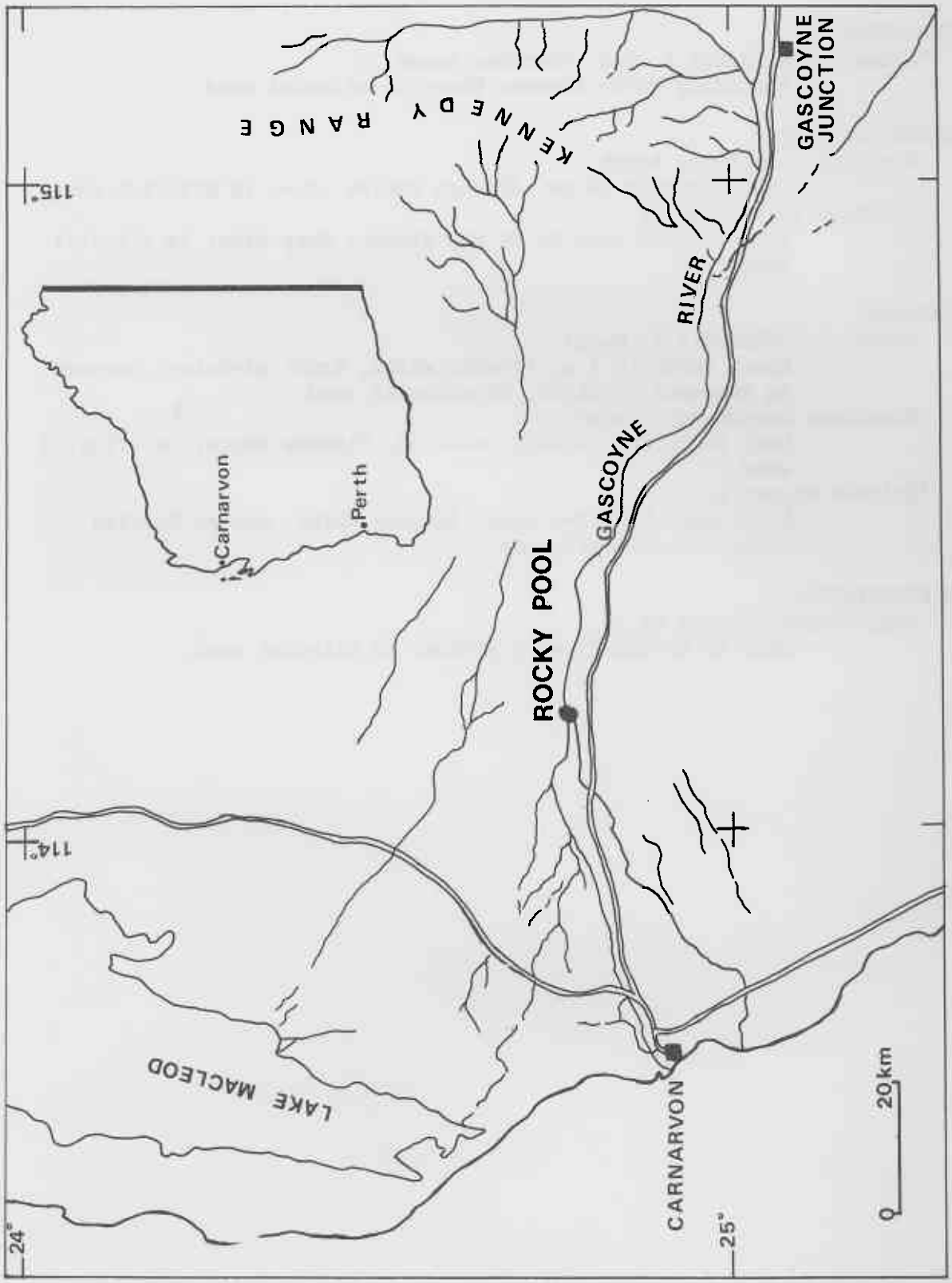

Fig. 1. Locality map showing Gascoyne River and Rocky Pool

Fig. 2. Rocky Pool from the northern abutment showing the indurated Toolonga Calcilutite.

Fig. 3. Eastern end of Rocky Pool showing bank of coarse river sand with Cadjeput (*Melaleuca leucadendron*) and River Gum (*Eucalyptus camaldulensis*) in the background.

Fig. 4. Western end of Rocky Pool showing indurated Toolonga Calcilutite (foreground) and dense stand of Cadjeput and River Gum on northern bank.

Fig. 5. River Gums (*Eucalyptus camaldulensis*) uprooted and pushed over by flood waters.

Fig. 6. River Gums with the main trunk lying parallel to the ground producing adventitious shoots.

Fig. 7. Natural grafting between River Gum branches forced into contact during flooding. Scale is in cm.