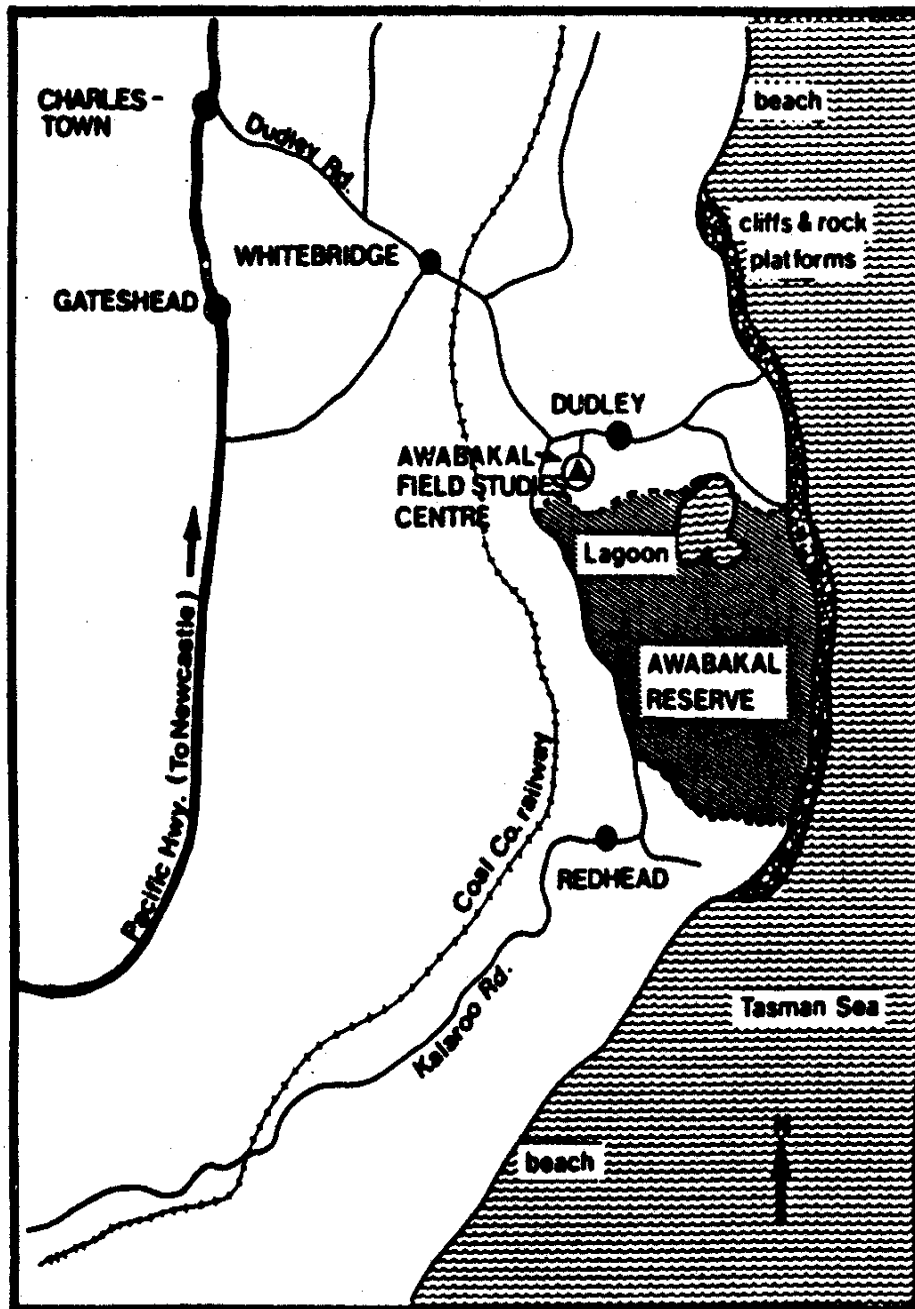


AWABAKAL NATURE RESERVE



reference
handbook

LOCATION MAP



ISBN 0-9757225-0-6
December 2004

AWABAKAL NATURE RESERVE

Reference Handbook

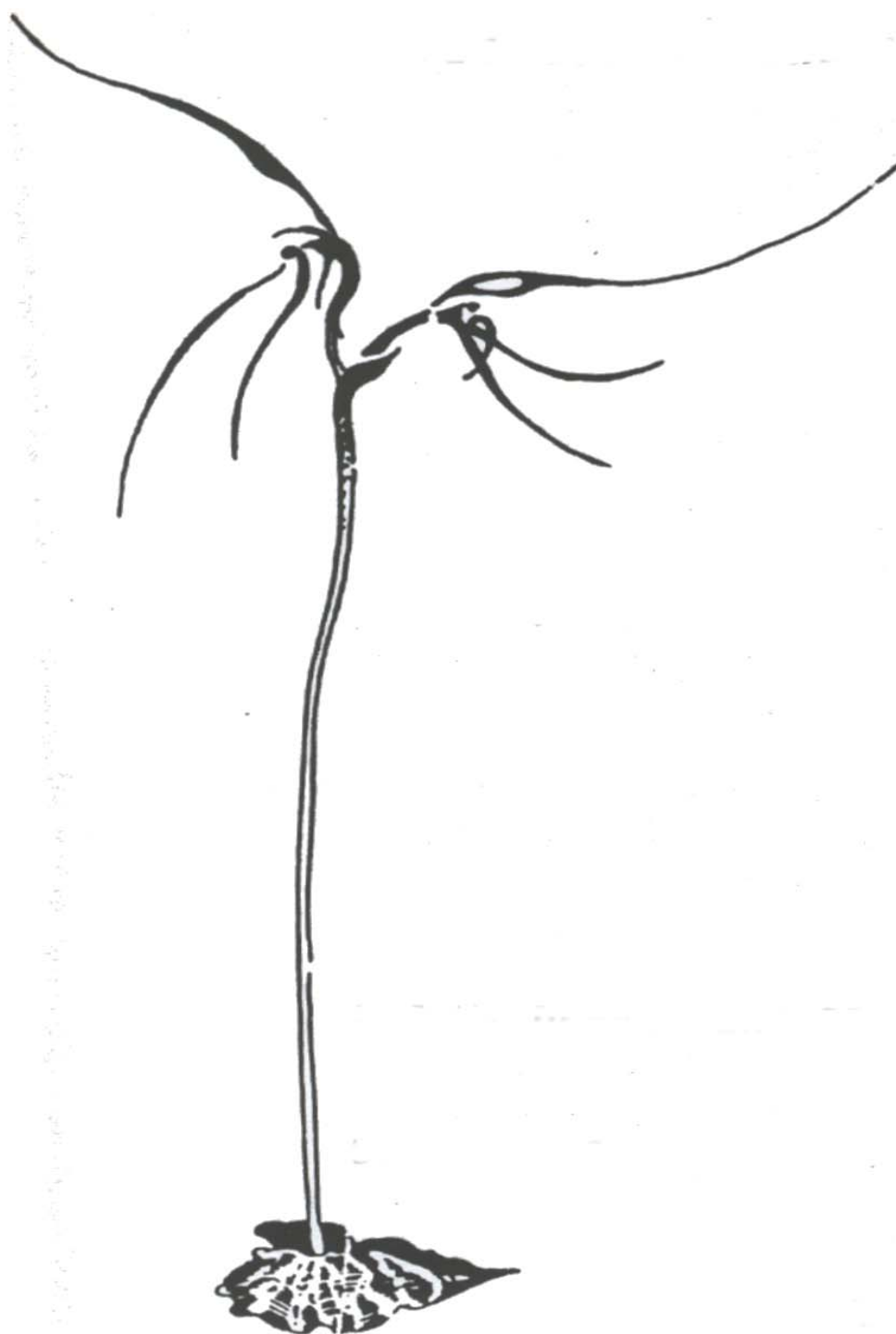
Second Edition

Edited by Carolyn Gillard

Wetlands Environmental Education Centre

The Wetlands Centre

Original Illustrations by Rhonda Ellem



FOREWORD

Twenty years have elapsed since this excellent reference handbook was produced. Indeed, its genesis goes back even further to earlier background papers on the natural history of the Dudley – Redhead area produced in 1975 by the former Awabakal Association for Environmental Education (later the Association for Environmental Education – Hunter Region). The credit for producing the original version of this booklet must go to Brian Gilligan, the first appointed Teacher-in-Charge of the Awabakal Field Studies Centre. In 1976, Brian brought together an assemblage of papers and articles by various authors, and with the skilled assistance of wildlife illustrator, Rhonda Ellem, and the cooperation of typist Judy Kay, the first batch of copies of this booklet were printed. As most people know, Brian later moved on to become Director-General of the National Parks and Wildlife Service of NSW.

Since the time of this booklet's initial production, there have been several reprintings. Many hundreds (perhaps thousands) of students and teachers have benefited from the existence of this highly valued resource. It has provided essential background reference material for undertaking field studies in the Awabakal Nature Reserve and adjacent bushland. The booklet had seen the passage of two decades, during which time the focus for the administration of environmental education programs has shifted to The Wetlands Centre at Shortland whilst complementary programs have continued to emanate from the Dudley site. In that time, the emphasis has changed somewhat from the earlier concept of 'field studies' (with its emphasis mainly on field biology) to the broader connotation of 'environmental education'. The emphasis is now on the vital importance of valuing, monitoring and managing a quality environment for the benefit of present and future generations.

It is timely to acknowledge the assistance of the group of people whose expertise over twenty years ago gave rise to the reference material incorporated in this booklet. The various contributors included Arthur Munro and Brian Gilligan (geology, botany, ecology and aboriginal lore), Peter Smith, Kevin McDonald and Nan Baxter (plant lists), Brian Timms (freshwater invertebrates, limnology), Boris Sokoloff (the Awabakal tribe),

David Waterhouse and Brian Gilligan (bird studies), Stephen Parks and Theo Tasoulis (reptiles), and Ken Leslight (the Dudley mine disaster).

This second edition is the work of Christine Prietto and Carolyn Gillard of the Wetlands Environmental Education Centre at Shortland. The reprinting of the booklet will ensure that the earlier resource material will continue to be made readily available for the many teachers and students who will continue to visit the Dudley – Redhead area for the wide range of environmental interests and stimulation which the site provides. I congratulate all those involved in this important and attractive production.

Kevin McDonald

formerly Secretary, Association for Environmental Education (Hunter Region) and Editor, *Hunter Natural History*

INTRODUCTION

It is with great pleasure that we launch this second edition of the Awabakal Nature Reserve Reference Handbook, originally published in 1984, and tell the story of how this edition has come about.

Many local environmental educators cut their eye teeth on this small booklet. This has certainly been the case for those of us who have found ourselves leading groups of students through Awabakal Nature Reserve over the past 20 years. The wonderful collection of articles and graphic illustrations has remained relevant and pertinent to the place. This has been proven many times over by the continuing demand for the book by schools, TAFE students and local residents.

The Wetlands Environmental Education Centre (formerly Awabakal Field Studies Centre) has continued to oversee the distribution and has initiated several reprintings due to the continuing interest. The book has always been sold for a nominal amount to support reprints, but in recent years it was obvious that the quality of the reprints did not match up to the quality and value of the contents.

As we approached the 20th anniversary, we had the idea of digitalizing the contents to allow an improved edition. A digitalized copy would result in an improved hard copy but could also be produced in an electronic version if needed. As the booklet is well known, attracting funding support to realize this idea was not difficult. Ecoedge, the Hunter Region's environmental educator's network, came forward as the major sponsor. This was most appropriate as Ecoedge is the new name adopted by the Hunter's Association for Environmental Education, the supporting organization for the original document. Other sponsors include Wetlands Environmental Education Centre, Awabakal Environmental Education Centre, SD Environmental Management, and Lake Macquarie City Council.

While sponsorship will cover the printing costs, the digitalizing work has been a labour of love for many individuals. Under the leadership of Carolyn Gillard, those who have contributed their time over the past 12

months include Marilyn Donn (our champion typist), Helen Aitchison, Sue Saxby, Christine Prietto and Christine Freeman, Amanda Gillard and Kelly Boyd. Staff and resources from Wetlands Environmental Education Centre and Awabakal Environmental Education Centre have contributed. Carolyn Gillard has maintained a watchful eye on the whole process to keep it on track.

We commend this unique publication to you and encourage you to visit The Awabakal Nature Reserve soon and often to appreciate its special values.

Christine Prietto

Carolyn Gillard

Wetlands Environmental Education Centre

AWABAKAL ENVIRONMENTAL EDUCATION CENTRE

Awabakal Environmental Education Centre is a Department of Education and Training facility that is staffed two days per week. It is located in Boundary St, Dudley, below Dudley PS adjacent to the northwestern corner of the Awabakal Nature Reserve. The EEC provides excellent programs on varied ecosystems within the reserve and provides great opportunities for learning over Key Learning Areas from Kindergarten to year 12 and beyond. Facilities consist of a classroom with toilets, walking and nature trails, freshwater lagoons and picnic area with barbeques.

PROGRAMS OFFERED

- Art courses are offered to suit many aspects of the curriculum
- Aboriginal Perspectives are a focus across the curriculum

PRIMARY: Science and Technology and HSIE

- 🦘 Stage 1: What's alive, Sense of Direction, The Need for Shelter, Wet and Dry Environments
- 🦘 Stage 2: Mini Worlds, Cycles in our World, Our Australia, State and National Parks, Places: Then, Now and Tomorrow, Australia: You're Standing in It
- 🦘 Stage 3: An Ancient Land/landforms, Environment Matters, Global Environments: Rainforests

SECONDARY

- 🦘 Year 7 to 10: Ecosystems: First hand investigations: planning, collating and reporting information
- 🦘 Year 11&12: Biology, Senior Science, Geography, Earth & Environmental Science, Food Technology

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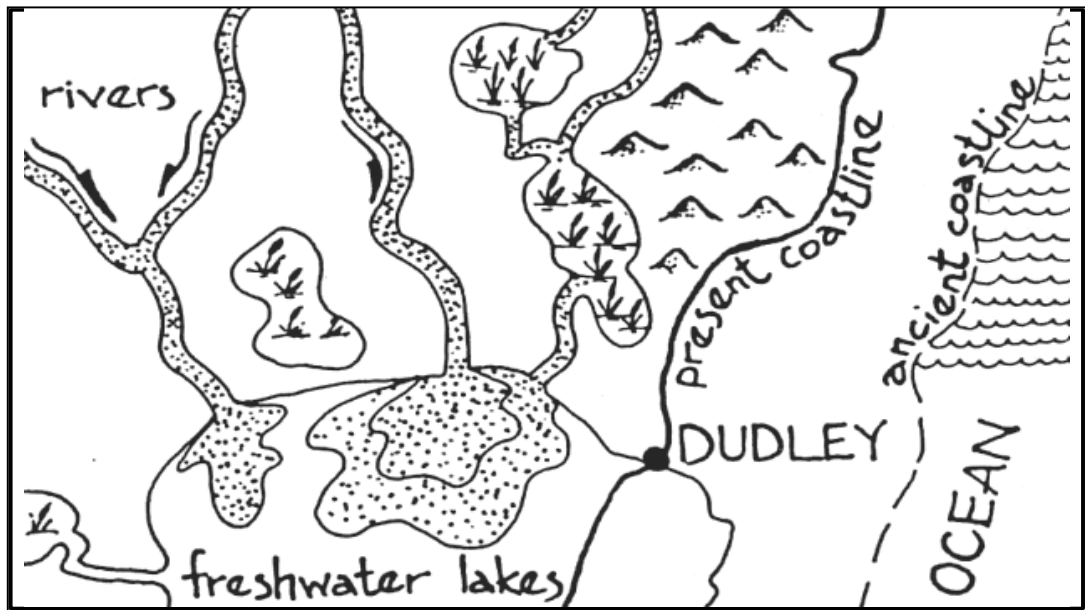
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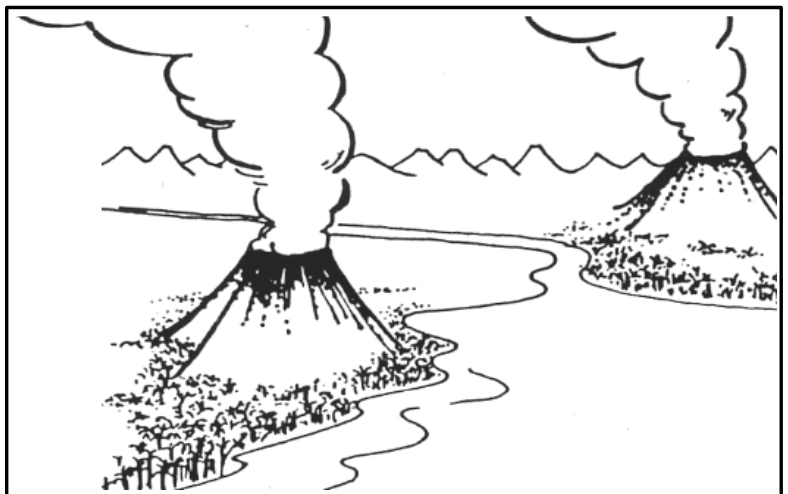
GEOLOGY

By A. Munro

The geological story of the rocks of Awabakal begins in the later Permian, perhaps 250 million years ago. The land north of Raymond Terrace and west from Barrington Tops 11 drained into a vast lowland of freshwater swamps, lagoons and open water. This was separated from the open ocean to the east by a land barrier, which had earlier been breached twice to allow marine conditions to replace the freshwater environment.



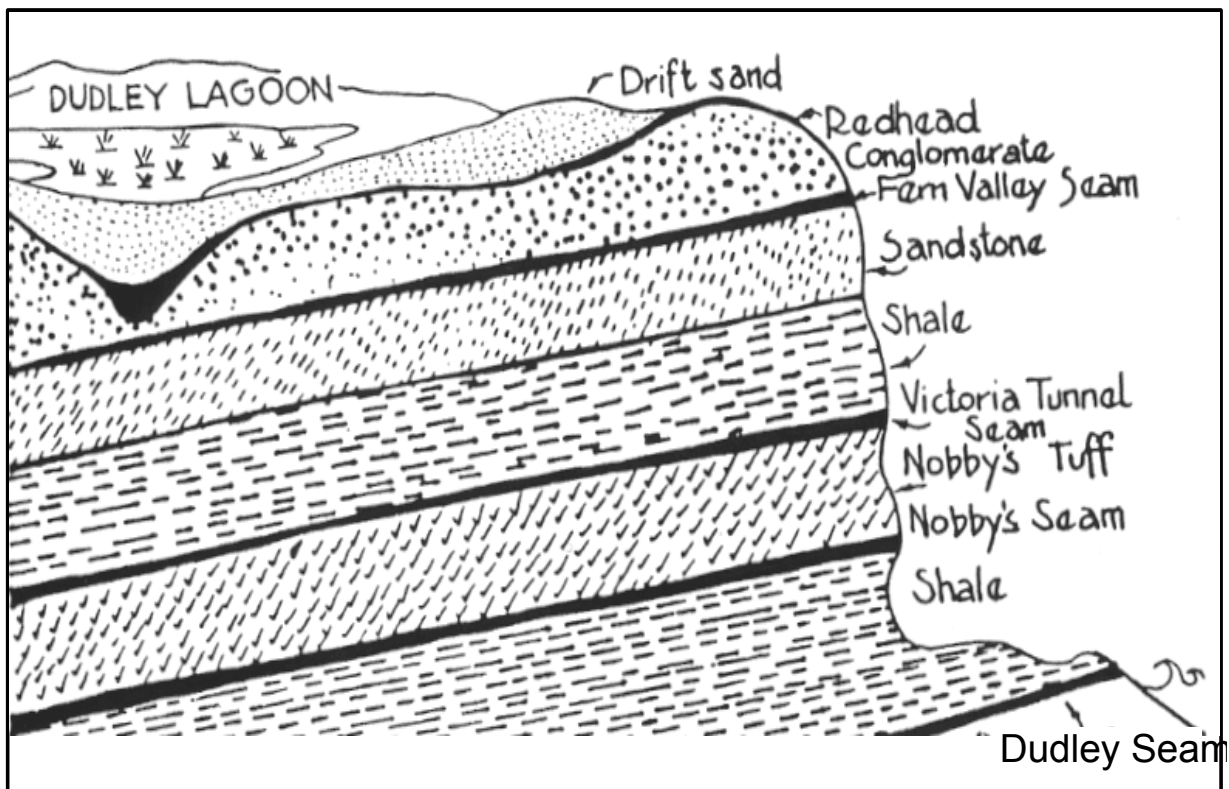
Dense and extensive forests of seed ferns covered the land providing a great thickness of plant material, which was later buried and altered to form coal seams. At least 15m of plant matter went into some of the coal seams beneath Awabakal.



Some seams are separated by layers of tuff (the fine ash of the volcanoes which were part of the scene during Permian times).

One such tuff bed must have buried the trees of the Dudley seam forests as they stood. Their petrified trunks stand and lie in their original positions when they were overwhelmed by the blanket of ash. They may be seen on the rock platform and in the rocks of nearby cliffs. Large rivers deposited gravel and sand from the northern highlands and today geologists are able to trace the ancient valleys by mapping the conglomerate beds, which are part of the coal measures.

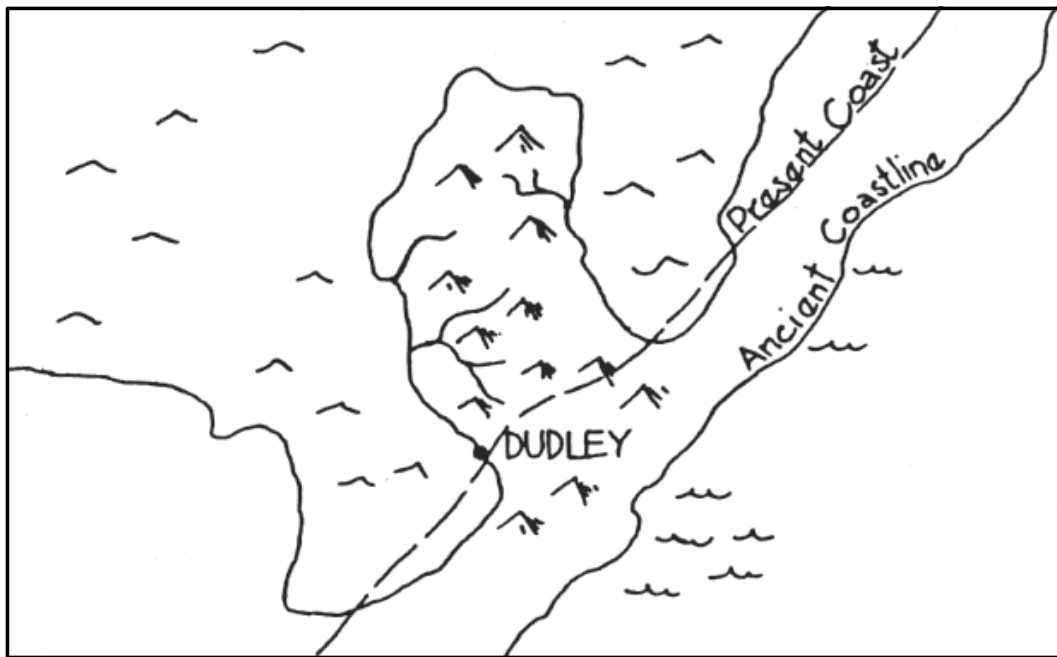
Conglomerate resists weathering and is often the capping on hilltops eg. at the monument at Dudley. It resists the cutting down action of streams and creates the many waterfalls in the rugged valleys around Awabakal. The cliff section at Dudley shows evidence of this succession of events during Permian times.



Mesozoic Era

Following the Permian came the Mesozoic era there must have been a change from the warm temperate Permian climate to unfavourable, possibly desert conditions. This is suggested by an almost complete lack of plant fossils in the Mesozoic rocks of Eastern N.S.W.

No Mesozoic rocks are left at Awabakal, but considering that the nearest are as close as Mawson, it seems likely that some were laid down and have been eroded away in the long interval (180 million years) since.



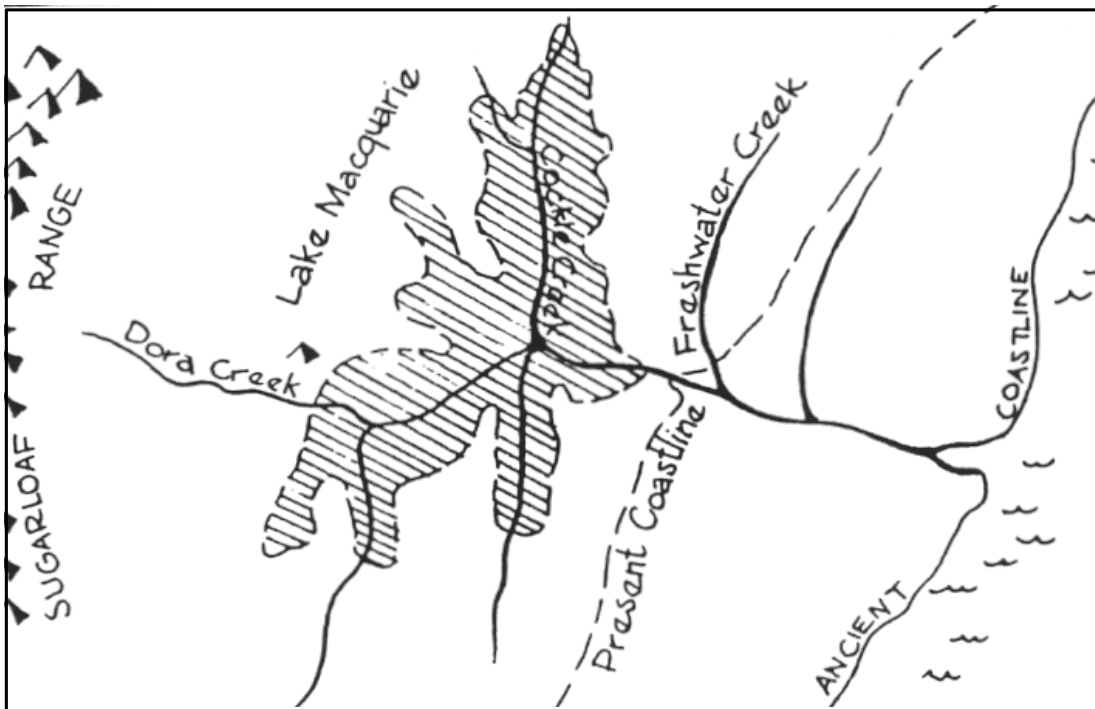
A general uplift turned the sedimentary basin into dry land and only minor changes have occurred since. Some volcanic activity has taken place because at various localities eg. north Dudley beach, Belmont North etc. volcanic rock dykes cut through the Permian rocks.

The Last Million Years

In recent times, the climate and topography of Australia were influenced by the Ice ages.

25,000 Years Ago

Australia was near the peak of the last glaciation. Great masses of ice had built up on the continents of Europe and America as well as the highlands of Kosciusko and Tasmania. So much water had been removed from the oceans because of this that sea level was 120 metres lower than at present. The coastline was kilometres further to the east. Because of the cool climate, temperate rainforests covered much of Australia including the inland.

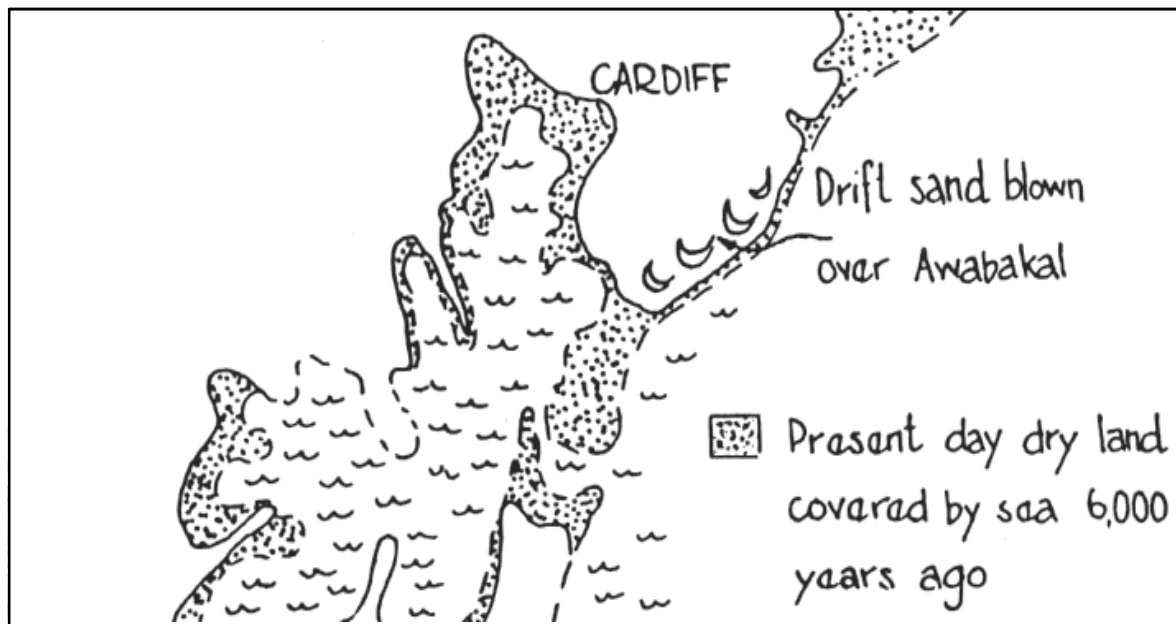


Lake Macquarie was a dry valley – Dora Creek, Cockle Creek, Mannering Creek ran into a major waterway, which flowed through this valley. Freshwater Creek must have entered the sea miles to the east, perhaps as a tributary of the river through “Macquarie Valley”. The Aborigines were in Australia long before this and perhaps their camp sites are now beneath the sea along the ancient coastline.

The temperate inland conditions would have assisted their migration from the north. However, the oldest dated remains were from an Awabakal Aborigines' camp at Swansea Heads occupied about 7,000 years ago.

6,000 Years Ago

Australia's climate had altered to hot dry conditions. The extensive rainforests retreated in the face of this change and a sparse, almost desert flora must have taken their place. This apparently allowed dunes of windblown sands to invade the Awabakal area and cut the valley heads of Freshwater Creek.



Behind such a sand barrier, Dudley Lagoon was impounded and partly sealed off by a layer of vegetable matter, which built up on the bottom.

Sea levels were 6 m higher than at present and much of the flat land around lake foreshores as then underwater. Since then, a return of cool (Ice Age) conditions has brought about a retreat of the sea level to its present position, the development of thick eucalypt forest cover on the dunes and hills and some revival of rainforest growth in the sheltered valley situations.

Things To Do

- A. Study the cliff section at Dudley. Make your own map and compare it with the section shown in Figure 4.

- B. From the lookout – watertower – at Redhead look for evidence of sea level changes and try to imagine the scene at times of high and low sea level.

- C. Walk over Awabakal and study the extent to which blown sand dunes have invaded the valley systems. Try to estimate the life expectancy of Dudley Lagoon and suggest how its age could be determined.

- D. Look for fossils and different rock types near Dudley Bluff.

MEET THE PLANTS

By A. Munro and P. Smith

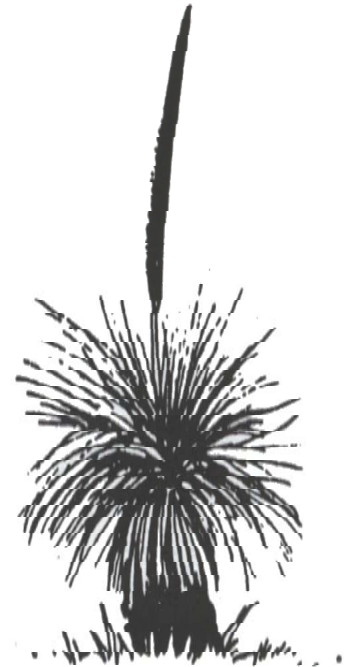
Grass Trees

These strange plants are called grass-tree or black boys because of their appearance after fire.

Soon after bush fires pass, they send up a tall flower spike on which there are dozens of honey-sweet flowers crowded together.

The birds and honey possums love to drink the nectar and once the aborigines made sweet drinks by soaking the spikes in water.

Plants looking just like these lived in the world millions of years ago, long before there were any people on earth. They grow very slowly and a large one is hundreds of years old.



The red gum (resin) you find at the bottom of the trunk was once used to make varnish. It burns with a smell like incense.

Native Parsnip



This is one of the many plants with swollen underground stems, which the Aborigines used for food. It is common on the sandy forest lands of the Awabakal area. The dark green, much-divided leaves are easily seen, especially after fire when they are the first to spring up. Botanists call this plant *Trachymene incisa*. It has a taste which reminds you of a carrot and it must have been a plentiful and useful part of the Aboriginal diet.

Trigger Plant

Many flowers depend on insects to bring pollen to them and to carry pollen to other plants.

The Trigger Plant has pretty pink petals to attract insects and nectar for them to drink.

However, there is a big surprise in store for the visiting insect. As soon as it touches the fine hairs growing around the nectary, the style flies up and dusts pollen over its back before it can escape.

In an hour or so the plant is able to re-set the trap and spring another insect.

If you find a fine grass stem and tickle the centre of the flower, you can set the plant off just as a fly does.



Woody Pears



At the top of these attractive trees you will see some of the strangest fruits in the bush. They look just like fawn-grey pears hanging from the wrong end. The outside has a soft velvety look but the pear is as hard as the hardest wood. When the fruit dries out it splits and two large winged seeds blow away on the breeze. The Aborigines used to eat these seeds.

Burrawang Palm (Macrozamia):

These palm-like plants are Cycads, the descendants of trees living 200 million years ago in the forests of the Permian times. Like the sago palm they contain much starch in the stem and seeds. However, also like the sago palm, the starch is contaminated with poisons and it must be carefully prepared. Even in small doses can cause violent retching and dizziness. Some early explorers were the first victims. The aborigines devised various methods of preparation. James Beckhouse in 1843 reported that in the Lake Macquarie area the seeds were roasted and pounded, then left in water for two or three weeks.

Some pioneers cracked the seeds, washed the starch out and let it settle so that it could be collected and dried.



Black Wattle

Along the watercourses of the Awabakal area there is this spindly shrub with dark grey stems and serrated (toothed) leaves. The leaves are dark and shiny on one side and whitish on the other. In later Spring, it has puffy, yellowish-white flowers which look like wattle flowers.

However, its name “Black Wattle” came from the fact that the long pliable branches of the young trees were used to build the first “wattle and daub” huts at Port Jackson in 1788. The plants grew thickly along the streams of Sydney Harbour and gave Black Wattle Bay its name.

Later, the Acacias (Wattles to us) were given their family name because of their pliable branches.

(Note: A wattle is a thin, pliable branch used for weaving).



PLANT ASSOCIATIONS – AWABAKAL RESERVE

By A. Munro

In the Awabakal Reserve, there is a great diversity of plants – some hundreds of species. The diversity exists because of the many different ecological niches, which exist here. As you walk through the area, you will notice changes in the plant communities. The changes are sometimes abrupt with quite clear boundaries between one group of plants and another. This is because sudden alterations occur in the physical conditions – soil type, drainage, depth of soil, shade etc. It is interesting to work out why a given community of plants exists in a given spot. Here is a list of localities where fairly simple, easily recognizable plant associations exist.

Blackbutt / Redgum / Banksia Association (1 on map)

Subsidiary species: tall bloodwoods, woody pear, oaks, blackboys.

Situation: the deep sand of stabilized “perched” dunes. There is shelter from the worst effects of the salt-laden southerly winds and the desiccating west wind. Very effective drainage in loose sand.

Profile: fairly continuous canopy at 15 metres. Sparse understorey of immature trees and minor species. Thick shrub and herb layer.

Status: climax vegetation of stabilized perched dunes.

Paperbark Swamp Edge community (2 on map)

Subsidiary species: bleeding heart, marshmallow, ferns, native violet.

Situation: border of Dudley lagoon, subject to periodic flooding. High water stable between high dune and swamp edge; sheltered, shaded.

Profile: continuous canopy with dense understorey of shade and water tolerant plants.

Closed Scrub**(3 on map)**

Chief species: banksias, teatree, fine-leaved paperbark.

As well, many other species, all xerophytic, e.g., blackboy, devils twine, honey flower. Herbs like wedding bush, eggs and bacon etc.

Situation: exposed, low, perched dunes. Vulnerable to south winds and sun.

Characteristics: impenetrably thick, continuous canopy about 1 metre above ground level.

Dwarf Wet Scrub**(4 on map)**

Species: green flowering banksias, broad-leaved hakea, fine-leaved paperbark.

Situation: a clay/sand soil with an extremely high water table and very poor drainage except down the slope. Exposed to desiccating westerly winds and salt laden sea breezes. Note abrupt boundary with closed scrub of the dunes. Note greatly reduced height, density and variety of plants as well as the sharply defined boundary with the other plant communities.

Swamp Mahogany / Bottlebrush Association**(5 on map)**

Species: broadleaved teatree, swamp mahogany (gum), crimson bottlebrush, fern, swamp lily, running postman pea.

Situation: partially sheltered, deep peat soil accumulated over hundreds of years. Now the lagoon has been drained by underground channels (probably due to mining activities). In recent fires, the peat has begun to burn and this association may modify in the altered conditions.

Wind Planed Coastal Heath**(6 on map)**

Species: dwarfed bloodwood, banksia, honeyflower plus a rich flora of heath species such as boronia, waxflower, peas, conesticks, blackboys, teatree.

Situation: perched dune. Totally exposed to the desiccating west wind and salty southerlies. Instant drainage after rain. Nearest “protection”, the ridges of the Wattagans south west of the lake. Vulnerable to fire. Note the reduced height of eucalypts and banksias 1 metre compared to 15 metres for the same species in Association 1. Note the developments of a rootstock and mallee growth habit as well as intense flowering and seeding effort to combat the destructive effects of fires.

Creek Border Wet Eucalypt Forest

(7 on map)

Major species: broadleaved teatree, swamp mahogany gum, bleeding heart.

Other species: bottlebrush, cutting grass, coral fern, *Banksia robur*, swamp wattle.

Situation: very high water table and abundant water supply from the seepage from Dudley Lagoon. Shelter from wind and sun to an appreciable extent. A deep peat soil, 30 cm of humus in most places. Note the upper boundary of this community is a line of paperbarks in a line across the hillside. This line probably marks the water level of nearby Dudley Lagoon which is impounded by the dune. Note the destructive effect of fire (April, 1975) which has destroyed the peat bed which supports major trees and shrubs.

Gully Rainforest Community

(8 on map)

Major species: corkwood, lillypilly, red ash, cheese tree.

Other species: muttonwood, native grape, callicoma bastard rosewood, pittosporum.

Situation: sheltered head of Freshwater Creek, southerly aspect, shaded, relatively entrenched.

NOTE: very surprising occurrence of several species.

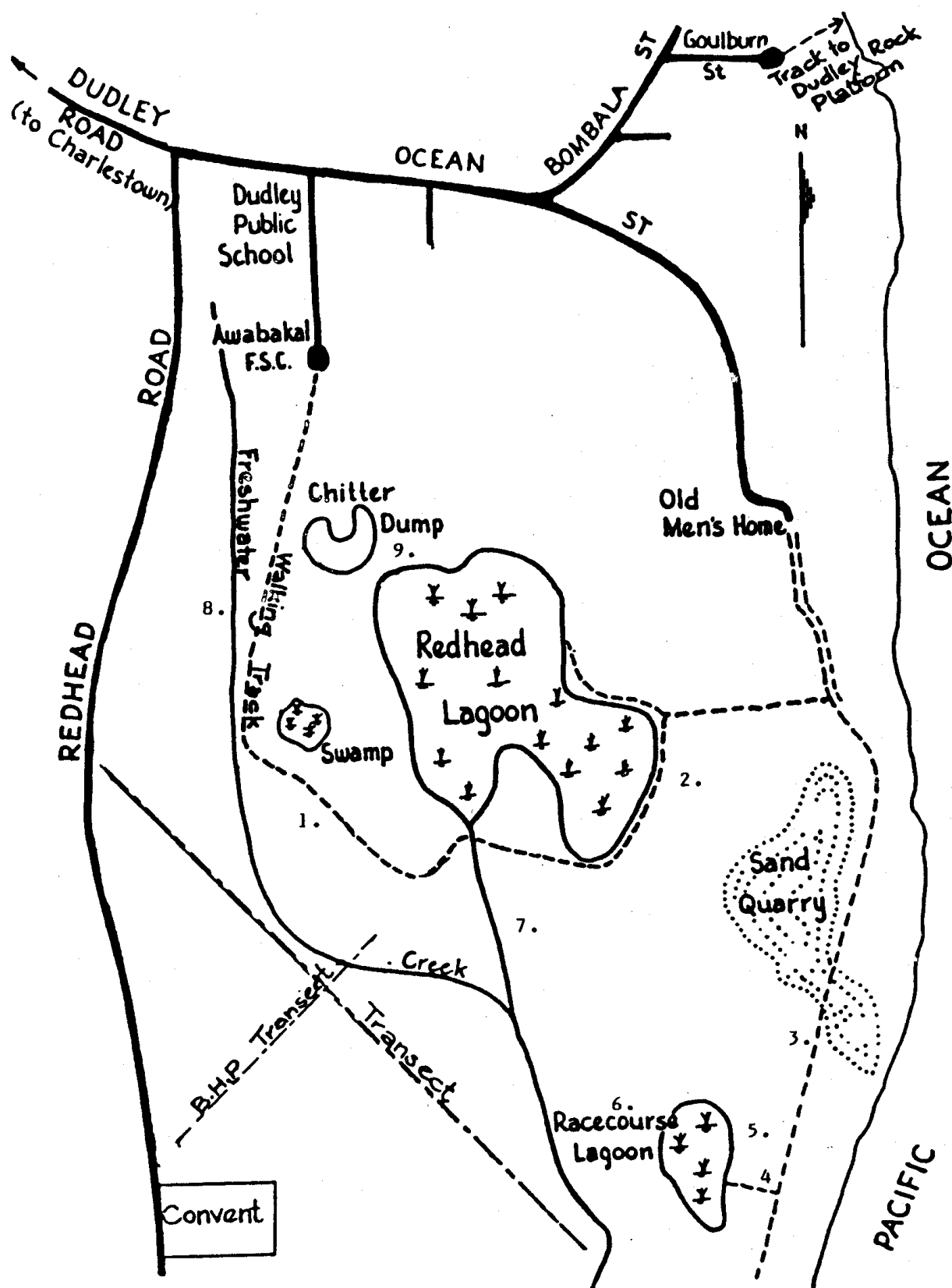
Sphagnum Moss Bog

(9 on map)

Species: sphagnum moss, several native orchids.

Situation: very moist, southerly aspect, steep hillside, producing very shady, constantly wet conditions.

PLANT ASSOCIATIONS.



AN ECOSYSTEM APPROACH TO THE STUDY OF THE MAJOR PLANT COMMUNITIES OF THE AWABAKAL NATURE RESERVE

Brian Gilligan (Regional Geography School, July 1978. H.V.S.S.T.A.)

The Ecosystem Approach

The word 'ecosystem' is a combination of 'ecology' and 'system'. The Greek word 'oikos' means house. In English that becomes 'ecos' and **ecology** is defined as the study of the relationship between living organisms and their surroundings or habitat. A **system** is perhaps easiest defined as a complex set of connected things.

At the 1977 Regional School in Geography, Kevin McDonald (previously from Newcastle College of Advanced Education) spoke on 'The Ecosystem Concept'.

He defined an ecosystem as:

'Any unit of the biosphere possessing a characteristic assemblage of plants and animals, landscape and soils and a specific set of climatic geological and topographical factors which, over a long period of time, has endowed the system with integrity and stability in cycles of water and nutrients, flow and utilization of energy, and production of organic matter'.

The ecosystem approach then, involves the study of organisms, **not** as separate isolated units, but as parts of a whole or total system very much dependent for their existence on the other parts of the system (**Figure 1**). The term ecosystem is usually only applied to reasonably large areas. The specific sites we are about to consider are more properly called 'communities'. This name carries the same connotation of interdependence; the difference between the two words being principally one of scale.

In studying the structure and present functioning of a community it is useful to consider the sequence of development or evolution of the system. All the components may be now interdependent but the interplay and balance between them is dynamic and the situation that now exists has taken a long time to develop with certain critical components preceding others in the time sequence.

In crude terms, a particular set of geological, topographic and climatic conditions have given rise to an association of plant species that, as food producers, are able to support the animal component of the community. Obviously, the plants then depend on the animals involved for energy/nutrient cycling and other considerations but in chicken/egg terms, the plants have been the chief determinant of the variety and numbers of animals in any community.

Awabakal Nature Reserve

The Awabakal Nature Reserve occupies approximately 120 hectares of coastal land between Dudley and Redhead, some 15 kilometres south of the city of Newcastle. **(Figure 2)**

The northern section of the reserve is elevated, with outcrops of rocks of the Kahibah and Tickhole Formations of the Newcastle Coal Measures. The southern two-thirds is a sand dune system more than 10,000 years old, of generally lower relief, elevating in the extreme southern portion to the Redhead Trig Station and outcrops of the Redhead Conglomerate **(Figure 3)**. The coastal frontage of the reserve is a series of cliffs and narrow rock platforms separating beaches just north of Dudley and at Redhead.

The drainage pattern of the area is dominated by Redhead Lagoon, two smaller wetlands and the only watercourse, Freshwater Creek, which traverses the reserve from north to south, ultimately bisecting the township of Redhead.

Nine or more plant associations have been identified in the Awabakal Nature Reserve, separated by at times complex transition zones **(Figures 4 and 5)**. The major associations can be dealt with in three broad groupings.

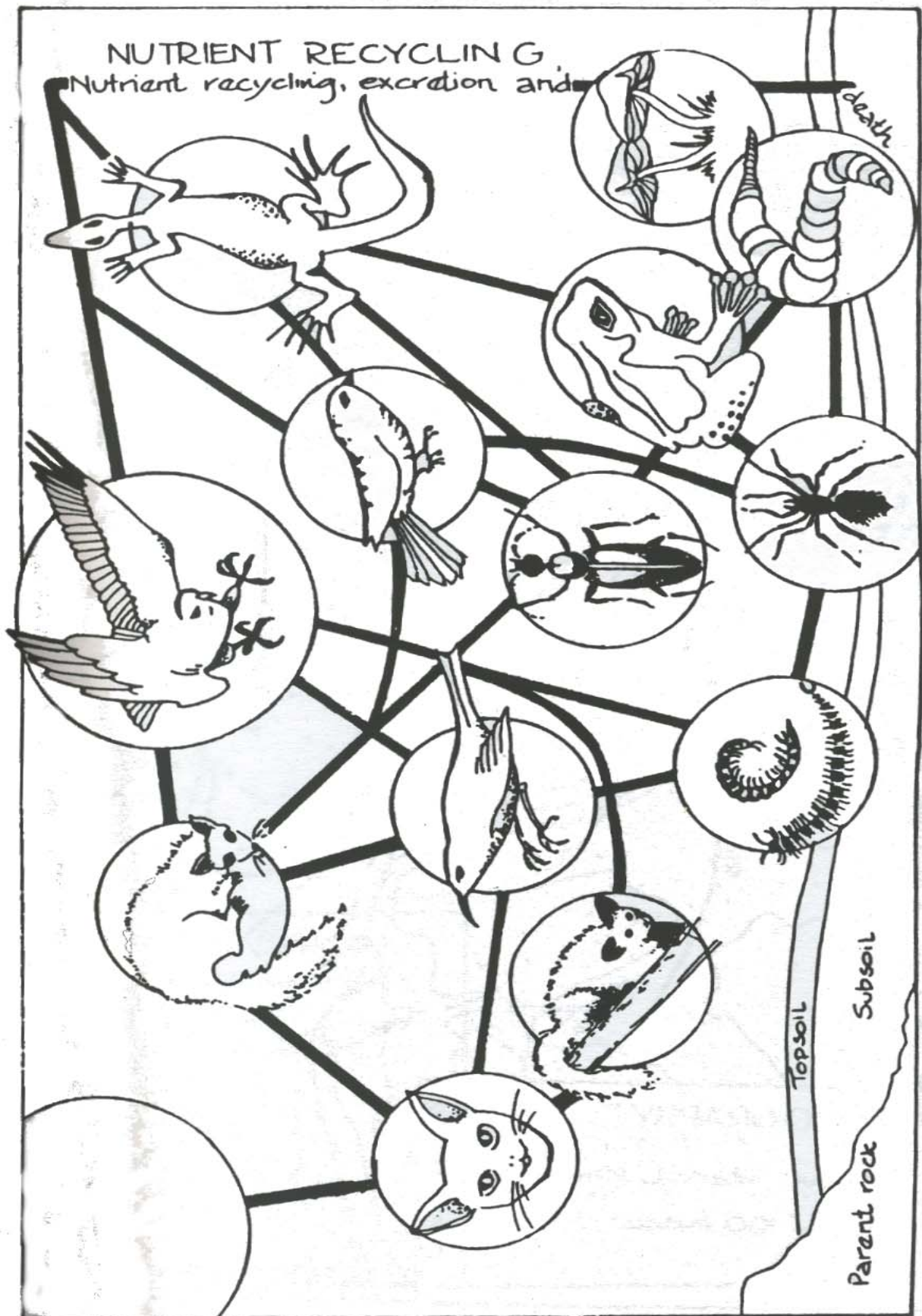


Figure. 1

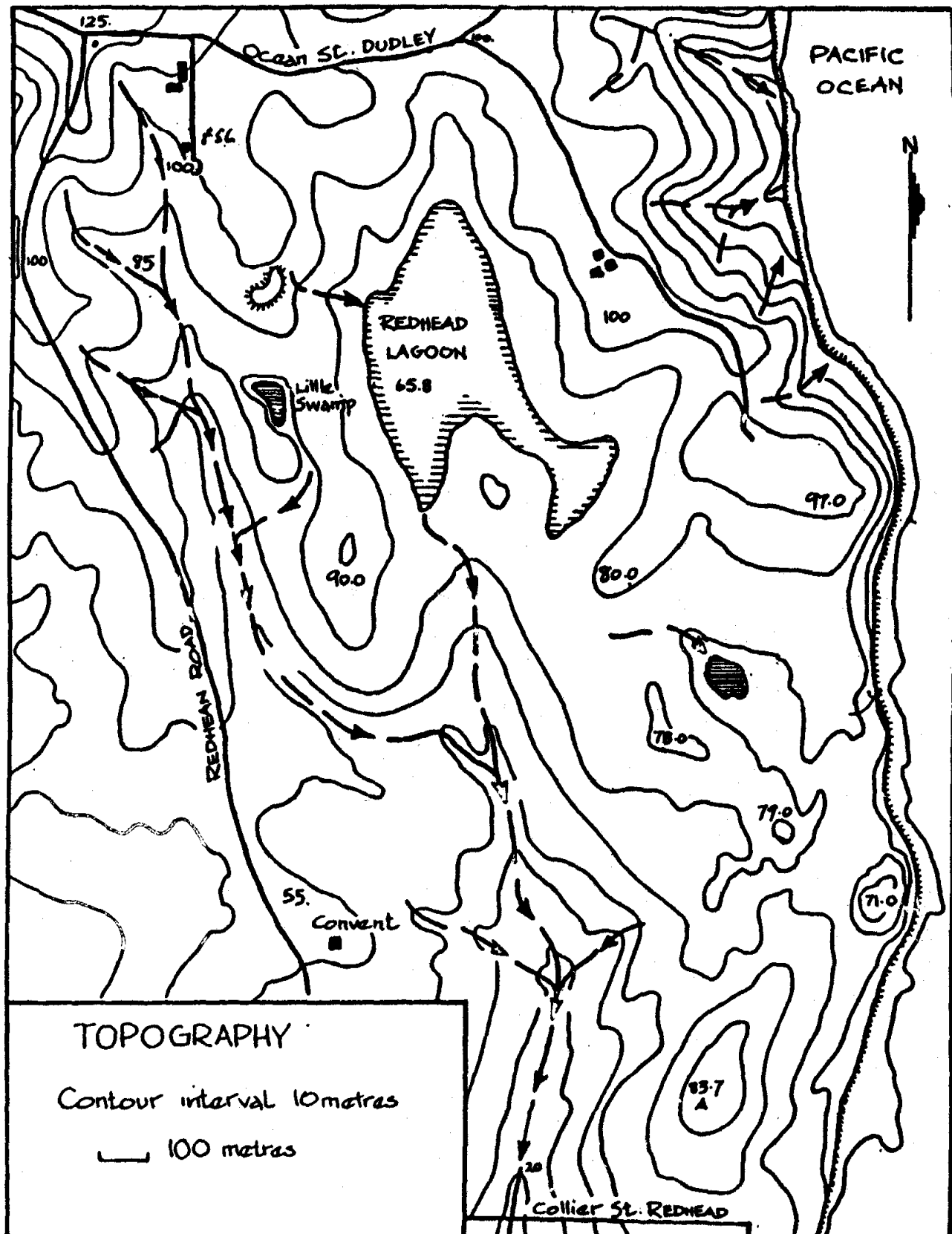


Figure 2

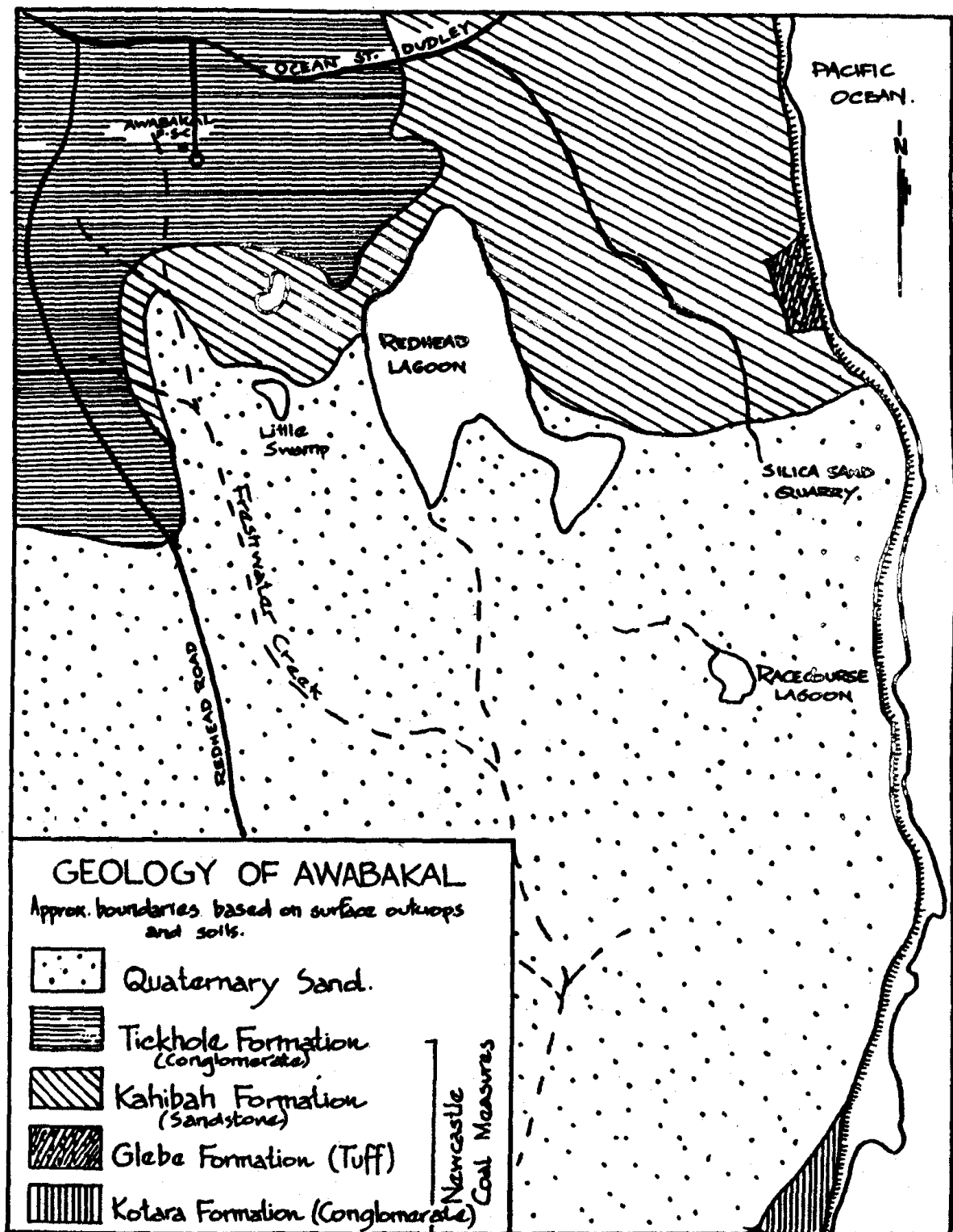


Figure 3

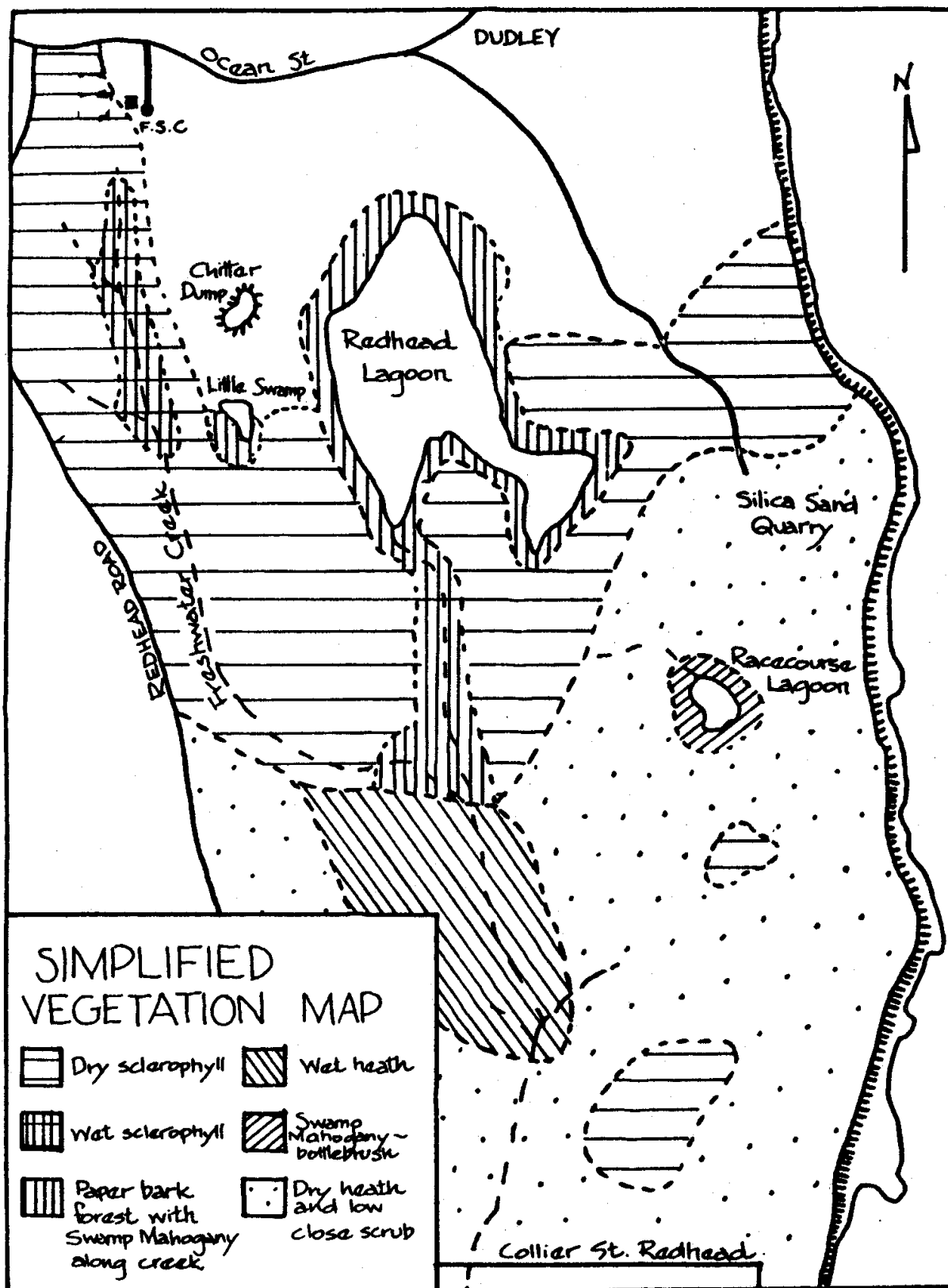
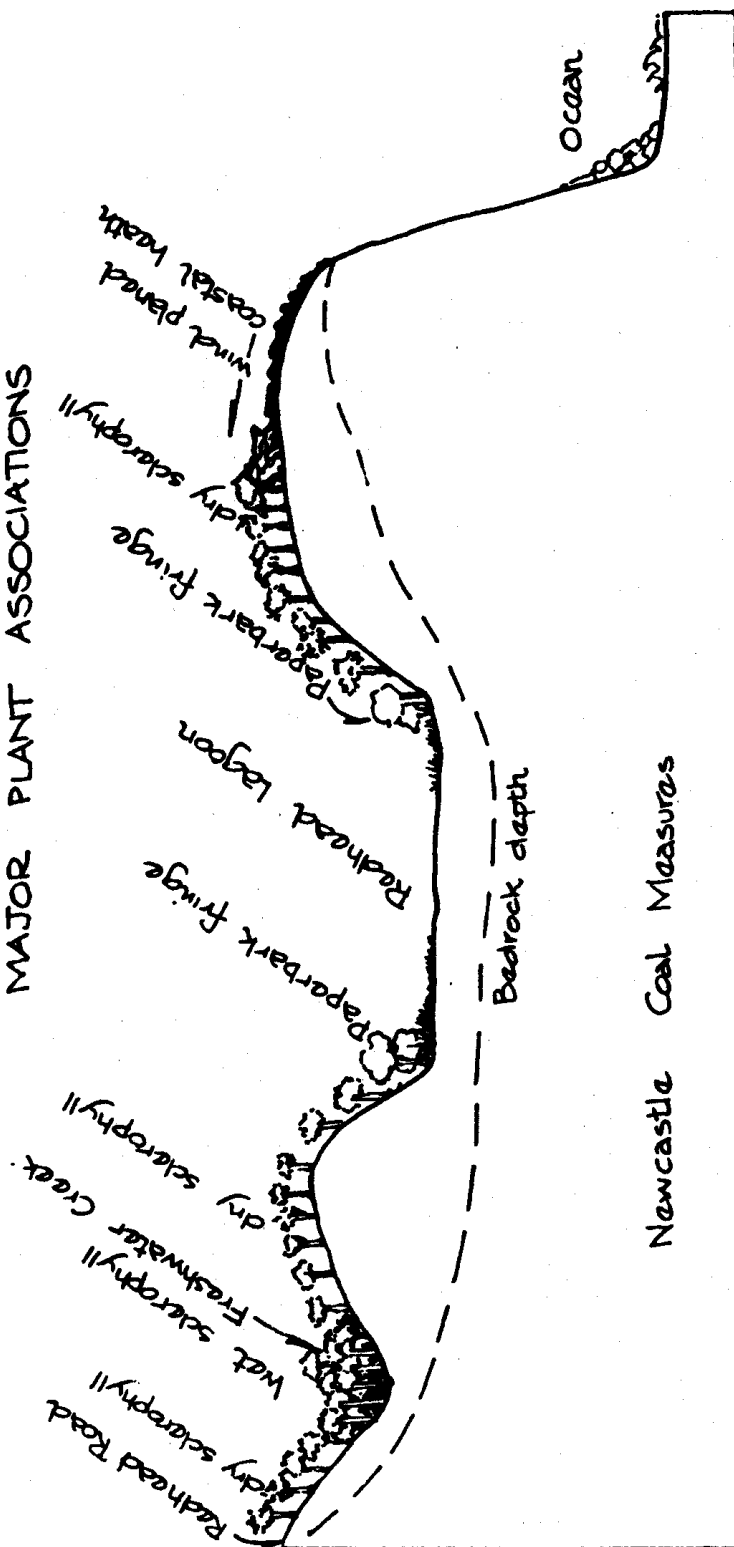


Figure 4

A SIMPLIFIED PROFILE ACROSS THE AWABAKAL
NATURE RESERVE SHOWING THE DISTRIBUTION OF THE
MAJOR PLANT ASSOCIATIONS



Newcastle Coal Measures

Figure 5

1. WET SCLEROPHYLL FOREST

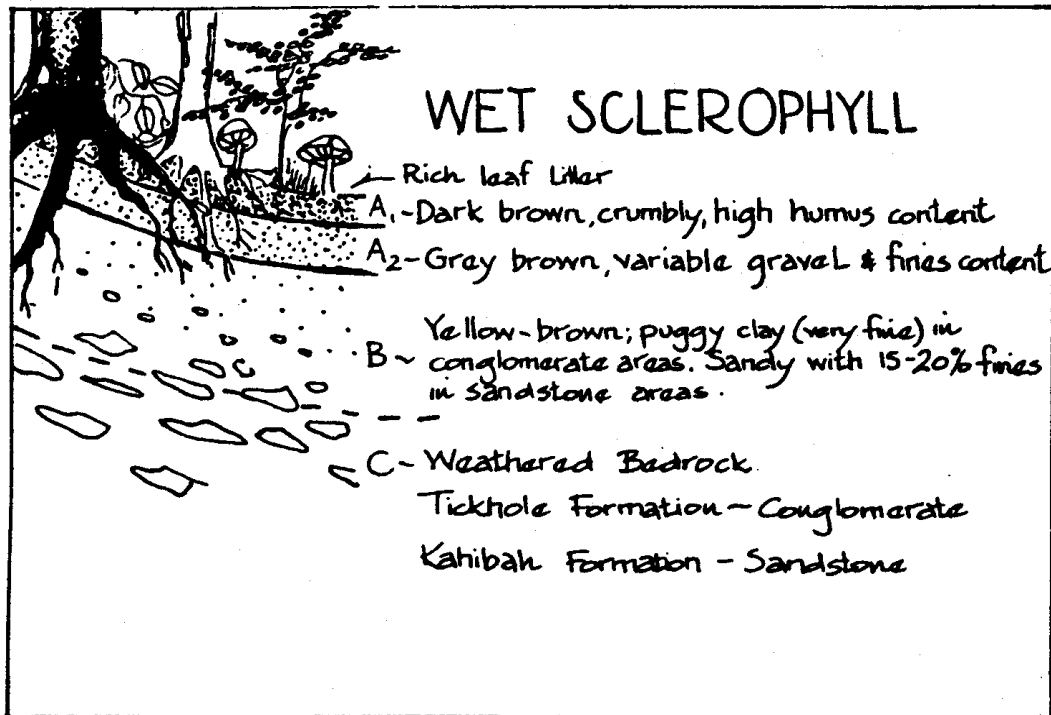


Figure 6

This forest type occupies only a small area within the Awabakal Nature Reserve, being restricted to the sheltered margins of the headwater section of Freshwater Creek. Such a narrow area is barely a discrete community, given the transitional zone, which encroaches from both sides; however, there are undeniably distinctive wet sclerophyll elements. **(Figure 6).**

The dominant tree species are:

Cheese Tree	(<i>Glochidion ferdinandi</i>)
Callicoma	(<i>Callicoma serratifolia</i>)
Lilly Pilly	(<i>Acmena smithii</i>)
Red Ash	(<i>Alphitonia excelsa</i>)

Others include:

Corkwood	(<i>Endiandra sieberi</i>)
Blueberry Ash	(<i>Elaeocarpus reticulatus</i>)
Sandpaper Fig	(<i>Ficus coronata</i>)
and Pittosporum	(<i>P. undulatum</i> and occasionally <i>P. revolutum</i>)

On the outer edges:

	Sydney Peppermint	(<i>Eucalyptus piperita</i>)
	Blackbutt	(<i>Eucalyptus pilularis</i>)
and	Banksia	(<i>B. serrata</i>)

are significant in providing canopy cover for undergrowth.

The understorey of much of the wet sclerophyll is Lantana (*Lantana camara*), introduced by European man and spread mainly by birds feeding on its tasty fruit.

Other plants include:

	Native Hop	(<i>Dodonea triquetra</i>)
	Bleeding Heart	(<i>Omalanthus populifolius</i>)
	Native Grape	(<i>Cissus sp.</i>)
	Bastard Rosewood	(<i>Synoum glandulosum</i>)
and	Lawyer Vine	(<i>Smilax australis</i>)

Ground cover consists principally of a number of native ferns, the most abundant being Common Maidenhair (*Adiantum aethiopicum*) and Rainbow Fern (*Culcita dubia*), which is also known as False Bracken. Mosses, lichens and fungi are plentiful.

The development of this vegetation association is due mainly to topography and soil. Freshwater Creek runs more or less north south. This alignment ensures protection from both excessive sunlight and most desiccating winds. The soil is derived from the Newcastle Coal Measures and has a high clay content. This assists water retention. Together, these factors produce a micro-climate favourable to the growth of wet sclerophyll plants.

The overall impression is one of dense vegetation growth and dampness. There is a large amount of leaf litter with moist, rotting moss-covered logs and twigs. Because it is sheltered from most winds and the soil surface is usually damp, this area usually escapes the fires, which ravage the rest of the reserve. As a result, the leaf litter has time to decompose fully into the soil, substantially enriching it and further encouraging plant growth.

Fungi play a significant role in decomposition under wet conditions. Leaf litter decomposition also provides a feeding niche for a variety of insects and other invertebrates, which in turn represent food for many frogs, birds and reptiles, the higher order consumers. The food web in the community is probably disrupted at times by human incursions, especially by the feeding demands of straying or dumped domestic/feral cats and dogs from nearby residential areas.

Although no detailed fauna study has been carried out, several species on the bird list for the reserve have been recorded exclusively in the wet sclerophyll community. For example,

Eastern Whipbird	<i>(Psophodes alivaceus)</i>
Rufous Fantail	<i>(Rhipidura rufifrons)</i>
Regent Bower Bird	<i>(Sericulus chrysocephalus)</i>

The Ring-tail Possum (*Pseudocheirus laniginosus*) also seems to favour the dense cover of the wet sclerophyll canopy for nesting. One of its favourite food trees, the Sydney Peppermint (*E. piperita*) is usually nearby. Swamp snakes (*Drepanodontis signata*) and Yellow-faced whip snakes (*Demansia psammophis*) are common.

2. DRY SCLEROPHYLL FOREST

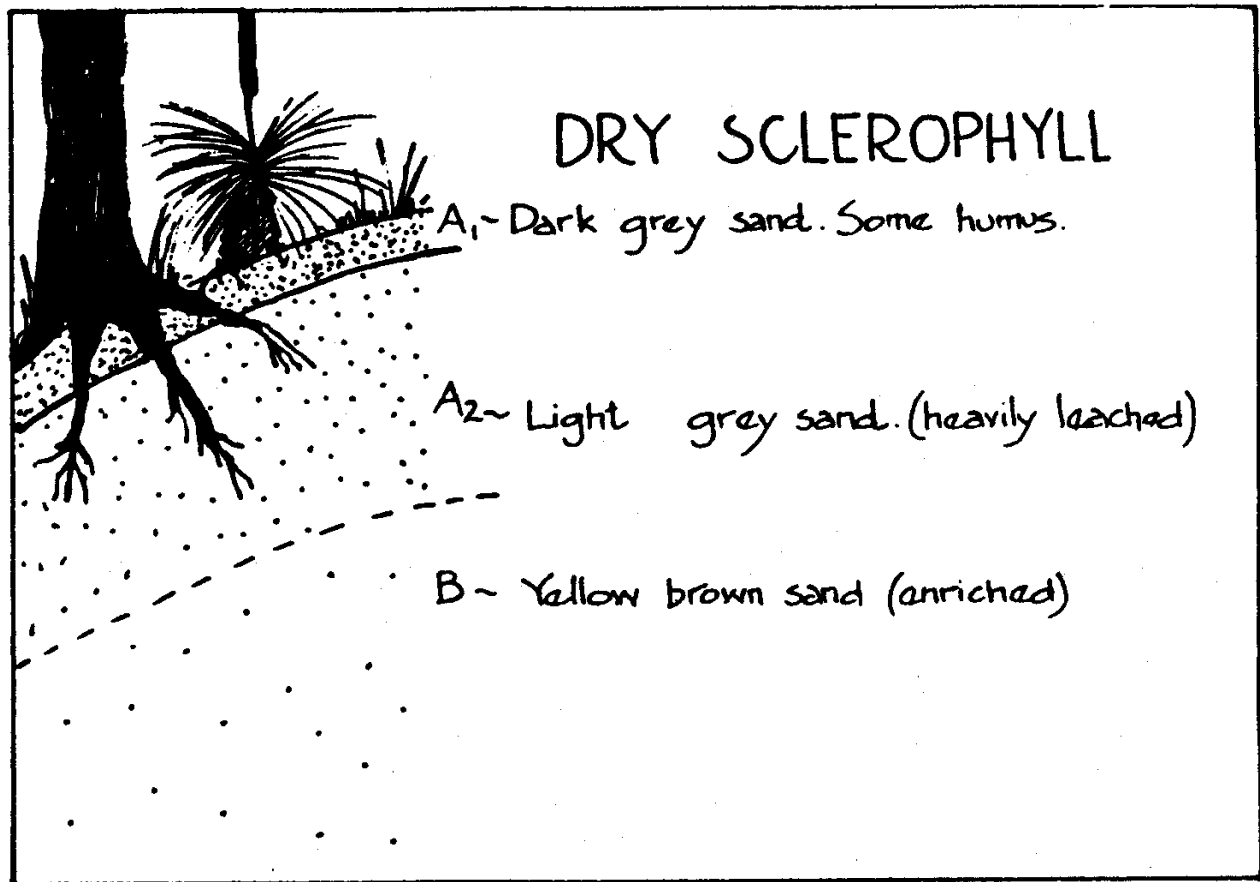


Figure 7

A large portion of the northern half of the Awabakal Nature Reserve is covered with this forest type. The soil is a sandy podsol. If a full profile could be examined it would presumably be identical with the deep profile exposed at the same latitude in Redhead Garbage Dump. Elevated and well drained, with little or no clay components, the topsoil retains much less moisture than the soil supporting wet sclerophyll. However, because this site is less elevated, more sheltered from winds and has more leaf litter cover, the soil is not as dry nor as heavily podsolized as that on Dudley Bluff. Similarly, organic matter in the topsoil is comparatively more than in bluff soil supporting heath, yet less than in the clayey soil of the Freshwater Creek headwater.

The forest canopy is made up of four main tree species:

	Blackbutt	(<i>Eucalyptus pilularis</i>)
	Rusty Gum	(<i>Angophora costata</i>)
	Bloodwood	(<i>Eucalyptus gummifera</i>)
and	Banksias	(<i>B. serrata</i>)

The shrub layer is dominated by wattles, principally:

	Sydney Golden Wattle	(<i>Acacia longifolia</i>)
	Sunshine Wattle	(<i>Acacia terminalis</i>)
	Prickly Moses	(<i>Acacia ulicifolia</i>)
and	Sweet Scented Wattle	(<i>Acacia suaveolens</i>)

Other plants include the Broad leaved Geebung (*Persoonia leavis*) and some She Oaks (*Casuarina littoralis*).

Below these is a thick ground cover up to 1 metre tall consisting mainly of:

	Bracken Fern	(<i>Pteridium esculentum</i>)
	Grasstree	(<i>Xanthorrhoea macronema</i>)
	Burrawang	(<i>Macrozamia sp.</i>)
	Slender Rice Flower	(<i>Pimelea linifolia</i>)
	Wedding Bush	(<i>Ricinocarpus pinifolius</i>)
	Native Fuchsia	(<i>Correa reflexa</i>)
	Kangaroo Grass	(<i>Themeda australis</i>)
and	Blady Grass	(<i>Imperata cylindrical</i>)

Bushfires frequently rage through this area. For several months after fires the forest floor is devoid of leaf litter. Bracken Fern and Blady Grass are the first to recover after fire and if fires are too frequent, a predominantly Bracken/Blady Grass association can become almost the permanent understorey.

In dry areas of the northwest corner of the reserve, Blackbutt tends to be replaced by Sydney Peppermint (presumably because of soil differences), Banksias are less common and the shrub layer is dominated by the Native Hopbush (*Dodonea triquerta*). Where an occasional damp spot occurs, Bracken Fern is replaced by Rainbow Fern which is normally more characteristic of the wet sclerophyll.

The dry sclerophyll forest supports a large variety of birds, chiefly nectar and insect eaters occupying either the canopy or the shrub layer depending on the species. Perhaps the most commonly observed birds are the Little Wattle Bird (*Anthochaera chrysoptera*) and the Grey Fantail (*Rhipidura fuliginosa*). Leaf litter invertebrates are varied and numerous but perhaps less so than in the wet sclerophyll where conditions are generally more favourable and populations are not so often decimated by fire. Fungi are not as plentiful as in the wet sclerophyll and their decomposition role is performed chiefly by termites.

Neither reptiles nor mammals have been studied in detail here, but certainly the:

Lace Monitor	(<i>Varanus varius</i>)
Blue Tongue Lizard	(<i>Tiliqua scincoides</i>)
Red bellied Black Snake	(<i>Pseudechis porphyriacus</i>)

and numerous skinks are significant consumers of insects, birds, eggs etc. Ring-tail Possum nests are rarely found in the dry sclerophyll. The commonly seen possum scratches on Rusty Gum trunks are made by the Brush-tail Possum (*Trichosurus vulpecula*) which lives in hollows in trees. These hollows are also used by Owls and Lace Monitors. Such hollows are generally unavailable in wet sclerophyll areas and certainly absent from heath areas.

The combination of extremely infertile dry soil and exposure to salt-laden sea winds have produced a vegetation association devoid of trees, except for the occasional very much stunted and dwarfed Bloodwood. Structurally, the community has no canopy or tree layer and in most areas no herb or ground cover layer. The dense cover of the closed “shrub” layer is complete. In places the heath has grown to a height of more than 2 metres but a west to east traverse towards the cliff line highlights the dramatic stunting of the more exposed plants closer to the sea. The species are essentially the same, but the individual plants are a fraction of the size of those with some shelter.

The principal genera are *Banksia* (mostly *B. serratafolia* but at least two other species are present), *Leptospermum* (3 or 4 species here), *Melaleuca* (4 or 5 species) and *Acacia* (5 species). A host of other xerophytic “wildflower” species are present but they are too numerous to list here. The accompanying bibliography contains references to detailed studies of this vegetation published in Hunter Natural History over the past ten years.

It is worth noting that many of the plants living on the bluff are leguminous, that is, they have nitrogen fixing bacteria in nodules on their roots, giving them an obvious survival advantage over non-leguminous plants in such a poor soil. All the heath plants are also well adapted to dry conditions and to fire. In fact, many of them need fire to either stimulate flowering, open fruits to free seeds, or crack seed coats to permit germination. Many plants develop a root system based on massive “lignotubers” from which fresh shoots sprout quickly after fire.

In other parts of the reserve, the heath takes slightly different forms. For example, adjacent to the Convent on Redhead Road is an area of dwarf heath growing in a very wet area, dominated by the Red Bottlebrush (*Callistemon citrinis*). In slightly more sheltered areas the Bloodwood and Rusty Gum grow to a greater height and a forest structure starts to develop.

3. CLOSED DRY HEATH

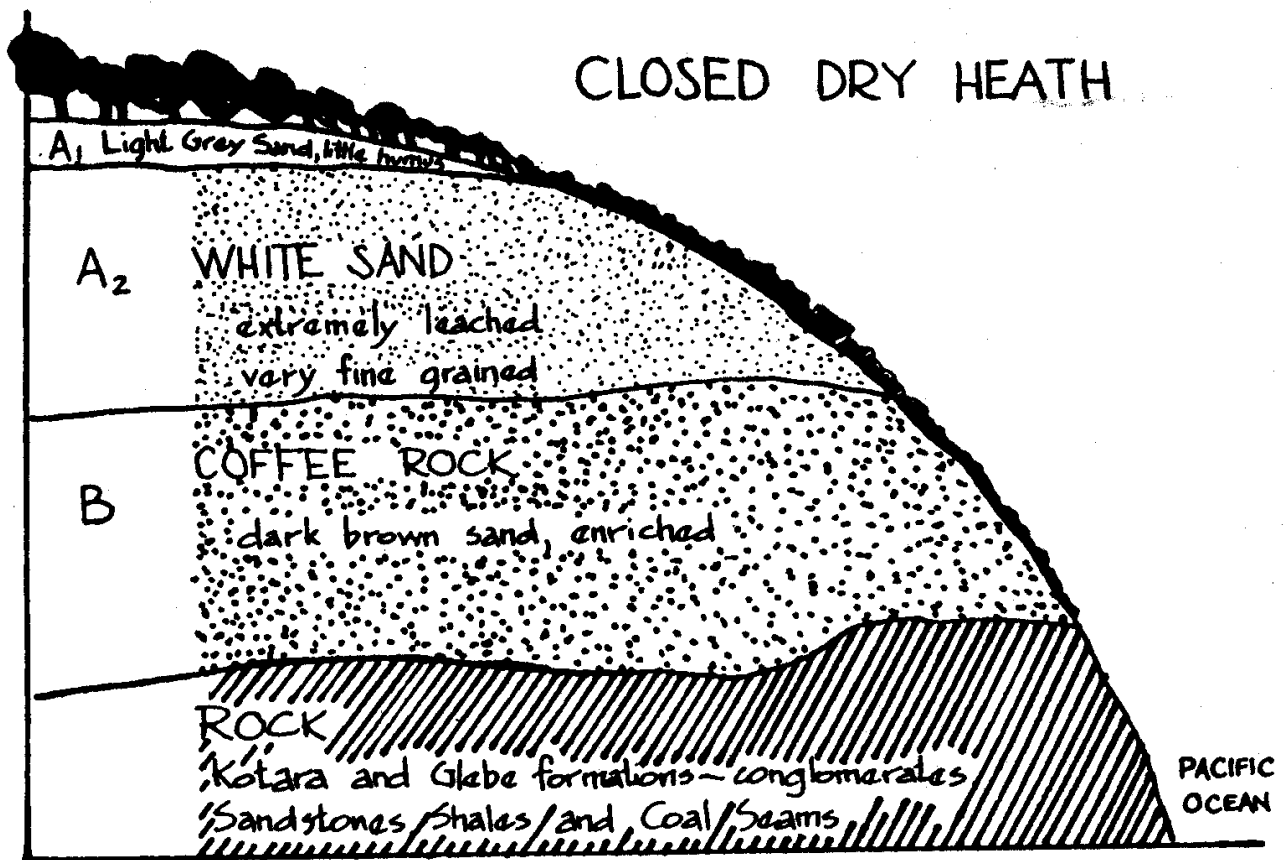


Figure 8

The bulk of the area of the Awabakal Nature Reserve is vegetated by heath of one form or another. Perhaps the most spectacular is that adjacent to the silica sand quarry on Dudley Bluff.

This exposed coastal site, some 90 metres above sea level, has a very dry, extremely podsolized sandy soil. Perched atop the headland for something in excess of 10,000 years almost all traces of mineral nutrients have been leached from the A horizon. So impoverished is the A horizon that it is mined for silica sand for the manufacture of light globes and fluorescent tubes. Only the purest of sand can be used for making such clear, fine glass. Below is the “coffee rock”, the dark brown B horizon enriched with the materials leached from above.

The most conspicuous fauna of the heath are the numerous small honeyeaters, the most commonly observed species being the Yellow-winged or New Holland Honeyeater (*Phylidonyris novaehollandiae*) and the Eastern Spinebill (*Acanthorhynchus tenuirostris*). The only reptiles seen on Dudley Bluff are small skinks. Obviously tree dwellers like the Lace Monitor and the various possums are unlikely to be found in such a treeless community. Leaf litter dwellers seem less plentiful and fungi are uncommon. The only mammals present would be the small species such as the Brown Antechinus (*A. stuartii*) and the New Holland Mouse (*Gyomys novaehollandiae*).

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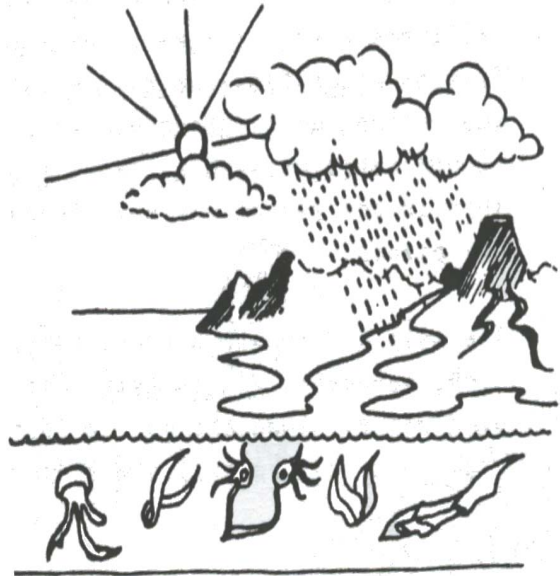
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THE FERNS

By A. Munro & P. Smith

Long ago, 350 million years ago, the lands of the earth were as bare of life as the moon or Mars today. All living things, plant and animal, dwelt in the oceans.

Gradually, from about this time, called the Devonian period by geologists, plants and then animals began to colonise the waiting land areas, probably starting with tidal creeks, then rivers, swamps and finally the driest places.



Ferns were among the **pioneer** plants, which first grew on the hostile land surfaces and developed ways of coping with the problems of obtaining minerals and water from the earth.

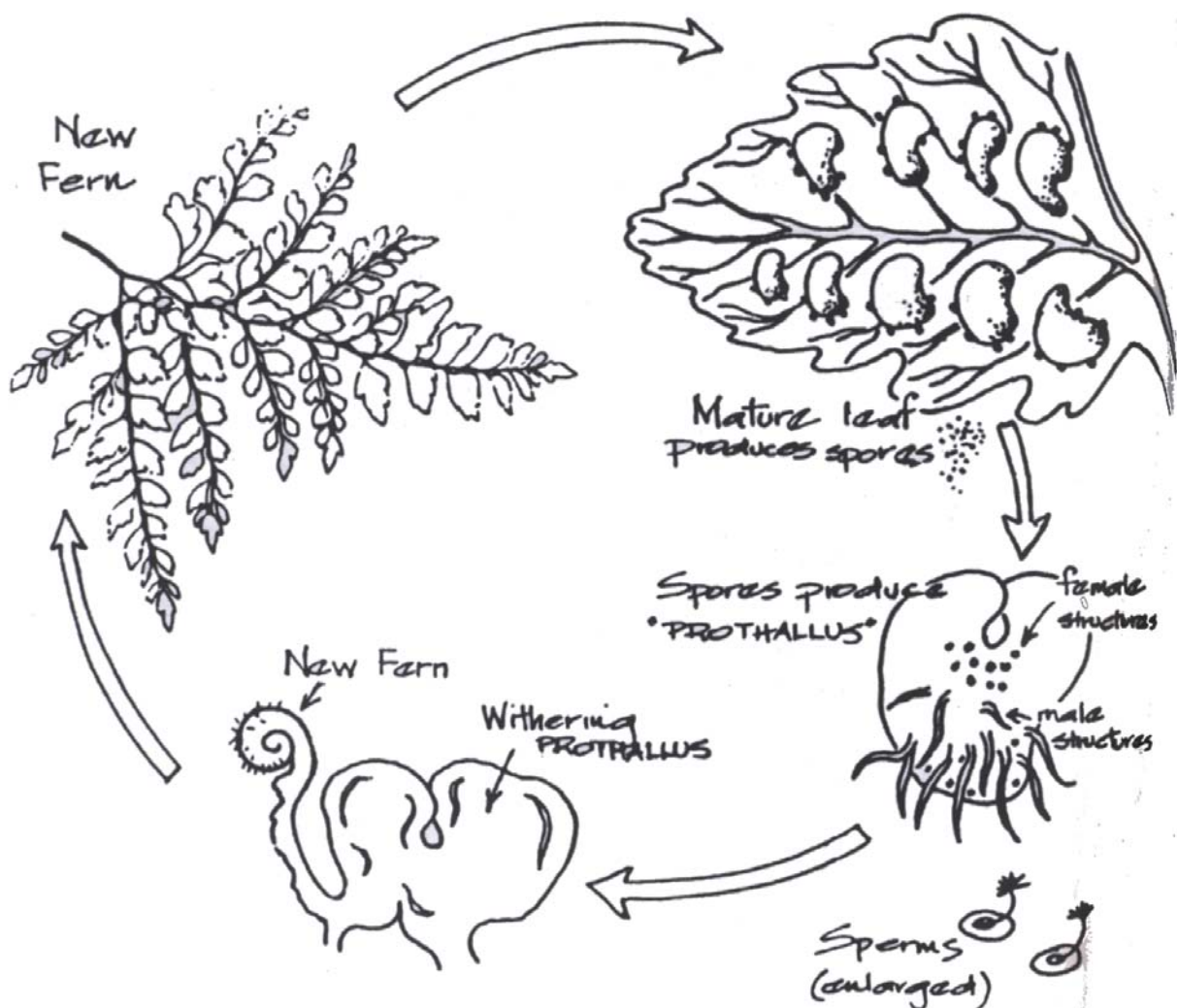


They are halfway between the humble algae mosses etc., and the seed bearing plants, which are dominant today. During the CARBONIFEROUS times, 280 million years ago, ferns grew in the dense forests, which provided the plant materials for the coal deposits Europe and America use today.

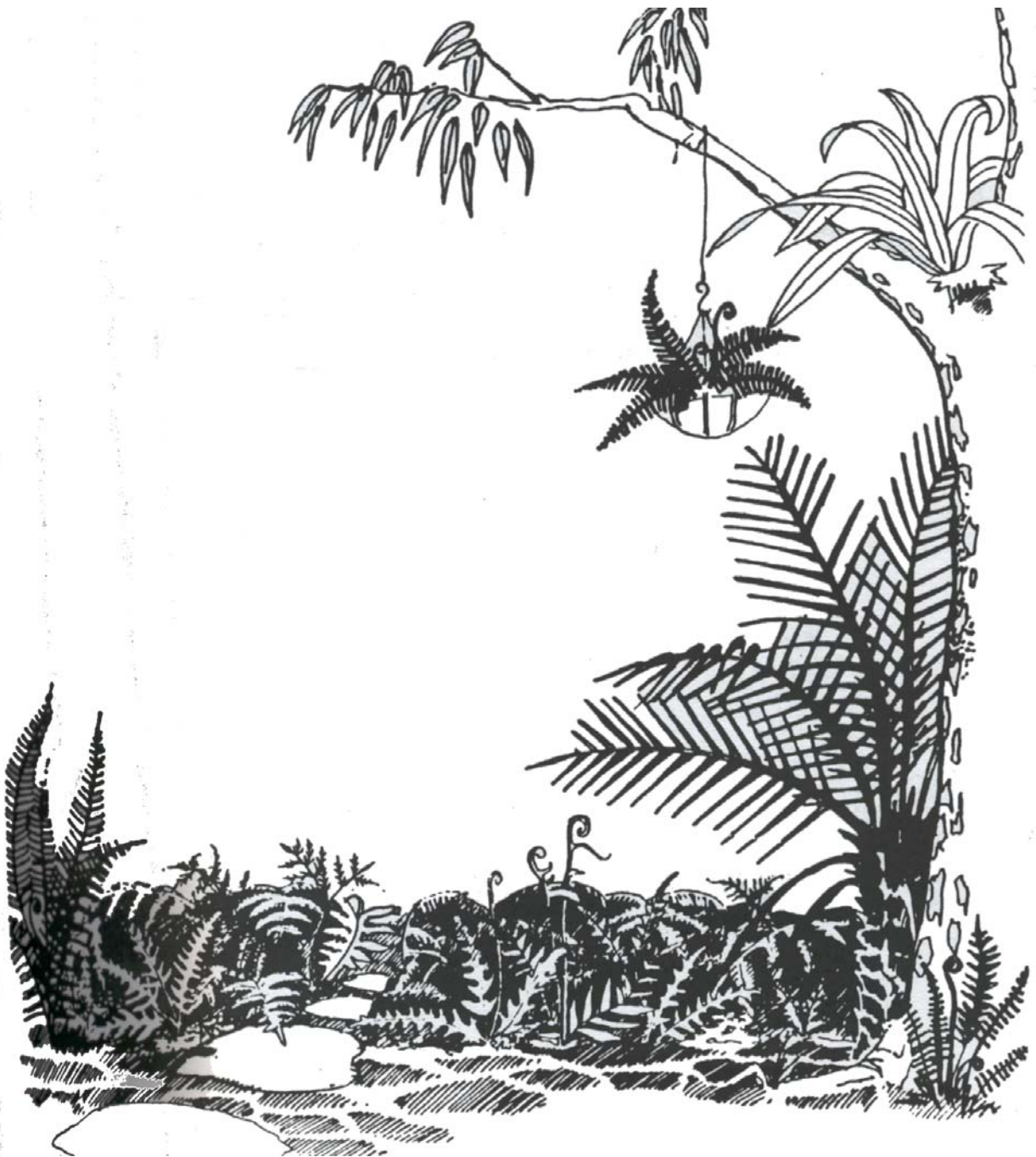
Reproduction

Ferns don't have flowers and seeds like modern plants. This is because they developed when there were NO INSECTS to pollinate them. Instead, the fertilizing sperm swims in the film of **water** from the male structure (antheridium) to the egg in the female structure (archegonium). Unless there is liquid water available, fertilization can't take place. This is one reason why most ferns are unable to live in very dry places.

The male and female structures grow on a special plant – a tiny, temporary single leaf less than 1 cm. long called a prothallus. Then the egg is fertilized, the new fern plant grows and the prothallus withers and disappears.



The **new** fern plant grows, matures and develops rusty spots or patches on the underside of some leaves. In these dust sized seeds, called **spores**, are produced. These are windblown sometimes over great distances and if they land in a favourable damp spot they germinate to grow into a new **prothallus**. Thus the cycle goes on. Spores often carry across oceans so that the ferns populations of nearby lands are often very alike. There are 10,000 species of ferns worldwide and 350 KNOWN species in Australia. More await discovery.



Grow a Fern Garden

You can start by buying from a nursery or digging up fern roots from an existing garden.

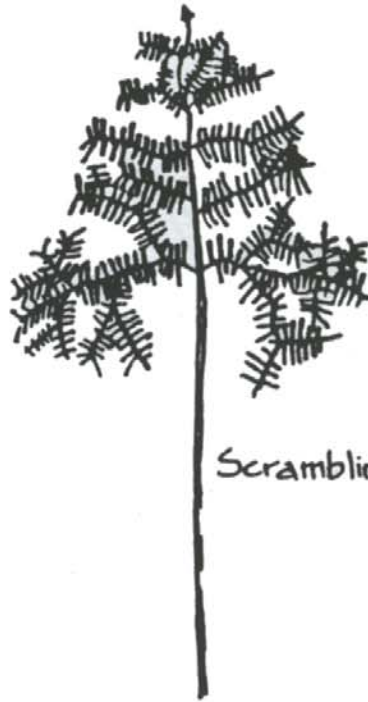
Ferns like the shade they get by being planted among other ferns and shade-loving plants, and on the **south** side of walls, rocks, trees etc. However, competition from other plants may restrict their growth.

They love water and high humidity, so need watering in the hot dry weather and shelter from drying winds. In winter, they appreciate sunshine, so that a **deciduous** tree, which sheds its leaves is a good shelter. They do better in **heavy** soils, with plenty of plant material and gypsum to break it up.

Mulching around the roots helps keep them cool and moist in dry times. Good mulches are bark, compost and leaf mould.

Baskets can be made from wire, wooden slats and sticks etc. They should be lined with bark moss, hessian, peat etc., to hold in the soil and prevent drying out.

Rainbow Fern



Scrambling Coral Fern



Bracken Fern



Water Fern



Forked Comb Fern



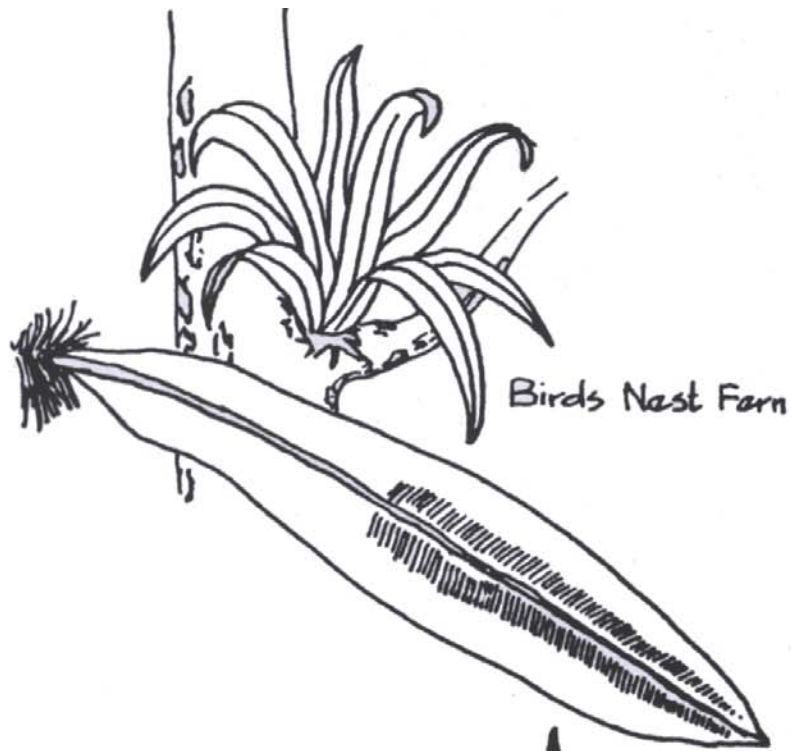
Raspfern



Ashbone Fern



Maidenhair Fern

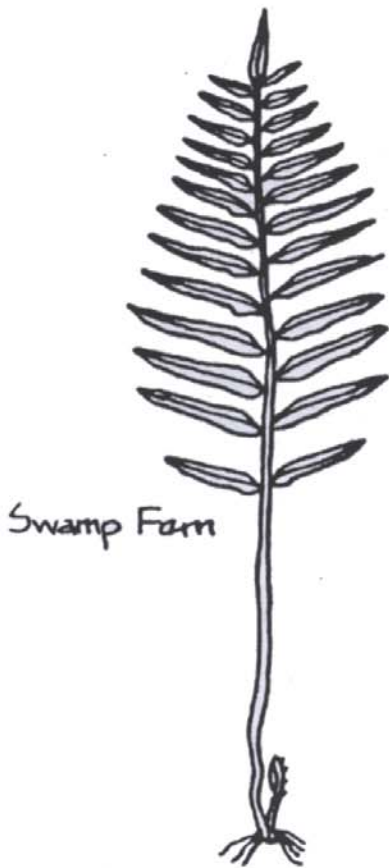


Birds Nest Fern

Screw Fern



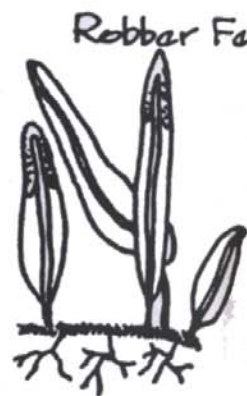
Fan Fern



Swamp Fern



Kangaroo Fern

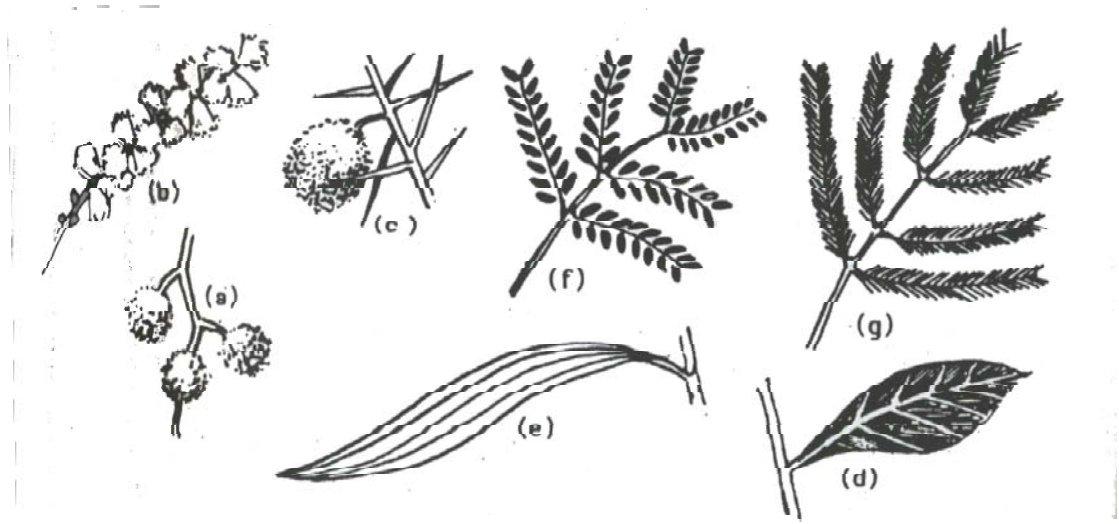


Robbar Fern

WATTLES

By A. Munro

There are many kinds of wattles in Australia, over 600 kinds in fact. They are found growing all over the continent, from sea level to the tree line at 6,000 feet in the Snowy Mountains. Some belong to the coastal sand dunes, others thrive in the inland deserts. They range in size from scrambling shrubs a few centimetres high to trees 35 metres tall in the deep gullies of the Blue Mountains. Their leaves, flowers and pods take many forms. Flowers may be oblong spikes (b), or spherical heads like (a) and (c). Leaves may be true feathery (compound) leaves like (f) and (g) or flattened stems (phyllodes) like (d) and (e).



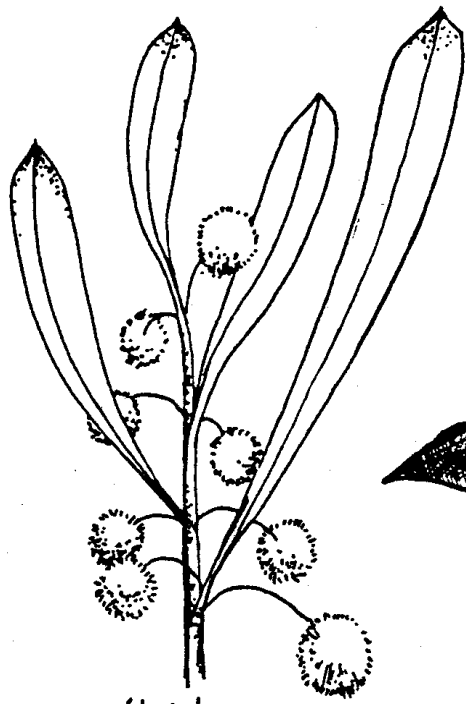
The seed pods may be long, narrow, broad or twisted. These are the features used to identify the various species.



One way to identify plants is to use a **key**. You study a good sample of the wattle while you check through the sequence of descriptive phrases. This should lead you to the name of the unknown plant. Remember, this simple key only works for the few species presently listed for this area, but there are keys for all the species in Australia.

KEY:

- 1.(a) Mature leaves are flat phyllodes go to 2
or
(b) Mature leaves feather, compound leaves go to 7
- 2.(a) Phyllodes usually longer than 4 cm. go to 3
or
(b) Phyllodes 4 cm long or less go to 6
- 3.(a) Phyllodes narrower than 1 cm go to 4
or
(b) Phyllodes 1 cm wide or wider go to 5
- 4.(a) Phyllodes long and narrow and with a fine brown point: (Sweet-scented wattle) *A. suaveolens*
(b) Phyllodes narrow with rounded ends, slightly indented at the tips; leaves point upward along the stems: *A. stricta*
- 5.(a) Phyllodes with rounded ends and branching veins.
Leaves often sickle shaped: (Sickle leaved wattle) *A. falcata*
(b) Phyllodes with parallel veins and oblong flower heads:
(Sydney golden wattle) *A. longifolia*
- 6.(a) Phyllodes needle-like and about 1 cm. long:
(Prickly moses) *A. ulicifolia*
(b) Phyllodes flat and with prominent midribs.
Stems red: (Myrtle wattle) *A. myrtifolia*
- 7.(a) Smallest leaflets 1 mm wide, crowded, dark green:
(Black wattle) *A. decurrens*
(b) Smallest leaflets rounded, 2 mm wide, spaced:
(Sunshine wattle) *A. terminalis*



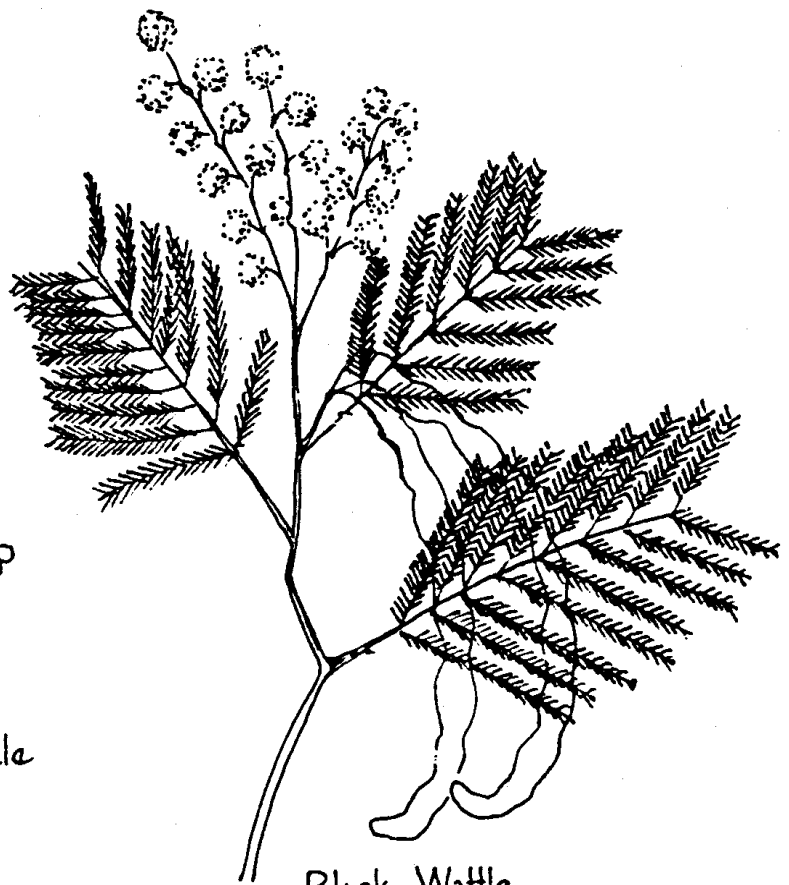
Acacia Stricta



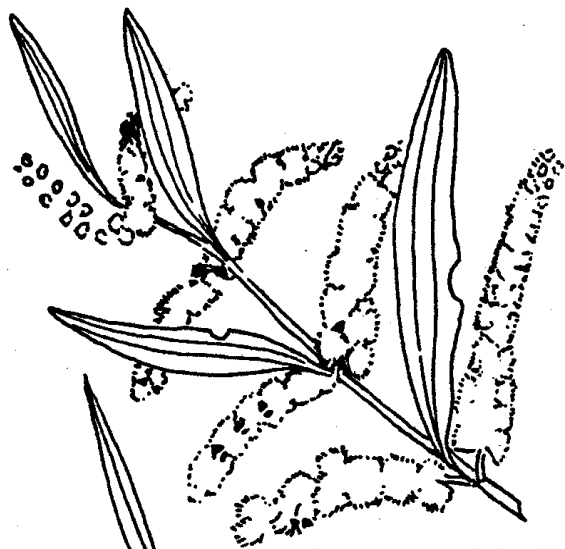
Acacia Falcata



Myrtle Wattle



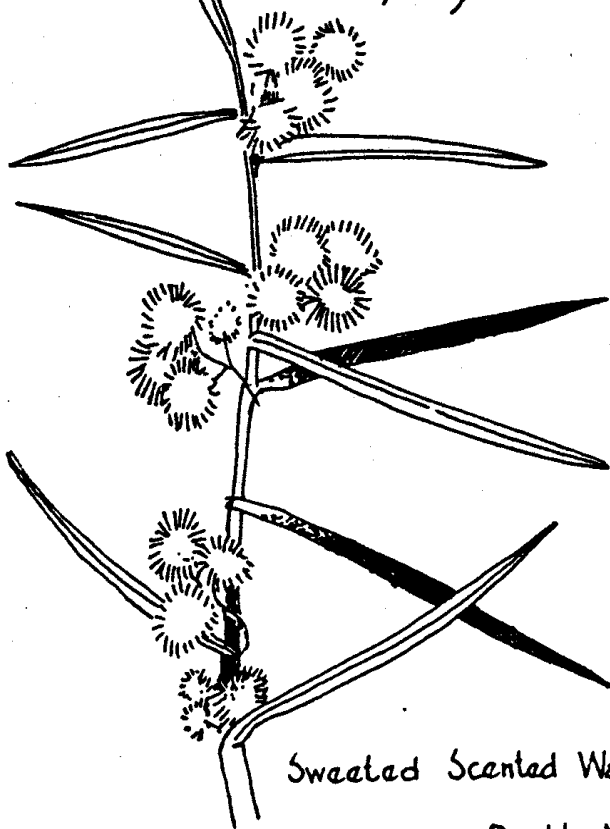
Black Wattle



Sydney Golden Wattle

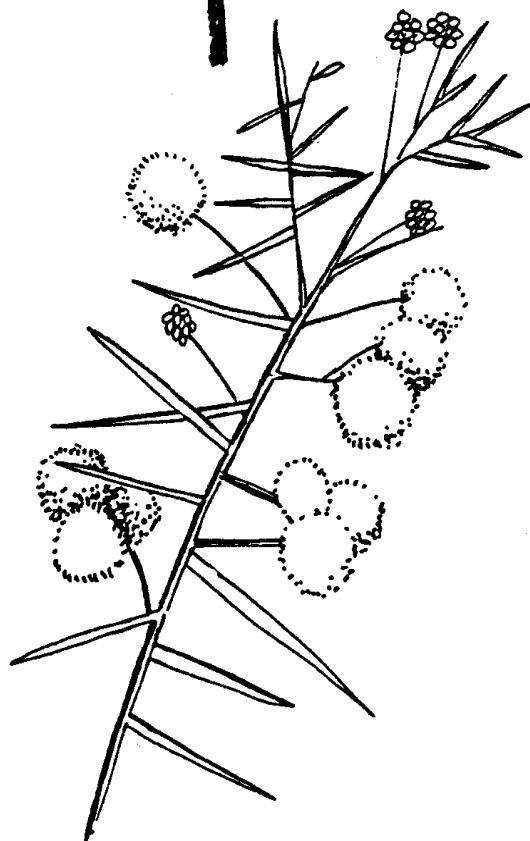


Sunshine Wattle



Sweet Scented Wattle

Prickly Moses

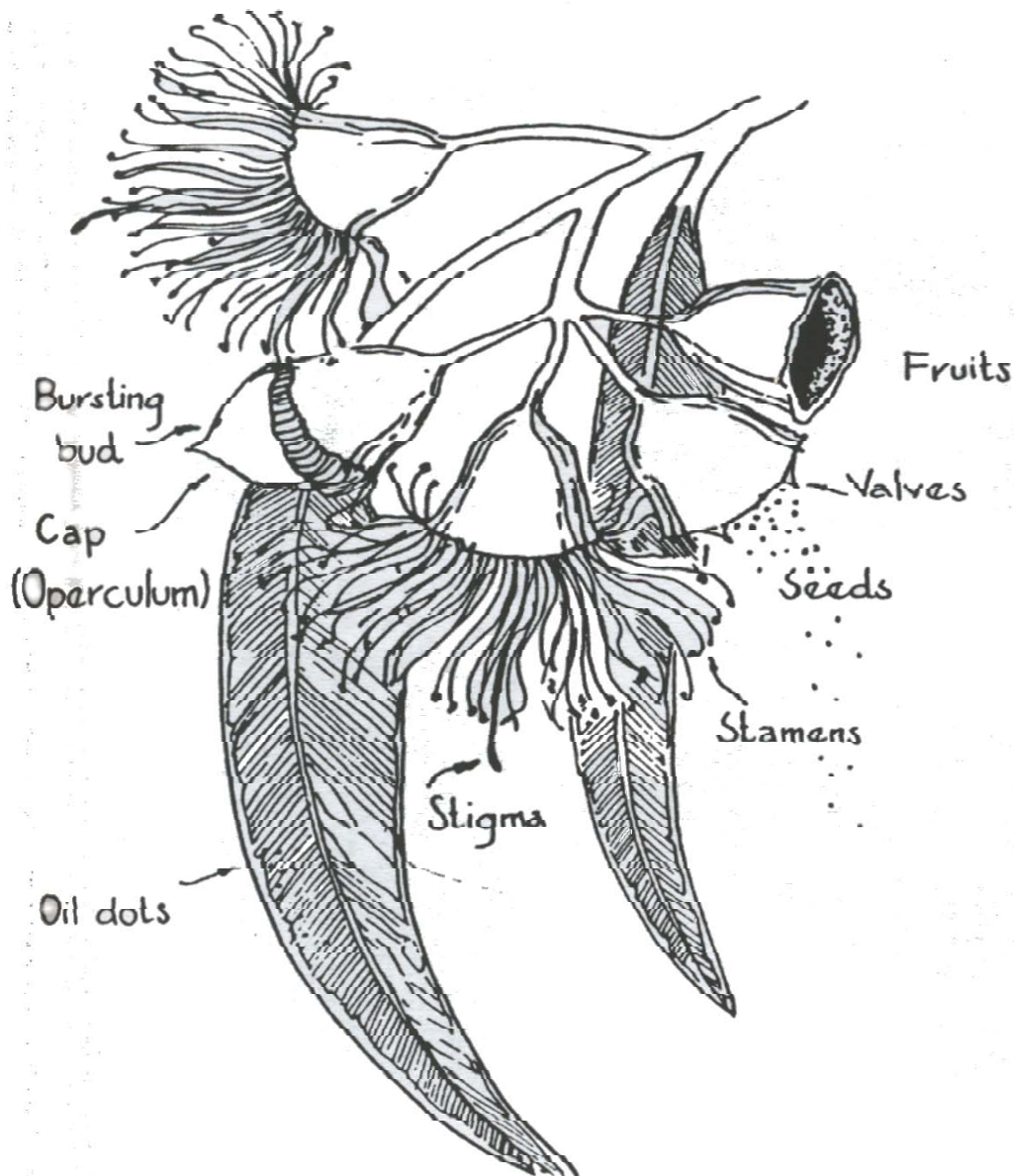


EUCALYPTS OF THE DUDLEY-REDHEAD AREA

By A. Munro

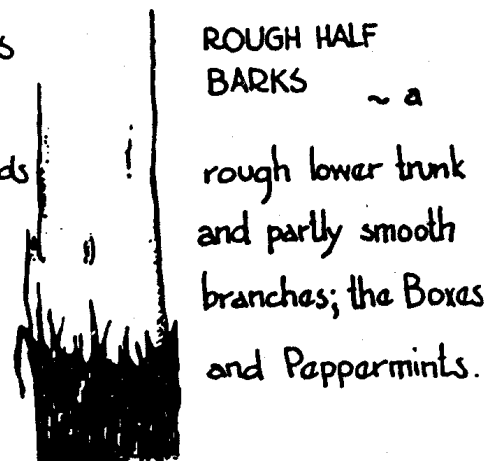
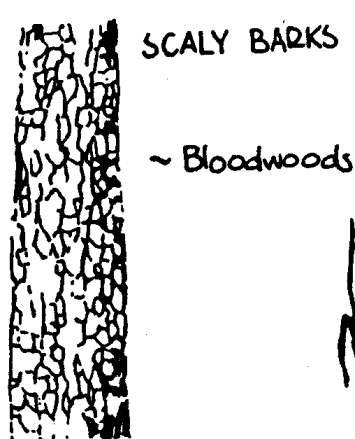
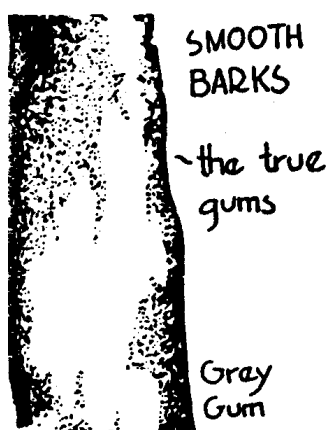
There are over 600 species of Eucalypt or gum trees in Australia. They are the main species in almost any forested area – from the treeline at Kosciusko to the hot deserts of the inland.

The name **EUCALYPT** means ‘well covered’. It describes the flower, which always has a cap protecting the stamens when it is in bud. This falls off as the flowers open. The shape and size of buds, cups and caps are the main clues, which help us to identify trees.



There are so many species that they are first divided into major groups according to the bark types:

1. smooth barks – the ‘true’ gums.
2. scaly barks – bloodwoods.
3. rough ‘half’ barks – with a rough lower trunk and partly smooth branches. These include boxes and peppermints.
4. rough whole barks – no smooth branches, the stringy barks and mahoganies.
5. ironbarks – with hard, rugged, furrowed bark.



IRONBARKS
~ with hard rugged
furrowed bark



ROUGH WHOLE BARKS
~ no smooth branches;
the Stringybarks
and Mahoganies

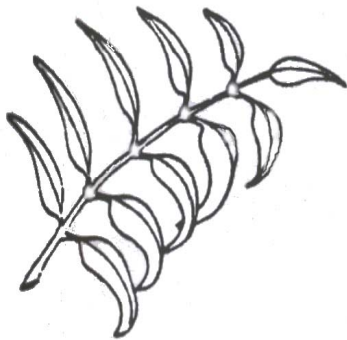
It is a good start to recognize a tree as being a gum, ironbark, stringybark etc. To work out which particular species it is can be very difficult unless you have a list or key for the small number of eucalypts in your local area.

This paper gives details of the main trees in the Dudley-Redhead area.

To identify a tree you need good material – buds, flowers, fruits (gumnuts) and a good look at the bark. Collect fruit, leaves and fallen flowers at the base of a group of similar trees but make sure they come from the right type.

What Gum Tree Is This?

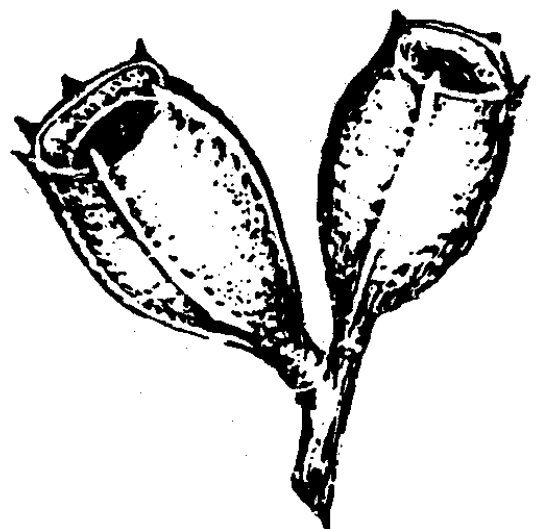
1. Are its mature leaves opposite (a) or alternate (b) on the twig?



OR



2. If they are opposite with fruits like this and the tree is fawn, pinkish or red in colour, you've been fooled! This common, gum-like tree is not a eucalypt but *Angophora costata*, the Smooth-barked Apple or Sydney Red Gum.



If the **mature** leaves are alternate, then decide which of the bark types it has and study the fruits to discover the exact species.

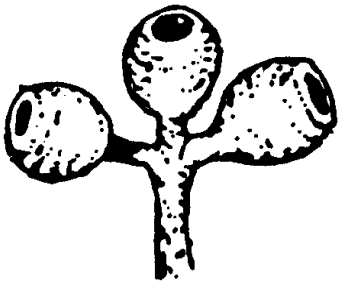
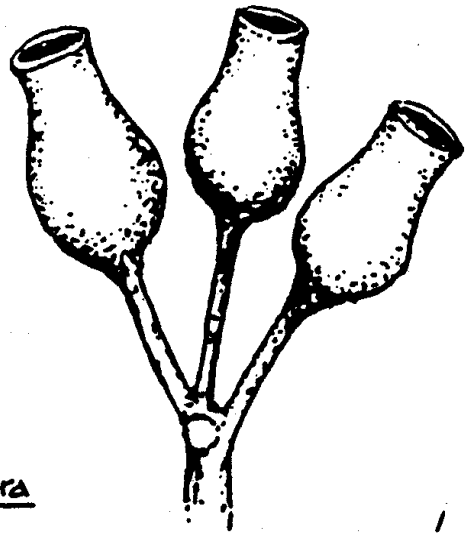
White Stringybark

Euc. Globoides



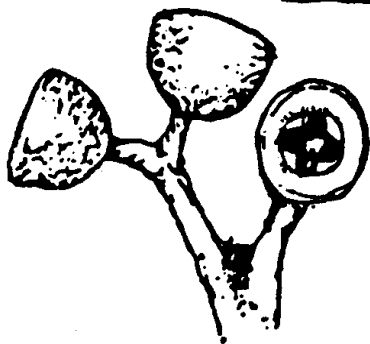
Bloodwood

Euc. Gummifera



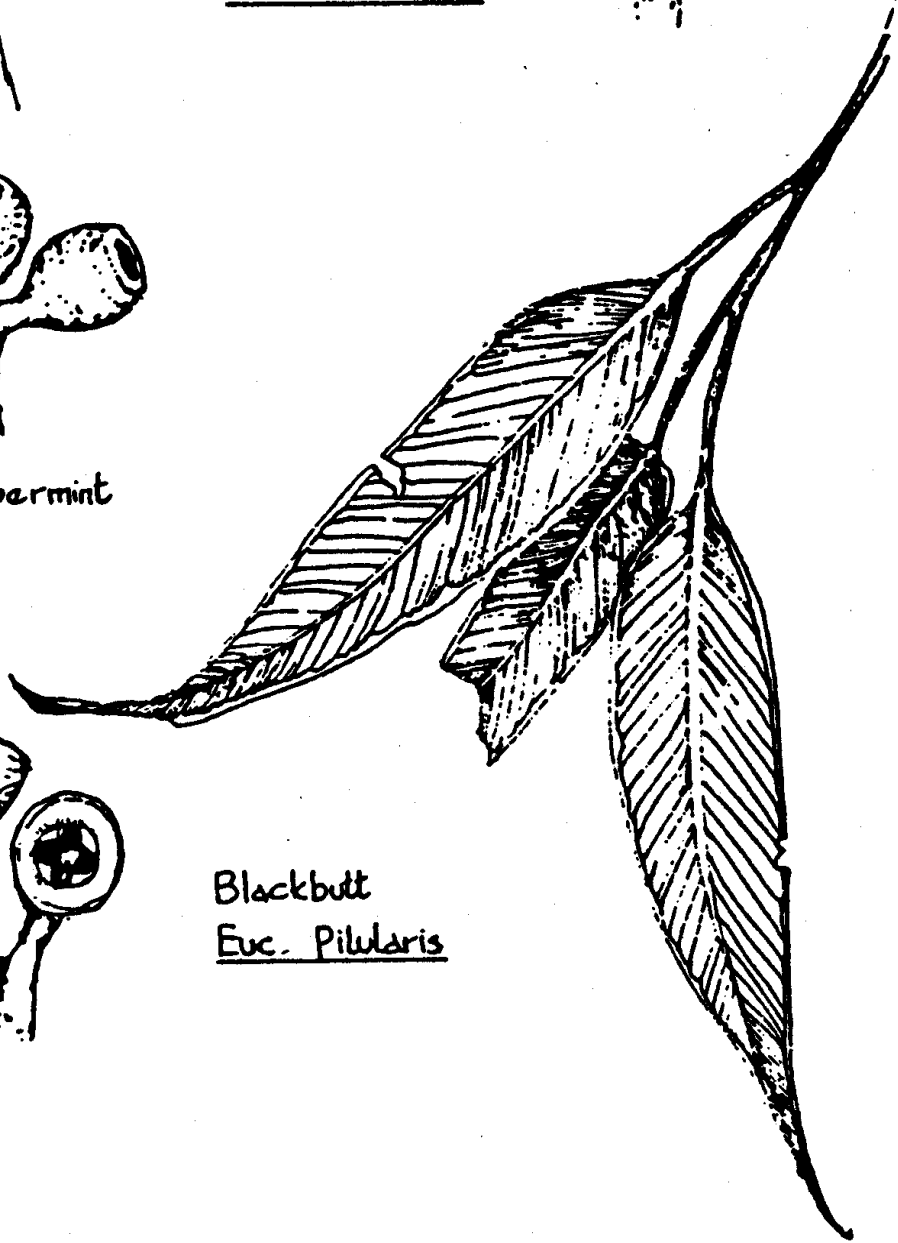
Sydney Peppermint

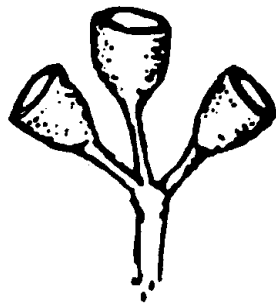
Euc. Piperita



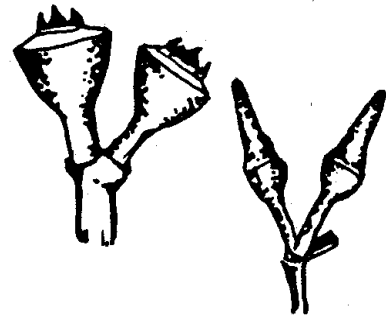
Blackbutt

Euc. Pilularis

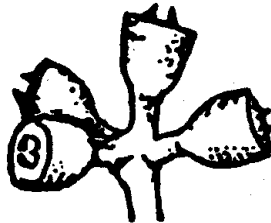




Grey Ironbark
Euc. Paniculata

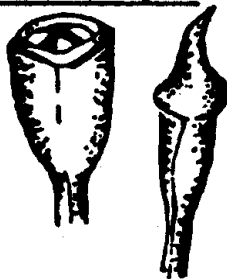


Broad-leaved Red Ironbark
Euc. Fibrosa

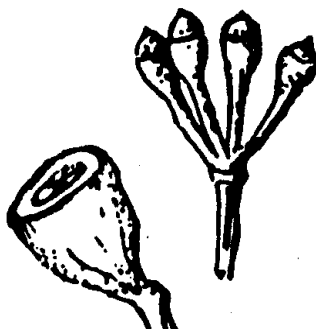


Sydney Bluegum
Euc. Saligna

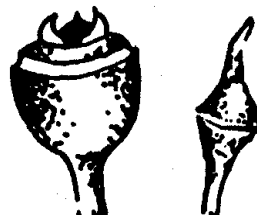
Swamp Mahogany
Euc. Robusta



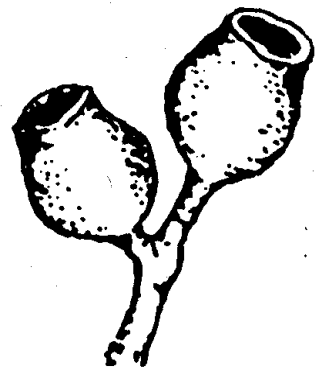
Red Mahogany
Euc. Resinifera



Scribbly Gum
Euc. Haemastoma



Grey Gum
Euc. Punctata



Spotted Gum
Euc. Maculata

FLORA OF THE REDHEAD-DUDLEY-JEWELLS AREA

Compiled by Nan Baxter and Kevin McDonald

1. This Flora replaces the preliminary report: Checklist of the flora of the Redhead-Jewells area (Newcastle) published in 'Hunter Natural History' 3:4, 284-290 (November, 1971)
2. Although this Flora is more complete than the earlier version, there is no doubt that some species have been missed. Supplementary lists will be published in later issues of 'Hunter Natural History' as additional species are located and identified.
3. In almost all cases, the scientific names used in this Flora correspond to those in the text:
Beadle, N.C.W., Evans, O.D., and Carolin, R.C. (1972)
'Flora of the Sydney Region'. Sydney, A.H. & A.W. Reed.
4. In general the area covered by the Flora comprises the country between the township of Dudley in the north and Jewells Swamp in the south (Shire of Lake Macquarie, N.S.W.). The area is bounded to the east by the cliffs and sandy beach of the Pacific coastline. The western boundary is arbitrarily set at the Pacific Highway though not all areas west of the Redhead/Kalaroo Roads have been studied.

More specifically, the locations of close investigation are as follows:
(Map 1)

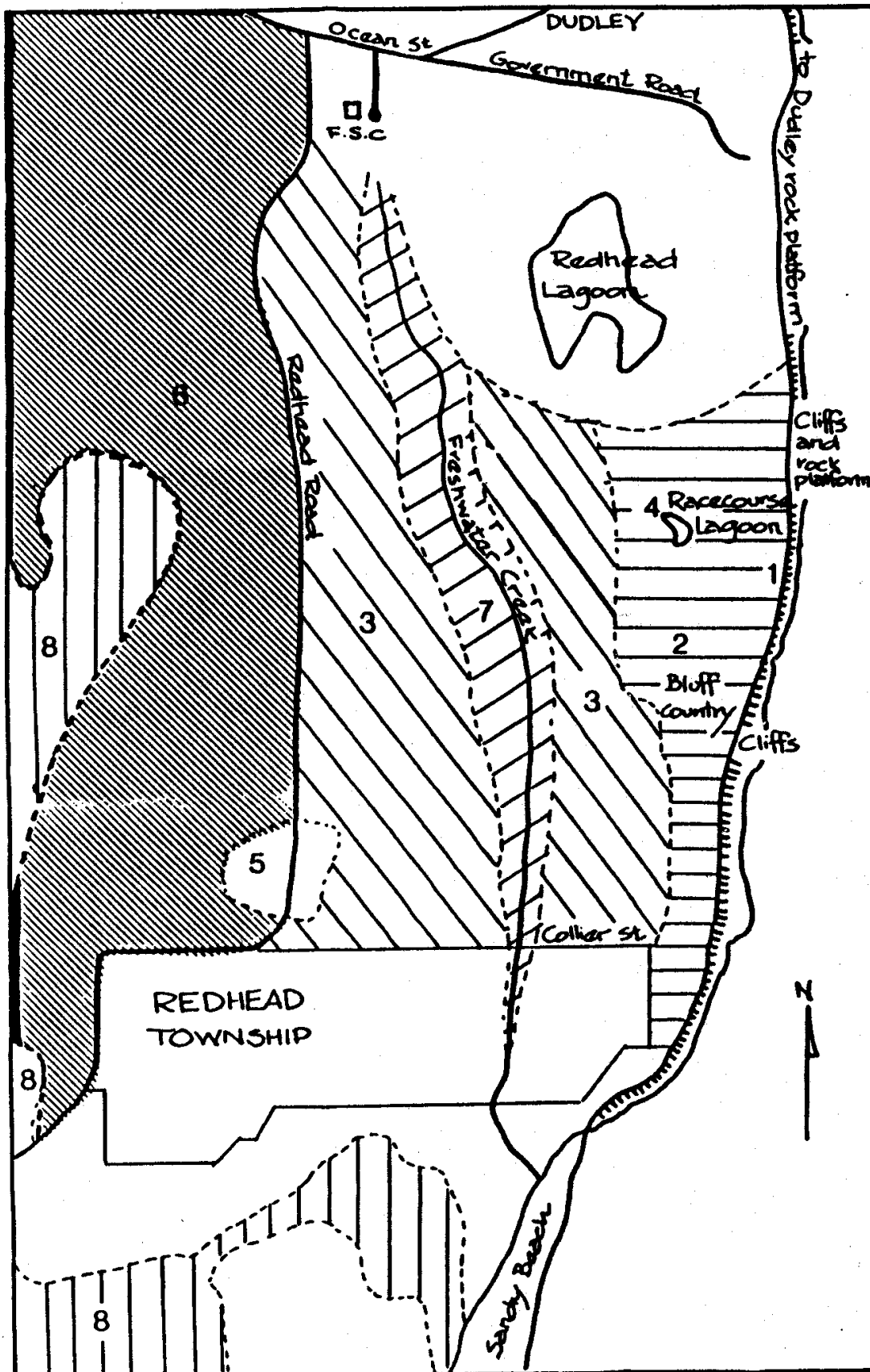
- (1) the cliff face, descending by the fishermen's path to 'Shelly Beach', Dudley/Redhead rock platform;
- (2) the coastal strip, running from the top of Redhead Bluff, northwards towards Dudley;
- (3) the area of undulating, sand-covered country, running down to the Redhead-Dudley Road;
- (4) a small lagoon – Racecourse Lagoon – now apparently permanently dried up due to mine subsidence;
- (5) a flat, open area on either side of the south end of Redhead-Dudley Road;
- (6) dry, wooded country (dry sclerophyll open forest);

- (7) where the north end of (3) descends to the road crossing a steep gully; here there is a variety of brush forest remnants not found elsewhere;
- (8) Jewell's Swamp. Mineral sands mining has removed almost all the vegetation in the swamp area. The swamp itself has become infested with water hyacinth (*Eichhornia crassipes*). Also periodic attempts to drain the swamp to the sea have adversely affected the plant communities associated with the swamp.

5. For ease of reference, plant families and the genera within them have been arranged in alphabetical order.

6. The geology of the area comprises Permian sedimentary rocks (sandstone, shales, chert and conglomerate, together with interbedded coal seams) overlain in many places by Quaternary sands. The perched dunes of the Redhead-Dudley Bluff and the inner Barrier sands of the swampland possess well developed podzol profiles. Younger, sandy deposits are found near the coastline. In places, the country rock has weathered **in situ** to give rise to clayey and / or stony soils of poor nutrient status. The average annual rainfall for nearby Newcastle is 1050 mm (41.36 ins.).

7. The area is extremely rich floristically, in possessing at least 100 plant families representing some 400 species. The area is remarkable for its variety of distinct plant communities, including open forest, dry heath, closed scrub, wet heath, swamp assemblages and rainforest remnants.



Map 1

FLORA OF THE REDHEAD-DUDLEY-JEWELLS AREA

Summary of Plant Divisions, Classes, Orders and Families

Note: Page Numbers refer to the text (Flora of the Sydney Region).
Beadle, N.C.W., Evans, O. D. and Carolin, R.C. (1972)
Flora of the Sydney Region. Sydney. A.H. & A. W. Reed.

Division: PIERIDOPHYTES (ferns and fern-allies)

Order: SELAGINELLALES

Family: SELAGINELLACEAE (p.45)

Order: FILICALES

Families: ADIANTACEAE	(p.68)
ASPLENIACEAE	(p.82)
AZOLLACEAE	(p.90)
BLECHNACEAE	(p.85)
CYATHEACEAE	(p.56)
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POLYPODIACEAE	(p.72)
SCHIZAEACEAE	(p.49)

Division: SPERMATOPHYTES

Class: GYMNOSPERMS (CONIFEROPSIDA) (Cone bearing plants)

Order: CYCADALES (palm-like plants)

Family: ZAMIACEAE (burrawangs) (p.95)

Class: ANGIOSPERMS (flowering plants)

Sub-class: **Dicotyledonae**

Families: ACANTHACEAE	(p.503)
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VERBENACEAE	(p.505)
VIOLACEAE	(p.167)
VITACEAE	(p.367)

Sub-class: **Monocotyledonae**

Families: CENTROLEPIDACEAE	(p.591)
COMMELINACEAE	(p.525)
CYPERACEAE	(p.595)
GRAMINEAE (POACEAE)	(p.618)
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XYRIDACEAE	(p.528)

Division: PTERIODOPHYTES (ferns and fern-allies)

Order: SELAGINELLALES

Family: SELAGINELLACEAE

Selaginella uliginosa

Order: FILICALES

Family: ADIANTACEAE

Adiantum aethiopicum Common maidenhair fern

Pellaea falcata Fishbone fern

Family: ASPLENIACEAE

Asplenium nidus Bird's nest fern

Family: AZOLLACEAE

Azolla filiculoides (var. *rubra*) Water fern

Family: BLECHNACEAE

Blechnum indicum
Doodia aspera Rasp fern

Family: CYATHEACEAE

Culcita dubia Rainbow fern; False bracken

Family: DENNSTAEDTIACEAE

Pteridium esculentum Bracken

Family: GLEICHENIACEAE

Gleichenia microphylla Scrambling coral fern
Sticherus lobatus Spreaking fan fern

Family: LINDSAEACEAE

Lindsaea linearis

Screw fern

Family: POLYPODIACEAE

Microsorium diversifolium

Kangaroo fern

Family: SCHIZAEACEAE

Schizaea bifida

Forked comb fern

Division: SPERMATOPHYTES

Class: GYMNOSPERMS (CONIFEROPSIDA) (Cone-bearing plants)

Order: CYCADALES (Palm-like plants)

Family: ZAMIACEAE (Burrawangs)

Macrozamia sp

Burrawang

Class: ANGIOSPERMS (Flowering plants)

Sub-class: Dicotyledonae

Family: ACANTHACEAE

Brunoniella australis

Dipteracanthus australis

Pseuderanthemum variabile

Family: AIZOACEAE

Carpobrotus edulis (introd.)

Hottentot fig

C. glaucescens

Pig-face

Tetragonia tetragonioides

New Zealand spinach or Warrigal
cabbage

Family: ARALIACEAE

Polyscias sambucifolius

(formerly *Tieghemopanan sambucifolous*)

Family: ASCLEPIADACEA

Marsdenia rostrata
M. suaveolens

Sweet-scented doubah

Family: BAUERACEAE

Bauera rubioides

Dog rose

Family: CAMPANULACEAE

Wahlenbergia sp.

Native bluebell

Family: CARYOPHYLLACEAE

Petrorhagia nanteuilii (introd.)
Silene gallica (introd.)

Small catchfly

Family: CASSYTHACEAE

Cassytha glabella
C. pubescens

Devil's twine

Devil's twine

Family: CASUARINACEAE (she-oaks)

Casuarina littoralis

Coastal she-oak; black she-oak

Family: CHENOPODIACEAE

Chenopodium album
C. carinatum
Enchylaena tomentosa

Fat hen

Keeled goosefoot or Boggabri

Ruby saltbush

Family: COMPOSITAE (ASTERACEAE) (Daisy family)

Ambrosia tenuifolia (introd.)
Bidens pilosa
B. tripartitus (introd.)
Chrysanthemoides monilifera (introd.)

Ragweed

Cobbler's peg

Bitou bush, Boneseed or South African
star bush

Coreopsis lanceolata (introd.)

Coreopsis

Cassinia aculeata

Eupatorium adenophorum (introd.)

Crofton weed

Brachycome sp.

<i>Olearia sp.</i>	
<i>Senecio laetus</i>	Variable groundsel
<i>Wedelia biflora</i>	

Family: CONVULVACEAE

<i>Convolvulus arvensis (introd.)</i>	Field bindweed
<i>Dichondra repens</i>	Kidney weed
<i>Ipomoea cairica (introd.)</i>	
<i>I. indica (introd.)</i>	Morning glory

Family: CUNONIACEAE

<i>Callicoma serratifolia</i>	Black wattle
<i>Ceratopetalum gummiferum</i>	Christmas bush

Family: DILLENIACEAE

<i>Hibbertia acicularis</i>	
<i>H. aspera</i>	
<i>H. dentata</i>	
<i>H. linearis</i>	
<i>H. monogyna</i>	
<i>H. scandens</i>	Guinea flower
<i>H. sericea</i>	
<i>H. stricta</i>	
<i>H. vestita</i>	

Family: DROSERACEAE (Sundews)

<i>Drosera auriculata</i>	Sundew
<i>D. binata</i>	Sundew
<i>D. peltata</i>	Sundew
<i>D. pygmaea</i>	Sundew
<i>D. spathulata</i>	Sundew

Family: ELAEOCARPACEAE

<i>Elaeocarpus reticulatus</i>	Blueberry Ash
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Family: EPACRIDACEAE

<i>Acrotriche divaricata</i>
<i>Astroloma humifusum</i>

<i>A. pinifolium</i>	Ten corners
<i>Brachyloma daphnoides</i>	
<i>Epacris microphylla</i>	Coral heath
<i>E. obtusifolia</i>	Blunt-leaved heath
<i>E. pulchella</i>	Beauty heath
<i>Leucopogon appressus</i>	
<i>L. juniperinus</i>	Juniper Whitebeard
<i>L. lanceolatus</i>	
<i>L. parviflorus</i>	Whitebeard
<i>L. virgatus</i>	
<i>Lissanthe sapida</i>	
<i>Melichrus procumbens</i>	Jam tarts
<i>M. urceolatus</i>	
<i>Monotoca elliptica</i>	
<i>M. scoparia</i>	
<i>Sprengelia incarnata</i>	Marsh sprengelia
<i>S. sprengelioides</i>	
<i>Styphelia viridis</i>	Green fivecorners

Family: EUPHORBIACEAE

<i>Amperea xiphioclada</i>	
<i>Breynia oblongifolia</i>	
<i>Glochidion ferdinandi</i>	Cheese tree
<i>Omalthus populifolius</i>	Bleeding heart
<i>Phyllanthus gasstroemii</i>	
<i>Poranthera ericifolia</i>	
<i>P. microphylla</i>	
<i>Pseudanthus orientalis</i>	
<i>Ricinocarpus pinifolius</i>	Wedding bush
<i>Ricinus communis (introd.)</i>	Castor oil plant

Family: FUMARIACEAE

<i>Fumaria officinalis (introd.)</i>	Common fumitory
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Family: GENTIANACEAE

<i>Centaurium erythraea (introd.)</i>	Common centaury
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Family: GERANIACEAE

<i>Pelargonium australe</i>	Wild geranium
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Family: GOODENIACEAE

Dampiera stricta (2 varieties)

Goodenia bellidifolia

G. heterophylla

G. ovata

G. paniculata

G. stelligera

Scaevola ramosissima

S. albida

S. calendulacea

Blue fan flower

Family: HALORAGACEAE

Haloragis micrantha

H. teucrioides

Family: HYPERICACEAE

Hypericum japonicum

Small St. John's wort

Family: LABIATAE

Plectranthus parviflorus

Westringia fruticosa

Coast rosemary

Family: LAURACEAE

Endiandra sieberi

Corkwood

Family: LENTIBULARIACEAE (bladderworts)

Utricularia cyanea

U. dichotoma

U. dichotoma var. *uniflora*

U. lateriflora

Family: LINACEAE

Linum trigynum (introd.)

Family: LOBELIACEAE

Lobelia alata

L. dentata

Pratia purpurascens

White-root

Family: LOGANIACEAE

Logania albiflora

(formerly *L. floribunda*)

Mitrasacme polymorpha

Mitrewort

Family: LORANTHACEAE

Amyema pendulum

Muellerina eucalyptoides

Drooping mistletoe

Creeping mistletoe

Family: MALVACEAE

Sida rhombifolia

Paddy's lucerne

Family: MELIACEAE

Synoum glandulosum

Bastard rosewood

Family: MENYANTHACEAE

Villarsia exaltata

Yellow marsh flower

Family: MIMOSACEAE (wattles)

Acacia baueri

A. brownii

A. decurrens

A. echinula

A. falcata

A. longifolia var. *longifolia*

A. longifolia var. *sophorae*

A. maidenii

A. myrtifolia

A. quadrilateralis

(formerly *A. pugioniformis*)

A. stricta

A. suaveolens

Green wattle

Falcate wattle

Sydney golden wattle

Coastal wattle

Myrtle acacia

Sweet-scented wattle

A. terminalis
(formerly *A. botrycephala*)
A. ulicifolia

Sunshine wattle

Prickly moses

Family: MORACEAE

Ficus coronata

Sandpaper fig

Family: MYOPORACEA

Myoporum acuminatum

Boobialla

Family: MYRTACEAE (myrtle family: eucalypts, tea trees)

Acmena smithii

Lillypilly

Angophora costata

Rusty gum; Smooth-barked apple

Baeckea imbricata

Callistemon citrinus

Crimson bottlebrush

C. linearis

Narrow-leaved bottlebrush

Eucalyptus globoidea

White stringybark

E. gummifera

Red bloodwood

E. haemastoma (*E. signata*?)

Scribbly gum (Northern Scribbly gum?)

E. maculata

Spotted gum

E. pilularis

Blackbutt

E. resinifera

Red mahogany

E. robusta

Swamp mahogany

Leptospermum arachnoides

L. flavescens

Yellow tea tree

L. juniperinum

Prickly tea tree

L. laevigatum

Coastal tea tree

L. lanigerum

Melaleuca deanei

M. ericifolia

M. linariifolia

M. nodosa

M. quinquenervia

Broad-leaved paperbark

M. squarrosa

M. thymifolia

Thyme honeymyrtle

Syzygium coolminianum

Family: OLACACEAE

Olex stricta

Family: OLACEAE

Notelaea ovata

Native olive

Family: ONAGRACEAE

Ludwigia peploides

Oenothera affinis (introduced)

O. stricta (introduced)

Evening primrose

Evening primrose

Family: OXALIDACEAE

Oxalis corniculata

Yellow wood sorrel

Family: PAPILIONACEAE (FABACEAE) (pea flowers; legumes)

Aotus ericoides

Bossiaea ensata

B. heterophylla

B. prostrata

B. rhombifolia

B. stephensonii

Canavalia maritima

Daviesia aciculari

D. alata

D. corymbosa

D. squarrosa

D. ulicifolia

Desmodium rhytidophyllum

D. varians

Dillwynia retorta

D. sericea

Dipogon lignosus (introduced)

Erythrina indica (introduced)

Gompholobium glabratum

G. huegelii

G. minus

G. pinnatum

G. virgatum var. *virgatum*

Glycine clandestina

Hardenbergia violacea

Hovea linearis

Indigofera australis

Jacksonia scoparia

Egg and bacon

Egg and bacon

Egg and bacon

Egg and bacon

Egg and bacon

Beach bean

Bitter fuzzy bush

Healthy parrot pea

Indian coral tree

Wedge pea

Pinnate glory pea

Purple pea

Dogwood

<i>Kennedia prostrata</i>	Running postman
<i>K. rubicunda</i>	Dusky coral pea
<i>Lupinus varius</i> (introduced)	
<i>Mirbelia rubiifolia</i>	Mirbelia
(formerly <i>M. reticulata</i>)	
<i>Oxylobium ilicifolium</i>	Native holly
<i>Phyllota phylicoides</i>	
<i>Psoralea pinnata</i> (introduced)	Psoralea
<i>Pultenaea daphnoides</i>	Bacon and eggs
<i>P. paleacea</i>	Bacon and eggs
<i>P. paludosa</i>	Bacon and eggs
<i>P. villosa</i>	Bacon and eggs
<i>Sphaerolobium vimineum</i>	
<i>Vicia augustifolia</i> (introduced)	Narrow-leaf vetch
<i>Vigna vexillata</i>	
<i>Viminaria juncea</i>	Native broom

Family: PHYTOLACCACEAE

<i>Phytolacca octandra</i>	Inkweed
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Family: PITTOSPORACEAE

<i>Billardiera scandens</i>	Dumplings
<i>Bursaria spinosa</i>	Blackthorn
<i>Marianthus procumbens</i>	
<i>Pittosporum revolutum</i>	Pittosporum
<i>P. undulatum</i>	Pittosporum

Family: PLANTAGINACEAE

<i>Plantago lanceolata</i> (introduced)	Plantain or Rib-wort
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Family: POLYGALACEAE

<i>Comesperma defoliatum</i>	Match-heads
<i>C. ericinum</i>	Match-heads

Family: POLYGONACEAE

<i>Polygonum lapathifolium</i>	Pale knotweed
<i>P. persicaria</i>	
<i>P. strigosum</i>	Spotted knotweed

Family: PORTULACACEAE

Portulaca oleracea

Purslane or Pigweed

Family: PRIMULACEAE

Anagallis arvensis

Pimpernel; Poorman's weatherglass

Samolus repens

Creeping brookweed

Family: PROTEACEAE (banksias, etc. – xeromorphic leaves, woody fruits)

Banksia aspleniifolia

Rusty-tips banksia

B. collina

Honeysuckle banksia

B. integrifolia

Coastal banksias

B. serrata

Old man banksia

B. serratifolia

Saw-tooth banksia

B. spinulosa and *B. robur*

Conospermum taxifolium

Coneseeds

Grevillea parviflora

Hakea bakerana

Needlebush

H. dactyloides

Broad-leaved hakea

H. teretifolia

Needlebush

Isopogon anemonifolius

Drumsticks

Lambertia formosa

Mountain devil; Honeyflower

Lomatia silaifolia

Wild parsley

Persoonia laevis

Broad-leaved geebung

P. laurina

Geebung

P. linearis

Geebung

P. salicifolia

Willow-leaved geebung

Petrophile sessilis

Conesticks

P. fucifolia

Conesticks

Xylomelum pyrifforme

Woody pear

Family: RANUNCULACEAE

Clematis aristate

Clematis; Traveller's joy

Ranunculus lappaceus

Family: RHAMNACEAE

Alphitonia excelsa

Red Ash

Pomaderris lanigera

Pomaderris

Family: ROSACEAE

Cotoneaster glaucophylla (introduced)
Rubus vulgaris (introduced)

Cotoneaster
Blackberry

Family: RUBIACEAE

Opercularia hispida

Family: RUTACEAE

Boronia parviflora
B. pinnata
B. polygalifolia
Correa reflexa
Eriostemon australasius
(formerly *E. lanceolatus*)
Philotheca salsolifolia
Zieria smithii

Pinnate boronia
Native fuchsia
Pink wax flower

Family: SANTALACEAE (semi-parasitic shrubs)

Exocarpos strictus
Leptomeria acida

Native cherry
Native currant

Family: SAPINDACEAE

Cupaniopsis anacardioides
Dodonaea triquetra

Tuckeroo
Hop bush

Family: SCROPHULARIACEAE

Mimulus repens
Veronica calycina

Family: SOLANACEAE

Solanum stelligerum

Family: STACKHOUSIACEAE

Stackhousia scorparia

Family: STERCULIACEAE

Lasiopetalum ferrugineum var. *ferrugineum*

Family: THYMELEACEAE

Pimelea linifolia

Buttons; Slender rice flower

Wikstroemia indica

Family: TREMANDRACEAE

Tetratheca juncea

Black-eyed Susan

(includes a leafy variety)

T. pilosa var. *denticulata*

Black-eyed Susan

Family: UMBELLIFERACEAE (APIACEAE) (carrot family)

Actinotus helianthi

Flannel flower

Cantella asiatica

Foeniculum vulgare (introduced)

Fennel; Aniseed weed

Hydrocotyle qacutiloba

H. bonariensis (introduced)

Pennywort

H. geraniifolia

Platysace ericoides

Platysace

P. lanceolata

Platysace

Trachymene incisa

Native parsnip

Xanthosia pilosa

X. tridentata

Family: VERBENACEAE

Chloanthes stoechadis

Snake's tongue

Lantana camara (introduced)

Lantana

Verbena bonariensis (introduced)

Purple top

V. rigida (introduced)

Veined verbena

Family: VIOLACEAE

Hybanthus filiformis

Lady's slipper

Viola betonicifolia

V. hederacea

Ivy-leaf violet

Family: VITACEAE

Cayratia clematidea

Cissus sp. Native grape; Water vine

Sub-class: Monocotyledonae

Family: CENTROLEPIDACEAE

Centrolepis fascicularis -

Family: COMMELINACEAE

Commelina cyanea Wandering jew

Family: CYPERACEAE (Sedges; grass-like plants; wiry stems)

Caustis pentandra

Cyperus gracilis Slender sedge

C. gymnocaulos

Eleocharis sphacelata Tall spike rush

Lepidosperma laterale

L. neesii

Lepironia articulata

Ptilanthelium deustum

Scirpus nodosus

Gahnia sp.

Family: GRAMINEAE (POACEAE) (Grasses)

Aristida vagans 3-awned spear grass

Briza maxima (introduced) Quaking grass

B. minor (introduced) Shivery grass

Danthonia purpurascens Wallaby grass

Echinopogon caespitosus Rough bearded grass

Entolasia stricta

Imperata cylindrica var. major Blady grass

Microlaena stipoides Weeping grass

Paspalum dilatatum (introduced) Paspalum

Phragmites australis Common reed; Swamp grass

Stenotaphrum secundatum (introduced) Buffalo grass

Stipa pubescens Tall spear grass

Themeda australis Kangaroo grass

Spinifex hirsutus Sand Spinifex

Family: HAEMODORACEAE

<i>Haemodorum coymbosum</i>	Bloodroot
<i>H. planifolium</i>	Bloodroot

Family: HYPOXIDACEAE

Hypoxis hygrometrica

Family: IRIDACEAE (Iris family)

<i>Freesia refracta</i> (introduced)	Freesia
<i>Orothrosanthus laxus</i> (introduced)	Morning iris
<i>Patersonia fragilis</i>	Wild iris
<i>P. glabrata</i>	Wild iris
<i>P. sericea</i>	Wild iris
<i>Romulea longifolia</i> (introduced)	Onion grass
<i>Tritonia lineata</i> (introduced)	

Family: JUNCACEAE

<i>Juncus</i> sp.	Juncus
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Family: JUNCAGINACEAE

<i>Triglochin procera</i>	Water ribbons
<i>T. striata</i>	

Family: LILIACEAE (lily family)

<i>Blandfordia grandiflora</i>	Christmas bell
<i>B. nobilis</i>	Christmas bell
<i>Burchardia umbellata</i>	Milkmaids
<i>Caesia parviflora</i>	
<i>Chlorophytum comosum</i> (introduced)	
<i>Dianella caerulea</i>	Flax lily
<i>D. laevis</i>	Flax lily
<i>D. revoluta</i>	Flax lily
<i>Schelhammera undulata</i>	
<i>Sowerbaea juncea</i>	Vanilla lily
<i>Stypandra caespitosa</i>	-
<i>Thysanotus juncifolius</i>	Fringed lily
<i>T. tuberosus</i>	Fringed lily
<i>Tricoryne elatior</i>	

Family: ORCHIDACEAE (orchids)

<i>Acianthus caudatus</i>	Mayfly orchid
<i>A. exsertus</i>	Mosquito orchid
<i>A. fornicatus</i>	Pixie caps
<i>A. reniformis</i>	Gnat orchid
<i>Arthrochilus irritabilis</i>	
<i>Caladenia alba</i>	White spider orchid
<i>C. carnea</i>	Pink fingers
<i>C. testacea</i>	Golden spider orchid
<i>Calochilus campestris</i>	Copper beards
<i>C. paludosus</i>	Father Christmas
<i>Chiloglottis reflexa</i>	
<i>Corybas pruinosis</i>	Helmet orchid
<i>Cryptostylis erecta</i>	Bonnet orchid
<i>C. subulata</i>	Tongue orchid
<i>Dipodium punctatum</i>	Hyacinth orchid
<i>Diuris aurea</i>	Golden rouble-tail; Donkey orchid
<i>Glossodia major</i>	Blue wax-lip orchid
<i>G. minor</i>	Small wax-lip orchid
<i>Microtis unifolia</i>	Onion orchid
<i>Prasophyllum brevilabre</i>	Short-lipped leek orchid
<i>P. elatum</i>	Tall leek orchid
<i>P. odoratum</i>	Scented leek orchid
<i>Pterostylis acuminata</i>	Sharp greenhood
<i>P. concinna</i>	Trim greenhood
<i>P. curta</i>	Twisted tongue greenhood
<i>P. obtusa</i>	Blunt-lipped greenhood
<i>Spiranthes sinensis</i>	Spiranthes
<i>Thelymitra carnea</i>	Pink sun orchid
<i>T. ixioides</i>	Spotted sun orchid

Family: PHILESIACEAE

<i>Eustrephus latifolius</i>	Wombat berry
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Family: PHILYDRACEAE

<i>Philydrum lanuginosum</i>	Frogsmouth; Woolly waterlily
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Family: PONTEDERIACEAE

<i>Eichhornia crassipes</i>	Water hyacinth
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Family: POTAMOGETONACEAE (Freshwater herbs)

Potamogeton tricarinatus

Pondweed

Family: RESTIONACEAE (rush-like plants)

Hypolaena fastigiata

Leptocarpus tenax

Family: SMILACACEAE

Smilax australis

Lawyer vine; Bush lawyer

Family TYPHACEAE

Typha orientalis

Bullrush, Cumbungi

Family: XANTHORRHOEACEAE (Grass –trees)

Lomandra filiformis

L. glauca

L. longifolia

L. multiflora

L. obliqua

Xanthorrhoea macronema

X. media subsp. latifolia

X. media subsp. media

Tufted strapleaf

Centipede plant

Blackfellow's spears

Blackfellow's spears or grass tree

Blackfellow's spears or Blackboy

Family: XYRIDACEAE

Xyris ustulata

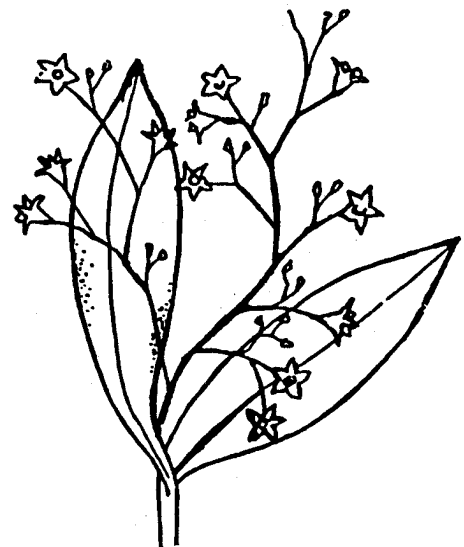
ABORIGINAL LORE

By A Munro

The Awabakal tribe roamed this area for thousands of years until the beginning of this century. They used the plants and animals, which we can still find here today and left some signs of occupation behind them. Imagine that you are an aborigine and see how the resources of the area could help you survive.

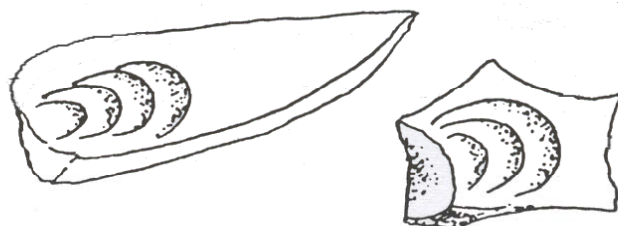
CORKWOOD TREES (A on the map)

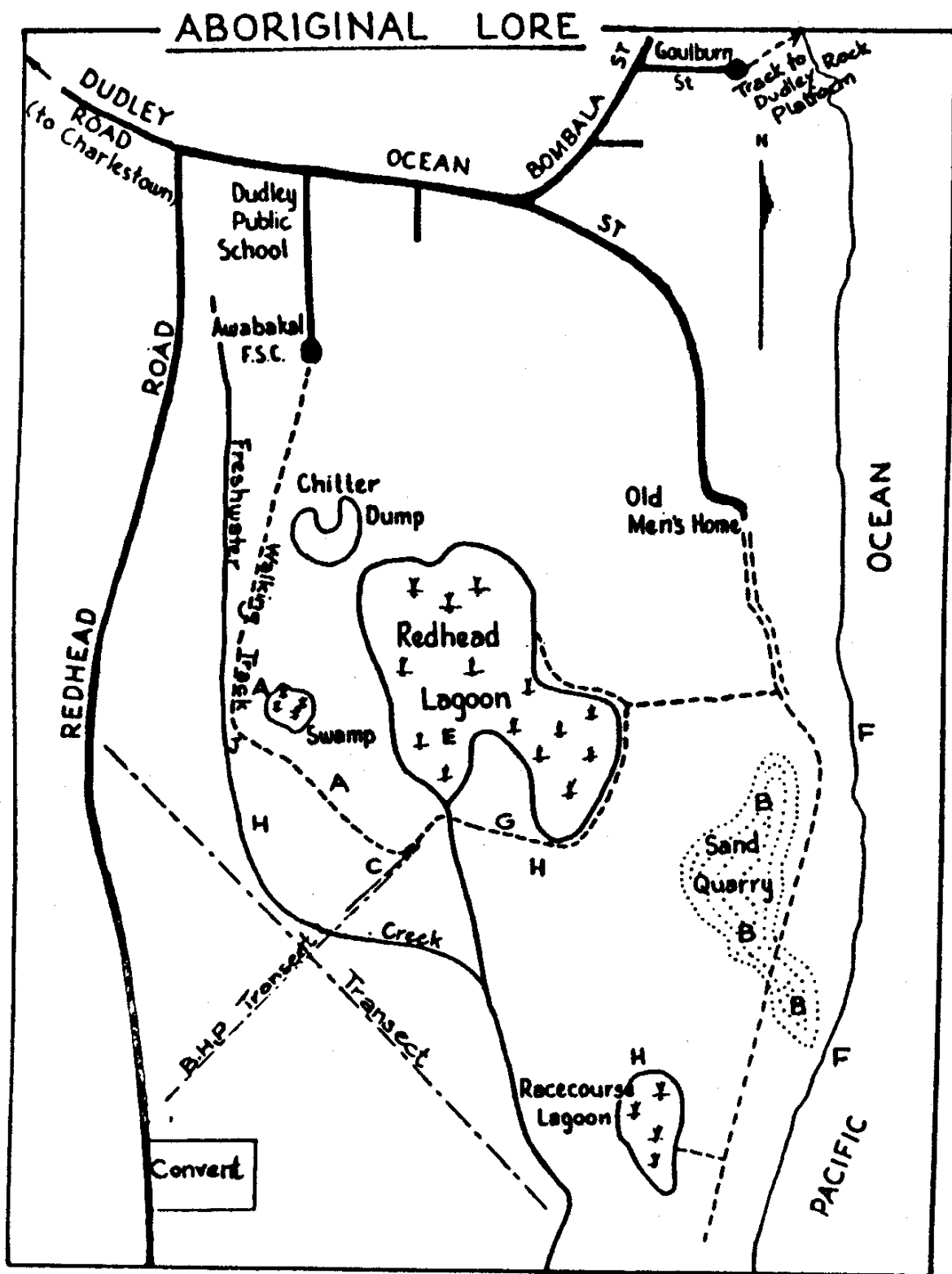
Find the trees with corky bark on the trunks, soft green leaves, tiny white flowers and small green fruits which turn black as they ripen. The leaves and fruits are **POISONOUS** but the Aborigines could use the crushed leaves to poison waterholes and bring stunned fish to the surface.



STONE FLAKES (B on the map)

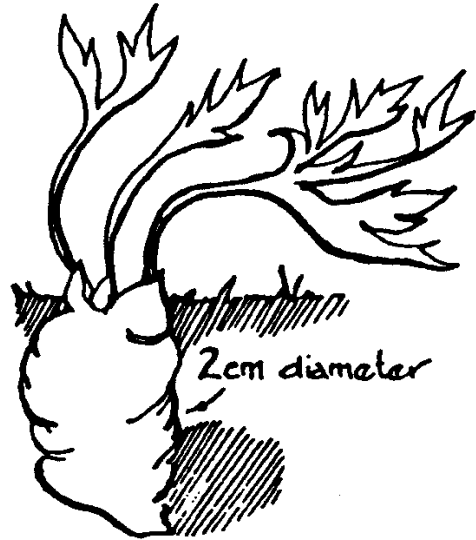
The stone flakes in the sand here are left over after Aborigines made tools from blocks of the hard, smooth chert rock they carried in from the sea cliffs. Flakes struck off from the cores of chert rock are quite sharp edged but the cutting tools were finished off by delicately improving the edge with fine notches to give a saw effect. You will find these stone pieces in many places where the wind has blown the sand away, e.g., at B on the map. Replace any flakes you discover. Others will enjoy finding them.





YAMS (C on the map)

Many plants have swollen fleshy underground stems, which the Aborigines dug up for food. This plant, which botanists call *Trachymene incisa* grows plentifully in the sand here and is easily found where it has quickly sprouted again after fire (April, 1975). It has a taste, which is a bit like carrot.

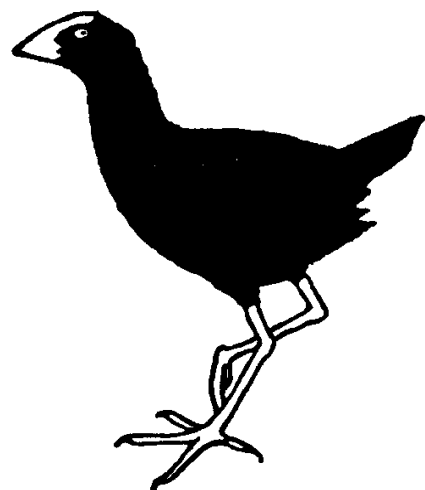


BLACKFELLOWS' POTATOES (D on the map)

The large pineapple shaped fruit of this palm-like plant burst open into dozens of orange segments. Each segment contains a round nut about 3cm long. If these are broken open, you will see that they contain a white starchy substance. This is **POISONOUS** but if washed thoroughly, it is edible, and was used as food by the aborigines.

WATERBIRDS (E on the map)

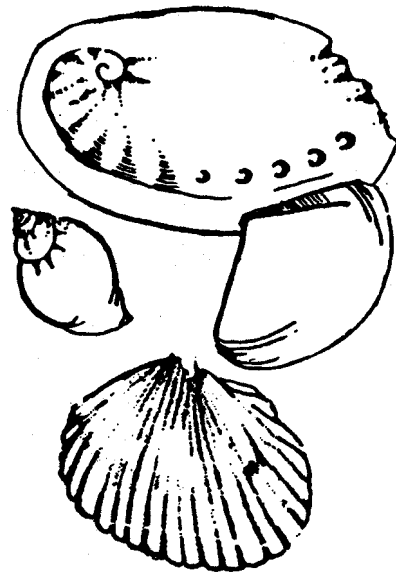
This lagoon is the home of many waterbirds such as Swampen, Black Duck, Dusky Moorhen, Chestnut Teal etc. These birds and their eggs were an easy food supply for the Aborigines. How do you think they were hunted?



MIDDENS (F on the map)

At several places along the shoreline, the soil is thick with a mass of shells. These are what remains of shells gathered by the Aborigines for food. The shell heaps are called kitchen middens and they are common along the coast. Some are 3 metres thick –like the one left by the Awabakal Tribe at Swansea Heads. You will find that the Aborigines ate pipis, abalone, whelks, oysters and several other kinds of shellfish.

Sometimes stone implements were left behind in the middens. For the sake of other interested people, look at but do not remove these things.



POSSUM SCRATCHES (G on the map)



The Eastern Brushtailed Possum was a good food for the Aborigines. These animals climb trees to eat buds and leave ragged scratches on the trees they climb. Look at the Redgum trunks around here and you might find where a possum has been! While your eyes are looking upward, try to find a bees' nest in a hollow branch. There are usually dozens of bees buzzing around the entrance. They will almost certainly be European Bees, which weren't here in Aboriginal times. The tiny, stingless native Australian Bees gave honey, which was one of the few sweet items in the Aboriginal diet.

BANDICOOT HOLES (H on the map and many other places)

Bandicoots don't live in these holes. They are left where the little animals have been burrowing for insects, grubs, mice, roots, bulbs and fungi. The animal makes its home in the root of a tree or in cavities under clumps of grass. Aborigines used these animals for food.

RINGTAIL POSSUM (J on the map)

There is a round, leafy nest about the size of a soccer ball in the dense crown of a rainforest tree on the left side of the creek bed just downstream of the track crossing. This is the nest of the common Ringtail Possum. It rears its young in these nests but otherwise lives in a hollow tree. Aborigines must have found them easy prey.



*If you were an Aboriginal, could you get a year-round balanced diet in the Awabakal area?
At least you would never be out of work!*

THE AWABAKAL TRIBE

by Boris Sokoloff.

The name "Awabakal" means people of the plain surface, which is taken to refer to the surface of Lake Macquarie. So the Awabakal Tribe would be the natives who live around Lake Macquarie. The Australian Aborigines identified themselves with their natural surroundings.

TRIBAL TERRITORY

This extended in the north from the Hunter River to the southern extremities of Lake Macquarie or the Tuggerah Lake in the south. The western boundary was the Sugarloaf Range.

CLANS

There were four clans or hordes, who had an area within the tribal territory which they considered as theirs to use in their search for food and to exploit its raw materials for the products of their material culture.

The best known was the Lake Macquarie Clan with whom the Rev. L.E. Threlkeld spent so much time. Their territory was - bounded to the south by Reid's Mistake, the entrance to Lake Macquarie. North by Newcastle and Hunter's River, West by the five Islands on the head of Lake Macquarie. This boundary, about 14 miles north and south by 13 miles east and west, is considered as their own land. (Threlkeld, p.241). Within this clan's territory is located the Awabakal Environmental Education Centre (map 2).

The other clans were the Pambalong (or Swamps District) the Ash Island, and the Kurungbong. These adjoined the Lake Macquarie Clan and came together on social and ceremonial occasions. Otherwise they respected each others territorial boundaries as with that of other tribes.

ADJOINING TRIBES (see map)

To the north, across the Hunter River, were the Worimi whose territory was similar to that of the Awabakal in that they had as varied an environment. Their close similarity was reflected by like exploitation of their respective environments. To the west and south were Wonnarua and Darkinjung Tribes.

POPULATION

Although there were reports of numbers of natives at Newcastle in excess of 200 and as high as 300, when Reverend L.E. Threlkeld began his mission at Lake Macquarie in 1825, he soon found these numbers to be exaggerated, at least in regard to the clan with which he had most contact. Between 1825 and 1837 there was a constant number of about sixty natives at the mission with an equal number of men and women. The disagreement between the reported numbers is probably that Threlkeld's figure refers to the Lake Macquarie Clan while the others refer to large tribal gatherings of the Awabakal or even inter-tribal gathering.

On most occasions the members of each clan would be scattering in search of food so that only on social or ceremonial occasions would the members of the clan and the whole tribe gather. Otherwise, small groupings of three or four were the rule. These probably included families.

The more favourable environment of the coast, with the greater abundance and range of foods, supported greater numbers of natives than further inland.

The numbers of the Awabakal were drastically reduced after 1837, when, within a matter of years, the numbers were reduced by up to a third of the sixty. Such a decline was a result of the European diseases, such as smallpox and influenza, which "made sad havoc amongst the Aboriginal Tribes". Also it was a reflection of the worsening relations between the natives and the Europeans.

MATERIAL CULTURE

This refers to the things that the natives made out of the natural material available in their tribal territory. They used a wide range of material including the hard wood of the gum tree, the resin of the blackboy or grass-tree, the stem of the grass-tree as well, animal bones, the bark of trees and shrubs, shells, animal skins and fur and stones. Native manufactures were weapons, implements, utensils, water transport, dwellings, items of apparel and ornaments.

WEAPONS

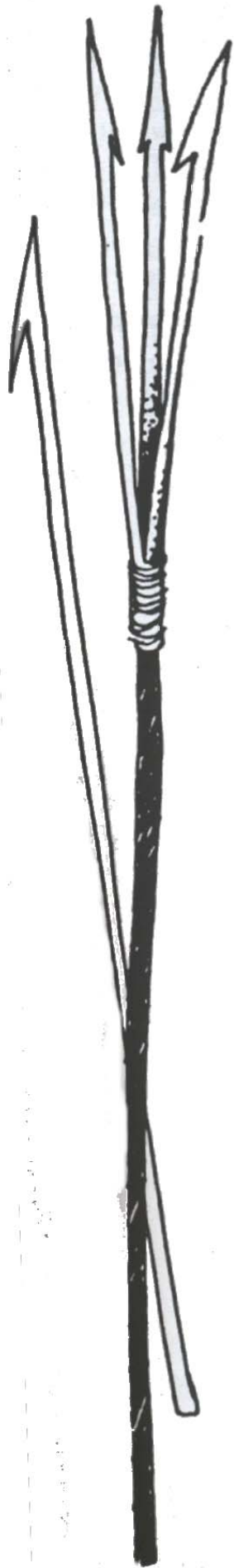
The most important weapons were the spear, the shield and the club. As well, the natives used the boomerang and stone axe.

Spears

There were several kinds of spears, which were used more for hunting and fishing than for war. At least half a dozen were carried by the natives.

The hunting spear (warai) was also used in battles. It was about two metres long and consisted of three parts, two of the grass-tree (native names for three varieties: gorro, pummeri, yonei – *Xanthorrhoea macronema*, *X. media* subsp.) and one of the hardwood of the iron bark tree (Grey Iron Bark – *Eucalyptus paniculate*). The construction was as follows:

‘The joints are cemented together with gum resin which exudes from the grass-tree...The ends of the grass-tree are charred in the fire, fitted one into the other with the melted resin infused, the joint is tied with a filament of bark, and a lump of the gum is wrapped round the joint...It is roasted over the fire, and as it is softened by the heat the softened gum is put into shape by the wetted fingers of the artisan. The hard wooden skewer-like end is sharpened to a very fine point, charred in the fire and covered whilst hot with melted gum, and in some instances a bone barb fastened at the point, in the same manner as the joints are made to adhere together’. (Threlkeld in Gunson, p.61)



Such spears were known to pierce wooden shields of several centimetres thickness. Great care was taken in the making of the weapons.

The battle spear was made in the same way, except that small pieces of sharp quartz were added along the hard wood joint with the grass-tree gum. Such a deadly weapon inflicted terrible wounds on an enemy in battle (native name; worowai)

The fish spear (called by the natives 'kullara' and 'moting') was made in the same way as the hunting spear, but:

'...at the end there are four pieces of hard wood, about two feet (0.6 metre) long, fastened with a bark-thread covered with the grass-tree gum...The three or four shorter spears thus fastened to the long stem of the grass-tree, of about six feet (2 metres) length, becomes thus somewhere nigh eight feet (2.4 metres) in total length. Small wooden wedges are inserted betwixt the attached short spears just at their base where they are tied, and like-wise gummed over firmly. They serve to spread out the three or four attached short spears, so that if one miss the fish in striking, the fish may be caught betwixt the expanded hardwood skewers...' (Threlkeld in Gunson, p.67)

Other features were the barbs of bone, fish or kangaroo that were attached by gum to the ends of the hardwood skewers. This ensured that the fish was less likely to escape. The length of the spears ranged from about four to six and a half metres. The pieces of bark used in fastening the parts of the composite spears was that of the stringy-bark tree (Thin-leaved Stringy-bark, *Eucalyptus eugenoides*, Native hemp, *Commersonia fraseri* or Green Kurrajong, *Hibiscus heterophyllus*.)

Sometimes the stem of the Gigantic Lily (*Doryanthes excelsa*) was used in the place of the Blackboy or Grass-tree.

Throwing stick

The spears described on the previous page were propelled by an ingenious device, a lever called “wommara”.

‘This instrument is generally about four feet long (1.2 metres), half an inch thick (12.7 mm) and tapers to a point at one end, where is fixed a sort of barb, about three-eighths of an inch long (9.5 mm), tied and gummed firmly to the small end of the instrument; the other end...is made flat and wedge-like, about an inch and a half wide (28 mm), and is used, to open an oyster, split up crayfish, embowel an opossum, or split a piece of rotten wood to obtain the large grubs’. (Threlkeld in Gunson, pp. 67-68)

This device was also used for assisting in peeling bark off trees. The throwing stick was most important because it improved the accuracy, distance and force of the propelled spears. Naturally it had a bearing on the success rate, upon which the natives relied for their subsistence, in securing marine, aquatic and terrestrial game. The leverage enables the penetration of thick shields to the extent of piercing the native’s hand behind them. Spears were thrown by natives in the following way:

‘The som-mur-rar they hold in their right hand about one-third up, inserting the barb into the end of the spear, which has a small hold for its reception, and is carefully tied round and gummed, so as to form a sort of ferrule, to prevent the weak reed-like substance of the grass-tree stem for splitting. The warrior grasps the spear and throwing stick in the right hand, and poising the spear until his aim is sure, when he hurls it with all the force of the four foot lever, in addition to that of the muscular arm’. (Threlkeld in Gunson, p.68).

Shield

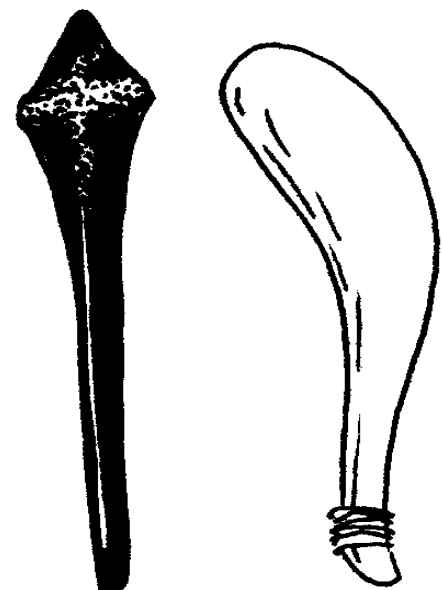
The shields were made of the buttresses of the giant Nettle tree (*Dendrocnide excelsa*) or Fig tree (*Ficus spp.*).

‘The shield (native name: koreil) is usually about three feet (1 m) long by eighteen inches (0.45 m) or so; at most lozenge-shaped, pointed at the top and bottom, and pigeon-breasted rather than flat. The thickness in the centre may be an inch (25 mm) not more, and thins off to about a quarter of an inch (6 mm) to the edge. On the inside of the shield, in the centre, a piece of tough wood is bent and inserted like the handle of a basket, just sufficiently large to hold by, and a soft piece of tea-tree bark is fixed on which to rest the knuckles and preserve them from abrasion...The shields are always painted white with pipeclay, and generally are ornamented with a St. George’s Cross, formed by two bands two or three inches (50-76 mm), one vertical and the other horizontal, coloured red, with the pigment with which they paint for their dances or the fight’. (Threlkeld in Gunson, p. 68)

The natives were most agile and skilled in the use of the shield in protecting their bodies from the weapons hurled at them.

Waddy (native name: kotara)

This was a short stick that tapered from the handle to a thicker end. It was used in securing animals, like the bandicoot, by throwing it with deadly accuracy at them. As well it was used in settling quarrels among the natives when turns were taken at striking at the head of an opponent until one succumbed, the survivor being the honourable victor.

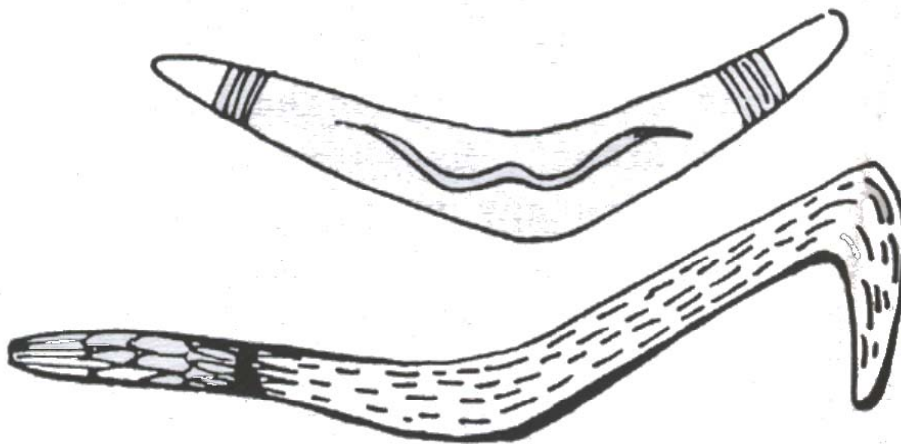


Boomerang (native name: turrama)

This is the most ingenious invention of the Australian Aborigines, testimony to their intelligence.

‘This curious instrument is seldom more than three feet from point to point in its crescent form. It has two curves, one like the moon in the first quarter, the other on the surface, just as the concave shell of an oyster would appear if cut into the shape of a half moon. It is this peculiar formation that causes the circular motion, whilst revolving upon its centre returning the boomerang to the thrower, after it has made its circular flight through the air.’ (Threlkeld in Gunson, p.69)

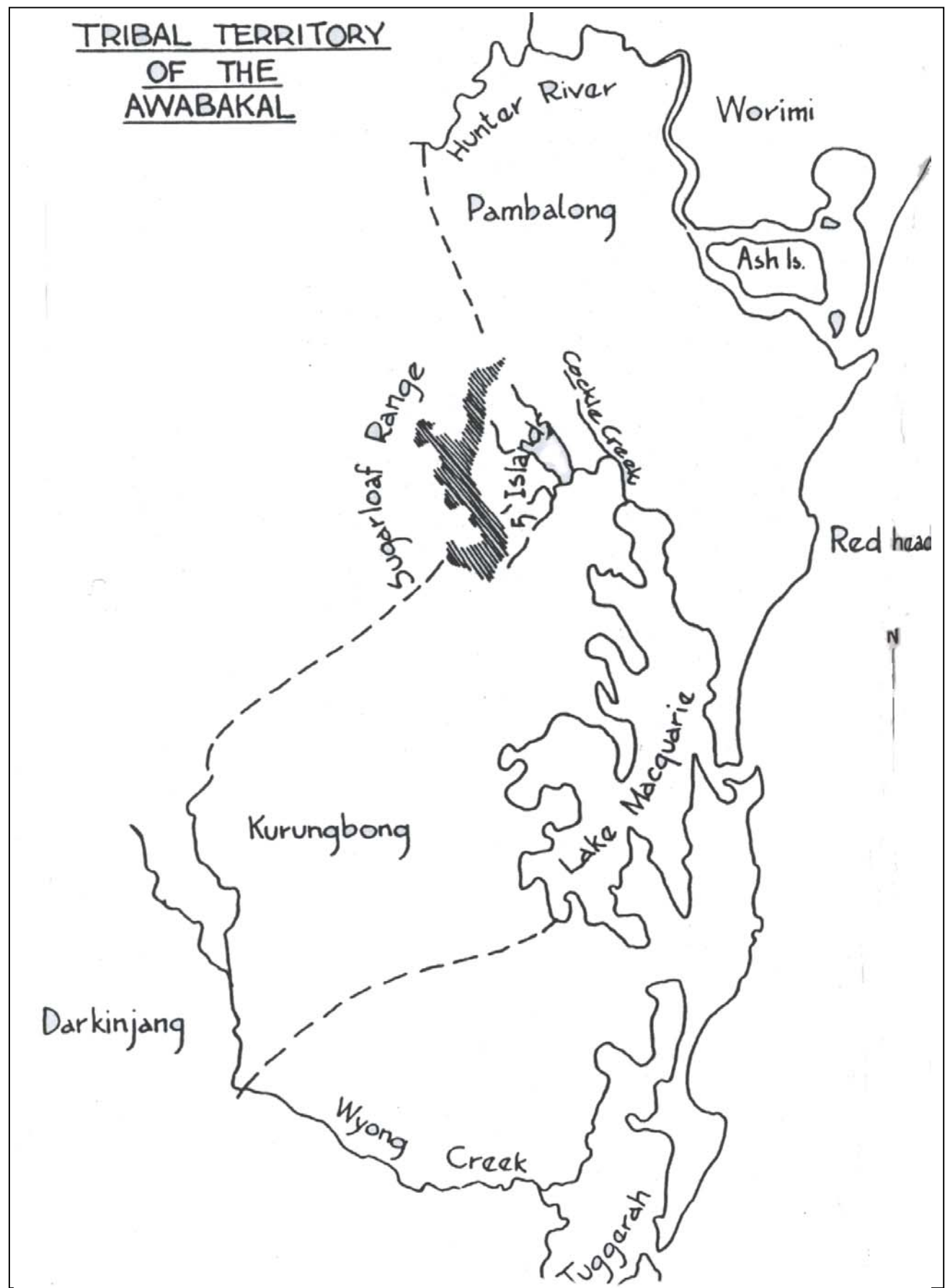
To have the boomerang return it needs to be thrown into the wind. This was done for amusement or to frighten a flight of birds. Its destructive power was improved when it rebounded inflicting terrible wounds. At an enemy it was launched directly, striking the ground first, or skimming horizontally close to the ground, or high in the air to take the enemy in the rear. The shield was the best means of protection. Another kind of boomerang called ‘yirra’, had a handle at one end and a bend contrary to the blade. The native term for throwing the boomerang was ‘nurilliko’.



Stone Axe (native name: pukko)

Unfortunately, detail is lacking for the structure of this most useful implement and weapon. The adjoining natives, the Worimi, used a shafted stone axe, with a groove to accommodate the handle around the stone head, which was then fastened with grass-tree gum. The handle had some bark wrapped around it. Professor Dyall has found evidence of edge grinding performed in the territory of the Awabakal natives and a ground edge stone axe was found in the Dudley area, while the Australian Museum has a number of specimens from the Lake Macquarie area. Other specimens have been found along the lower Hunter River. The stone axes were used for a wide range of purposes; for cutting the bark for canoes and shelters; the cutting notches that enabled them to climb trees after possums and honey; for chopping bowls out of the protuberances on gum trees; for chopping up the carcass of an animal like a kangaroo. Another kind of axe was a hand-held cleaver, called the Worimi Cleaver. These are large triangular-shaped blocks trimmed by knapping, with the sharp thinner margin being the chopping edge. These were used for bark and woodwork.

TRIBAL TERRITORY
OF THE
AWABAKAL



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AN ILLUSTRATED KEY TO THE FRESHWATER INVERTEBRATES OF REDHEAD LAGOON

By Dr. B.V. Timms

(Reprinted from *Hunter Natural History*, February, 1976)

INTRODUCTION:

This key is designed specifically for the fauna known to live in Redhead Lagoon. It would be serviceable, with some deficiencies for dune lakes and swamps (e.g., at Nelson Bay, Myall Lakes) along the Central Coast. However, because the fauna of dune lagoons are somewhat depauperate the key will be of limited use elsewhere (e.g., for floodplain lagoons of the Lower Hunter).

The key is not phylogenetic, nor are taxonomically similar groups necessarily keyed out together. A list of animal groups (=taxa) arranged systematically follows the key. A real attempt has been made to use very obvious features, so that the tedious, but more exact, features used by professional zoologists are rarely used. Few technical words are used so that the key can be used by anyone interested in nature study.

To use the key, start at couplet 1 and choose the alternative, which applies to the unknown animal. Then go to the couplet indicated at the end of line. Repeat the procedure until a definite answer is reached. If problems arise, consult one of the references listed at the end. Note that some "couplets" contain three alternatives in which case all three need to be read before a choice is made. All couplets except No. 1 contain a number in brackets – this refers to the couplet from which you have just come. It is included for ready reference.

As mentioned above, the key is not a complete guide to the freshwater fauna of the Hunter Valley or even of dune lakes in general. This is because a number of taxa do not occur in acid waters of dune hollows, or occur spasmodically, or as yet have not been found in such water locally.

Such animals include:

Protozoans	- probably occur, but not studied yet.
Rotifers	- probably occur, but not studied yet.
Hydras	- may occur, but not studied yet.
Flatworms	- seem to be absent from dune lakes.
Nematodes	- probably occur, but not studied yet.
Amphipods	- usually absent in dune lakes, but some swamps in the Myall Lakes have them.
Mayflies	- usually absent in dune lakes, but occur in the Grafton area.
Stoneflies	- absent from dune lakes.
Dobson Fly Larvae	- rarely found in dune lakes.
Ceratopogonids	- rarely found in dune lakes.
Various bug and beetle families, e.g., Water Scorpions,	
Water Measurers	- probably occur but uncommon.
Bivalves	- seem to be absent from dune lakes.

SYSTEMATIC LIST OF TAXA KNOWN FROM REDHEAD LAGOON *

<u>Phylum</u>	<u>Class</u>	<u>Order/Family</u>	<u>Common Name</u>
Porifera			Sponges
Annelida	Oligochaeta	(F. Tubificidae) (F. Naididae)	Freshwater worms
	Hirudinea	F. Glossiphonidae	Freshwater Leeches
Arthropoda	Crustacea	S.C. Ostracoda	Seed Shrimps
		O. Cladocera	Water Fleas
		S.C. Copepoda	Copepods
		O. Decapoda	Yabbies
	Insecta	O. Odonata	(Dragonflies) (Damselflies)
		O. Hemiptera	Bugs (3 families)
		O. Coleoptera	Beetles (2 families)
		O. Diptera	Phantom & Blood Midges
	Arachnida	O. Acarina	Water Mites
Mollusca	Gastropoda	S.C. Pulmonata	Water Snail


**** Identification to species level, where possible, will be provided in an account of Redhead Lagoon to be published later in Hunter Natural History.***

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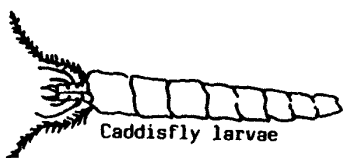
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AN ILLUSTRATED KEY TO THE FRESHWATER INVERTEBRATES

THE KEY:


1. a Macroscopic, i.e., $>1/10''$ or 2.5mm long – readily visible.....2
 - b Microscopic, i.e., $<1/10''$ or 2/5 mm long – just visible.....20
2. (1) a. Shapeless form, encrusting
plant stems, logs etc.
 


freshwater sponge

 - b. Moving stick or joined leaves, which
on close examination has an insect head
protruding from one end.
 


Caddisfly larvae
 - c. Definite animal shape with head, body, etc.....3
3. (2) a. Body not, or apparently not, segmented4
 - b Body segmented into at least two, usually more, divisions.....5
4. (3) a. Body enclosed in a coiled shell.
 


Snail

 - b Body with four pairs of long legs.
 

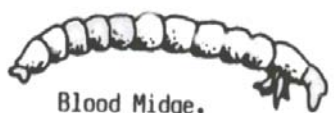
Water Mite
5. (4) a. There are no jointed appendages obvious.....6
 - b Some or most of body segments with jointed appendages.....9
6. (5) a. Number of body segments >157
 - b. Number of body segments <128
7. (b) a. Animal round in cross section;
no suckers; small (usually <5 mm)
 

Freshwater Earthworm

 - b Animal flat in cross section;
sucker at posterior end;
Large (usually >10 mm)
 

Leeches
8. (6) a. Animal clear with two silvery
air bladders at each end;
very active and difficult to see.
 

Phantom Midge

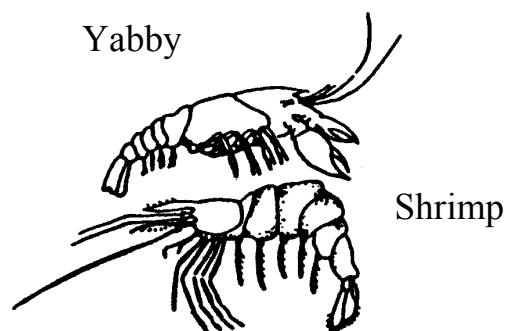
 - b Animal usually opaque, often red,
no air bladders; usually sluggish
 

Blood Midge.

- 9.(5) a. Abdomen with 5 pairs of jointed appendages. Higher Crustacea..10
 b. Cephalothorax with 4 pairs of jointed appendages.
 Water Mitessee 4b
 c. Thorax with 3 pairs of jointed appendages (= legs).
 Insects11

10.(9) a. Outer skin (i.e., carapace) thick and opaque; usually with large nippers; crawls on bottom.

b. Outer skin thin, usually clear, Nippers small; active swimmer.

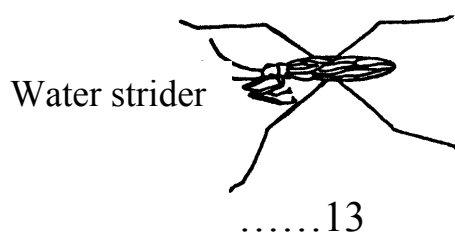


11.(9) a. Mouthparts extended into a beak (i.e., sucking tube).
 Also small antennae; upper surface with a large triangle towards the front.....Bugs12

b. Mouthparts biting (i.e., with mandibles).....15

12.(11)a. Legs longer than twice length of body; skims on water surface.

b. Legs less than twice as long as the body.....



13.(12)a Body oval, front legs used for grasping.

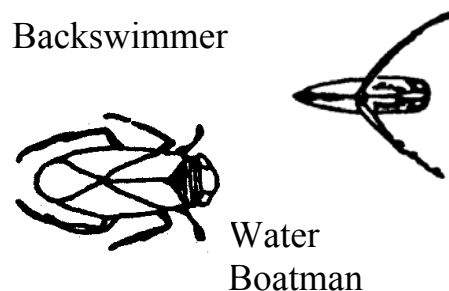


Oval Water Bug

b Body streamlined.....14

14.(13)a Swims on back, hind legs long and used as oars.

b Swims normally, front legs with spoon-shaped organ at tip.



- 15.(11)a Adult insect with wings under a hard upper covering over the abdomen.....Beetles.....16
- b Larva, lacking wings.....18
- c Larva, with wing pads covering only a small portion of abdomen.....Odonata.....19

- 16.(15)a. Each eye divided, so that there seems to be 2 pairs of eyes.
Active swimmer on surface.

Whirlygig Beetle



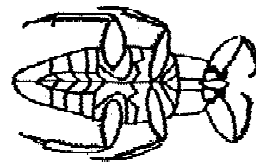
- b. 1 pair of eyes; usually submerged.....17

- 17.(16)a. Base of hind legs large,
no keel beneath

Diving Beetle



- b. Base of hind legs small, keel beneath



Water

- 18.(15)a. Pair of 'legs' at hind end; usually without sharp jaws.



Caddisfly larvae
(case removed)



Beetle Larvae

- b. No such pair of legs; usually with sharp jaws.

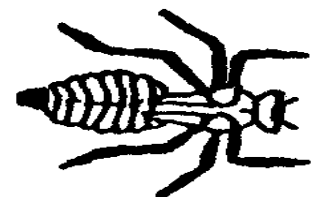
- 19.(15)a. Slender insect with three leaf-like gills at hind end.
Usually light coloured.



Damselfly nymph

- b. Stout insect without external gills.
Typically dark coloured.

Dragonfly nymph

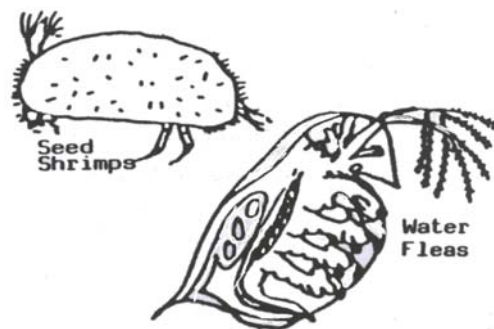


20.(2) a.Body almost or totally enclosed in a bivalve shell.....21

b Not so.....22

21.(20)a. Body completely enclosed in a bivalve shell; thorax with only 2 pairs of limbs.

b. Head not enclosed in the bivalve shell; thorax with 4-6 pairs of limbs.



22.(20)a. Apparently not segmented;
4 pairs of legs.....

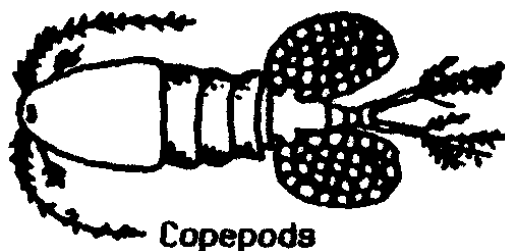
Water Mites.....see 4b

b. Segmented.....23

23(22)a. Worm-like, no jointed appendages,
but often with long bristles.....

Freshwater Earthworms.....see 7b

b. Body cigar-shaped, with a pair of long antennae and 5 pairs of swimmerets on thorax.



BIRDS OF THE AWABAKAL RESERVE – A CHECKLIST.

Listed by: D. Waterhouse (1976)

Revised by: S. Johnson (1983)

1. Common
2. Uncommon
3. Rare
4. Occasional visitor
- * Breeding

In the following list, names in the left-hand column are the recommended English names, those in the right-hand column are the scientific names according to the 1975 Checklist of the Birds of Australia, Part 1 by H.T. Condon and its amendments (Emu 76: 216-217; Emu 78: 80-87) and the Interim List of Australian Songbirds by R. Schodde.

4	Hoary-headed Grebe	<i>(Poliocephalus poliocephalus)</i>
*1	Australasian Grebe	<i>(Tachybaptus novaehollandiae)</i>
	Little Penguin	<i>(Eudyptula minor)</i>
	Short-tailed Shearwater	<i>(Puffinus tenuirostris)</i>
	Wedge-tailed Shearwater	<i>(Puffinus pacificus)</i>
1	Australasian Gannet	<i>(Morus serrator)</i>
	Great Cormorant	<i>(Phalacrocorax carbo)</i>
	Little Black Cormorant	<i>(Phalacrocorax sulcirostris)</i>
	Little Pied Cormorant	<i>(Phalacrocorax melanoleucos)</i>
1	Pacific Heron	<i>(Arcea pacifica)</i>
1	White-faced Heron	<i>(Ardea novaehollandiae)</i>
1	Great Egret	<i>(Egretta alba)</i>
1	Rufous Night Heron	<i>(Nycticorax caledonicus)</i>
3	Little Bittern	<i>(Ixobrychus minutus)</i>
2	Straw-necked Ibis	<i>(Threskiornis spinicollis)</i>
1	Sacred Ibis	<i>(Threskiornis aethiopica)</i>
4	Royal Spoonbill	<i>(Platalea regia)</i>

*1	Black Swan	<i>(Cygnus atratus)</i>
*1	Pacific Black Duck	<i>(Anas superciliosa)</i>
1	Chestnut Teal	<i>(Anas castanea)</i>
1	Hardhead	<i>(Aythya australis)</i>
3	Maned Duck	<i>(Chenonetta jubata)</i>
1	Grey Teal	<i>(Anas gibberifrons)</i>
1	Black-shouldered Kite	<i>(Elanus notatus)</i>
	Whistling Kite	<i>(Haliastur sphenurus)</i>
2	Brown Goshawk	<i>(Accipiter fasciatus)</i>
1	White-bellied Sea-Eagle	<i>(Haliaeetus leucogaster)</i>
4	Little Eagle	<i>(Hieraaetus morphnoides)</i>
1	Marsh Harrier	<i>(Circus aeruginosus)</i>
	Osprey	<i>(Pandion haliaetus)</i>
2	Peregrine Falcon	<i>(Falco peregrinus)</i>
2	Australian Hobby	<i>(Falco longipennis)</i>
1	Australian Kestrel	<i>(Falco cenchroides)</i>
1	Brown Quail	<i>(Coturnix australis)</i>
*3	Buff banded Rail	<i>(Rallus philippensis)</i>
	Lewin water Rail	<i>(Rallus pectoralis)</i>
1	Dusky Moorhen	<i>(Gallinula tenebrosa)</i>
*1	Purple Swamphen	<i>(Porphyrio porphyrio)</i>
1.	Eurasian Coot	<i>(Fulica atra)</i>
3	Pied Oystercatcher	<i>(Haematopus longirostris)</i>
2	Sooty Oystercatcher	<i>(Haematopus fuliginosus)</i>
2	Masked Lapwing	<i>(Vanellus miles)</i>
	Black-fronted Plover	<i>(Charadrius melanops)</i>
2	Ruddy Turnstone	<i>(Arenaria interpres)</i>
3	Greenshank	<i>(Tringa nebularia)</i>
1	Latham's Snipe	<i>(Gallinago hardwickii)</i>
1	Silver Gull	<i>(Larus novaehollandiae)</i>
1	Crested Tern	<i>(Sterna bergii)</i>
1	Common Tern	<i>(Sterna hirundo)</i>

	Little Tern	<i>(Sterna albifrons)</i>
1	Bar-shouldered Dove	<i>(Geopelia humeralis)</i>
	Emerald Dove	<i>(Chalcophaps indica)</i>
*2	Brush Bronzewing	<i>(Phaps elegans)</i>
1	Crested Pigeon	<i>(Ocyphaps lophotes)</i>
*1	Galah	<i>(Cacatua roseicapilla)</i>
1	Sulphur crested Cockatoo	<i>(Cacatua galerita)</i>
4	Swift Parrot	<i>(Lathamus discolor)</i>
1	Little Lorikeet	<i>(Glossopsitta pusilla)</i>
2	Scaly breasted Lorikeet	<i>(Trichoglossus chlorolopidotus)</i>
3	Rainbow Lorikeet	<i>(Trichoglossus haematodus)</i>
2	Crimson Rosella	<i>(Platycercus elegans)</i>
*1	Eastern Rosella	<i>(Platycercus eximius)</i>
1	Pallid Cuckoo	<i>(Cuculus pallidus)</i>
*1	Fan-tailed Cuckoo	<i>(Cuculus pyrrhophanus)</i>
2	Horsefield's Bronze-Cuckoo	<i>(Chrysococcyx basalis)</i>
2	Shining Bronze-Cuckoo	<i>(Chrysococcyx lucidus)</i>
1	Pheasant Coucal	<i>(Centropus phasianinus)</i>
1	Koel Cuckoo	<i>(Eudynamys scolopacea)</i>
4	Channel-billed Cuckoo	<i>(Scythrops novaehollandiae)</i>
	Southern Boobook	<i>(Ninox novaeseelandiae)</i>
	Barn Owl	<i>(Tyto alba)</i>
	Sooty Owl	<i>(Tyto tenebricosa)</i>
	Powerful Owl	<i>(Ninox strenua)</i>
1	Tawny Frogmouth	<i>(Podargus strigoides)</i>
*1	Laughing Kookaburra	<i>(Dacelo novaeguineae)</i>
*1	Sacred Kingfisher	<i>(Halcyon sancta)</i>
1	Dollarbird	<i>(Eurystomus orientalis)</i>
*1	Welcome Swallow	<i>(Hirundo neoxena)</i>
2	Tree Martin	<i>(Cecropis nigricans)</i>
2	Fairy Martin	<i>(Cecropis ariel)</i>
1	Spine tailed Swift	<i>(Hirundapus caudacutus)</i>
1	Black-faced Cuckoo-shrike	<i>(Coracina novaehollandiae)</i>

3	White-bellied Cuckoo-shrike	<i>(Coracina papuensis)</i>
2	Rose Robin	<i>(Petroica rosea)</i>
*1	Eastern Yellow Robin	<i>(Eopsaltria australis)</i>
2	Jacky Winter	<i>(Microeca leucophaea)</i>
1	Golden Shistler	<i>(Pachycephala pectoralis)</i>
*1	Rufous Whistler	<i>(Pachycephala rufiventris)</i>
1	Grey Shrike-thrush	<i>(Colluricincla harmonica)</i>
3	Black-faced Monarch	<i>(Monarcha melanopsis)</i>
2	Leaden Flycatcher	<i>(Myiagra rubecula)</i>
2	Rufous Fantail	<i>(Rhipidura rufifrons)</i>
*1	Grey Fantail	<i>(Rhipidura fuliginosa)</i>
1	Willie Wagtail	<i>(Rhipidura leucophrys)</i>
4	Restless Flycatcher	<i>(Myiagra inquieta)</i>
1	Eastern Whipbird	<i>(Psophodes olivaceus)</i>
2	Clamorous Reed-Wharbler	<i>(Acrocephalus stentoreus)</i>
2	Tawny Grassbird	<i>(Megalurus timoriensis)</i>
3	Little Grassbird	<i>(Megalurus gramineus)</i>
1	Golden-headed Cisticola	<i>(Cisticola esilis)</i>
*1	Superb Fairy-wren	<i>(Malurus cyaneus)</i>
*1	Variegated Fairy-wren	<i>(Mulurus lamberti)</i>
1	Southern Emu-wren	<i>(Stipiturus malachurus)</i>
*1	White-browed Scrubwren	<i>(Sericornis frontalis)</i>
1	White-throated Gerygone	<i>(Gerygone olivacea)</i>
1	Brown Thornbill	<i>(Acanthiza pusilla)</i>
2	Buff-rumped Thornbill	<i>(Acanthiza reguloides)</i>
2	Yellow-rumped Thornbill	<i>(Acanthiza chrysorrhoa)</i>
1	Striated Thornbill	<i>(Acanthiza lineata)</i>
*1	Yellow Thornbill	<i>(Acanthiza nana)</i>
3	Varied Sittella	<i>(Daphoenositta chrysoptera)</i>
1	White-throated Treecreeper	<i>(Climacteris leucophaea)</i>
4	Brown Treecreeper	<i>(Climacteris picumnus)</i>
2	Red Wattlebird	<i>(Anthochaera carunculata)</i>
*1	Little Wattlebird	<i>(Anthochaera chrysoptera)</i>

1	Noisy Friarbird	<i>(Philemon corniculatus)</i>
4	Blue-faced Honeyeater	<i>(Entomyzon cyanotis)</i>
*1	Noisy Miner	<i>(Manorina melanocephala)</i>
1	Lewin's Honeyeater	<i>(Meliphaga lewinii)</i>
*1	Yellow-faced Honeyeater	<i>(Lichenostomus chrysops)</i>
2	Yellow-tufted Honeyeater	<i>(Lichenostomus melanops)</i>
1	White-naped Honeyeater	<i>(Melithreptus lunatus)</i>
*1	New Holland Honeyeater	<i>(Phylidonyris novaehollandiae)</i>
*1	White-cheeked Honeyeater	<i>(Phylidonyris nigra)</i>
*1	Tawny-crowned Honeyeater	<i>(Phylidonyris melanops)</i>
*1	Eastern Spinebill	<i>(Acanthorhynchus tenuirostris)</i>
4	Striped Honeyeater	<i>(Plectorhyncha lanceolata)</i>
4	Regent Honeyeater	<i>(Xanthomyza phrygia)</i>
1	Mistletoebird	<i>(Dicaeum hirundinaceum)</i>
2	Figbird	<i>(Sphecotheres viridus)</i>
*1	Olive backed Oriole	<i>(Oriolus sagittatus)</i>
*1	Spotted Pardalote	<i>(Pardalotus punctatus)</i>
*1	Silvereye	<i>(Zosterops lateralis)</i>
1	Red-browed Firetail	<i>(Emblema temporalis)</i>
2	Double-barred Finch	<i>(Poephila bichenovii)</i>
4	Chestnut-breasted Mannikin	<i>(Lonchura castaneothorax)</i>
2	Regent Bowerbird	<i>(Sericulus chrysocephalus)</i>
4	Satin Bowerbird	<i>(Ptilonorhynchus violaceus)</i>
*1	Australian Magpie-lark	<i>(Grallina cyanoleuca)</i>
1	Dusky Woodswallow	<i>(Artamus cyanopterus)</i>
2	Masked Woodswallow	<i>(Artamus personatus)</i>
2	White-breasted Woodswallow	<i>(Artamus leucorhynchus)</i>
*1	Grey Butcherbird	<i>(Cracticus torquatus)</i>
4	Pied Butcherbird	<i>(Cracticus nigrogularis)</i>
*1	Australian Magpie	<i>(Gymnorhina tibicen)</i>
1	Pied Currawong	<i>(Strepera graculina)</i>
2	Spangled Drongo	<i>(Dicrurus hottentottus)</i>
*1	Australian Raven	<i>(Corvus coronoides)</i>

BIRDS OF THE AWABAKAL RESERVE

Illustrated notes on some of the more common species

(Reprinted from *Hunter Natural History*, February, 1977)

by Brian Gilligan

There are some 700 species of birds found in Australia. Almost all of them are native to this country, but a number have been introduced by man from other parts of the world. More than 110 bird species have been observed in the Awabakal Reserve. The list is incomplete and is constantly being added to.

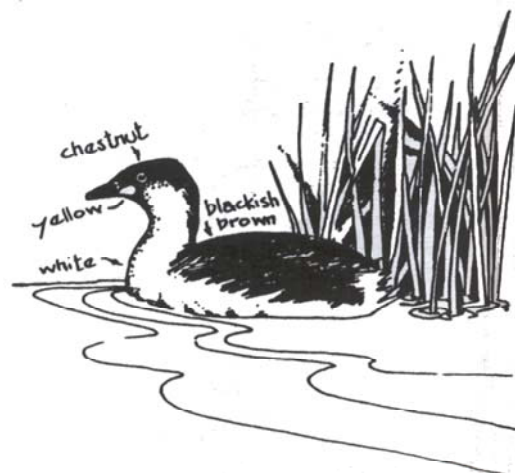
These notes are aimed at those people who are interested in birds, but know little about them, and want to be able to recognize some of the common birds without having to carry voluminous textbooks with them. The treatment is not intended to be exhaustive or systematic. However, the birds are dealt with in the order in which they are encountered in the C.S.I.R.O. Index of Australian Bird Names. This same order is used in most of the reference books listed at the end of this article.

What follows is simple a collection of line drawings and snippets of information about some of the birds. Those mentioned are not necessarily the most common, but they are some of the species more readily identified by the uninitiated.

1. LITTLE GREBE

Often called a dabchick, this bird spends most of its time swimming and diving for food and is very rarely seen on land.

It builds a raft-like nest made of water plants which is often moored to rushes or a fallen tree but is free to move up or down with minor fluctuations in water level.



2. CORMORANTS ('Shags')

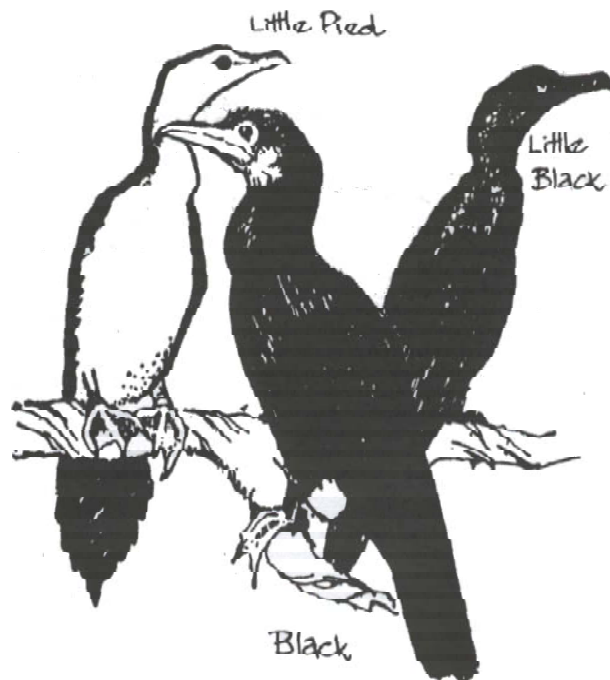
Three of the four Australian species of cormorants are found at Awabakal. They are:

Black Cormorant

Little Black Cormorant

Little Pied Cormorant

The two little species are most often seen around the freshwater areas while the large Black Cormorant is most often around the seashore. All are expert fishers.



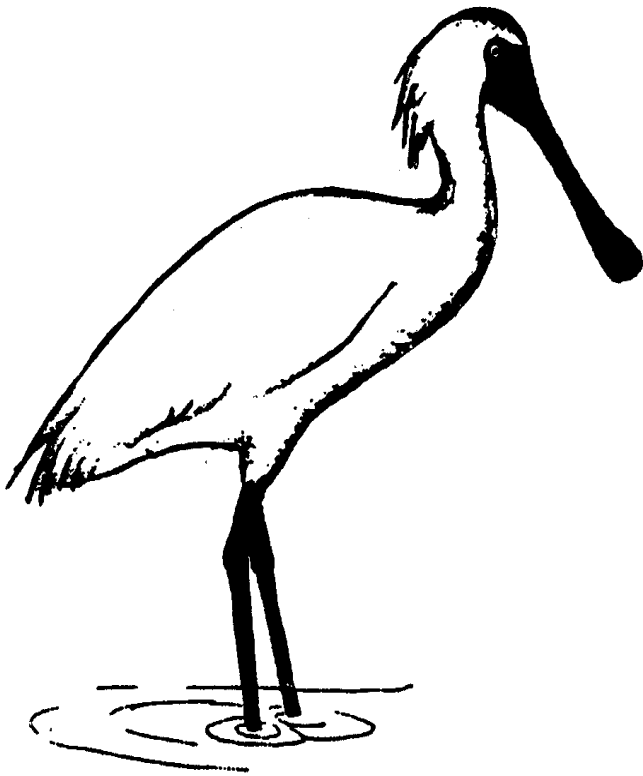
Cormorants are especially interesting because, despite their expertise at getting food and living in an aquatic habitat, they do not have the water-proofing adaptations of most other waterbirds. Because of this they must hold their wings out to dry after being in the water. This is not to say that there might not be some advantage for a diving bird in having feathers that get wet.

3. WHITE EGRETS

This is the largest of the four species of egrets in Australia. (Incidentally, all four – White, Plumed, Little and Cattle Egrets are found around Newcastle).

The White Egret will be seen around the edge of Redhead Lagoon and occasionally around Little Swamp, feeding on small fish, aquatic insects and freshwater crustaceans. A very elegant looking animal, the egret always seems to keep itself much cleaner (pure white) than other white waterbirds such as the Ibis and Spoonbills. Egrets were once hunted extensively for their breeding plumes, which were used to decorate ladies' hats, but now they are protected.



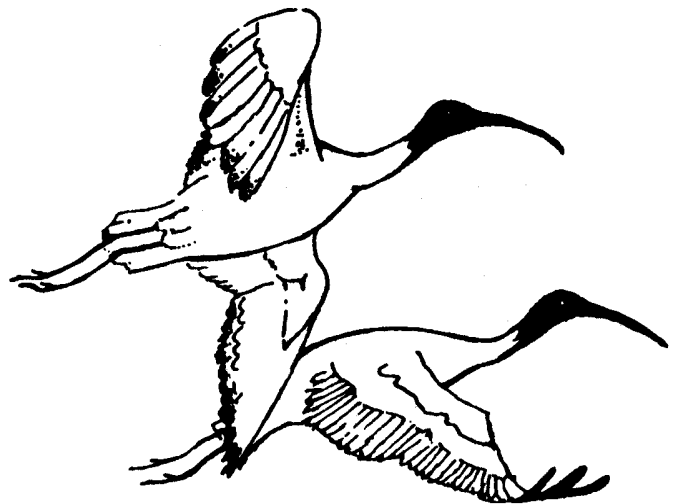


4. ROYAL SPOONBILL

If this large bird (up to 75 cm tall) is seen feeding, sweeping its spoonshaped bill from side to side continuously in shallow water, it is easy to understand why it doesn't keep as clean as the White Egret. The spoonbill feeds predominantly on fish and crustaceans, and breeds in colonies (often hundreds of birds nesting in a clump of 5 or 6 trees). At least one such colony exists in the Lower Hunter Region. Cormorants, Egrets, Ibises and some Herons also breed in colonies. The Yellow-billed Spoonbill is found mainly in inland areas.

5. WHITE IBIS

There are three species of Ibis found in Australia. So far only one has been definitely observed at Awabakal, but it is expected that the Straw-necked Ibis (*T. spinicollis*) will soon be added to the list. Common on pasture land, ibises are credited with consuming large quantities of grass-hoppers and other insects which man considers "undesirable".



6. HERONS – There are three herons recorded in the area:

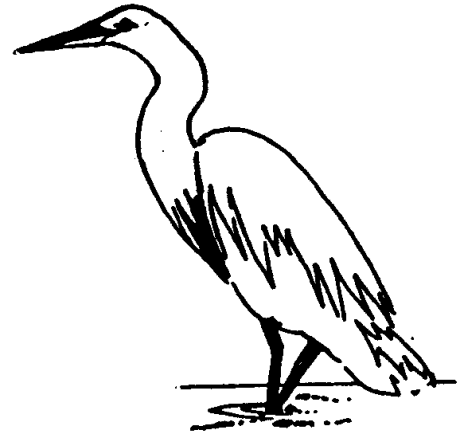
White-faced Heron

(*Ardea novaehollandiae*)

Commonly referred to as the “blue crane”.

This is technically inaccurate since Australia has only one species of crane – the Brolga.

Unlike the ibises, egrets and spoonbills, the White-faced heron does not breed in a colony. Although not confirmed, it is expected that isolated pairs probably breed at Awabakal.



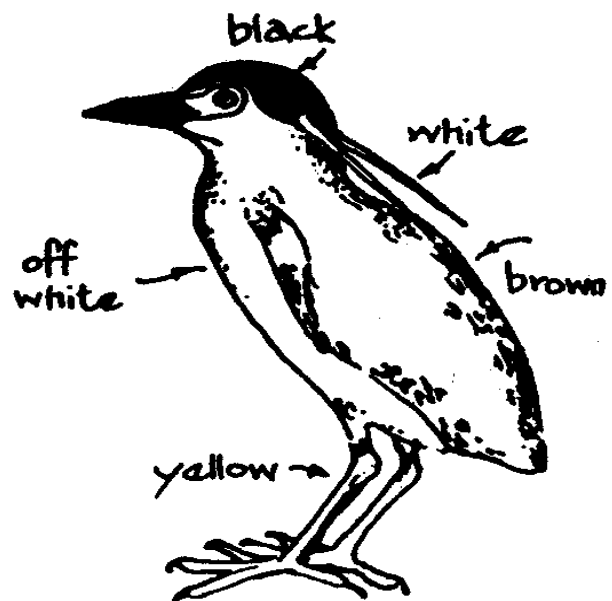
White-necked Heron (*A. pacifica*)

Also called the Pacific Heron, it is larger than most other herons (up to 90 cm tall). Like the White-faced Heron it feeds mainly on lizards, frogs, snails and aquatic insects.

Nankeen Night Herron

(*Nycticorax caledonicus*)

Not as common as the other two species. Not often seen during the day, but may occasionally be disturbed roosting in the paperbark trees around Redhead Lagoon.



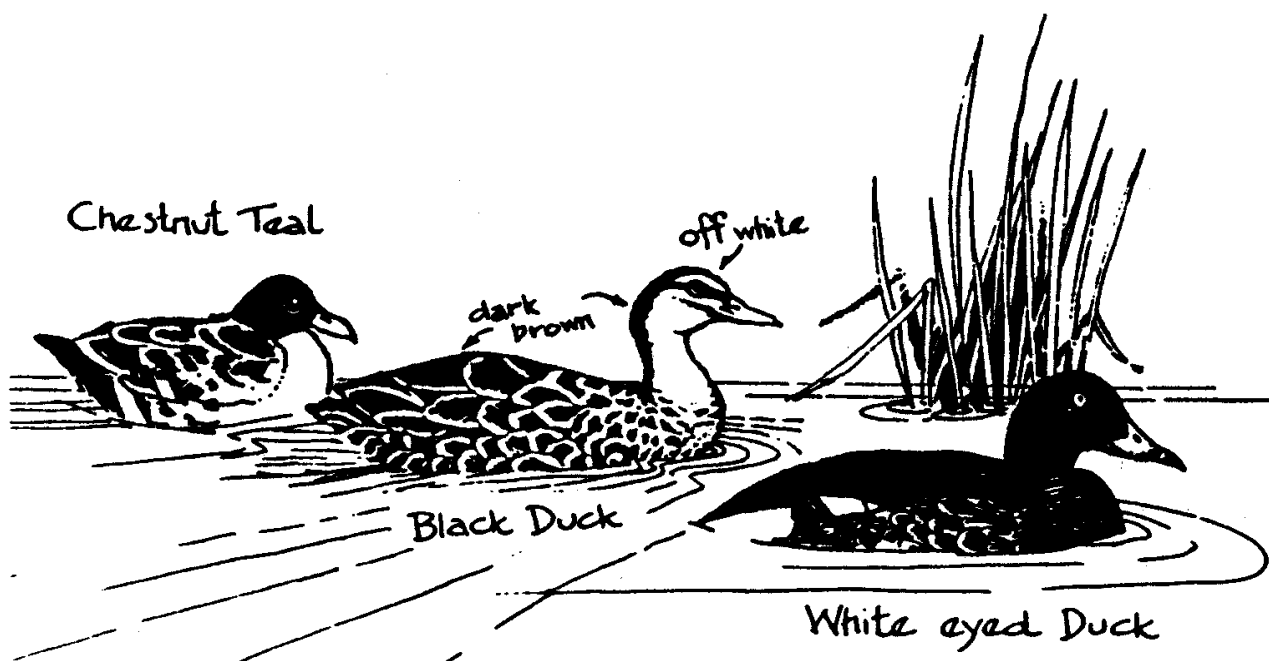
7. DUCKS

David Waterhouse lists three duck species in the bird list for the freshwater habitats:

Black duck	(<i>Anas superciliosa</i>)
Chestnut teal	(<i>A. castanea</i>)
White eyed duck	(<i>Aythya australis</i>)

The White eyed duck is quite uncommon, but the other two species are frequently seen on both Redhead Lagoon and Little Swamp. The Black duck is larger than the Chestnut teal and is readily identified by its light coloured “eye-brow”. Male and female look alike. In contrast, the male Chestnut teal has a spectacular bright green head, quite distinct from the female.

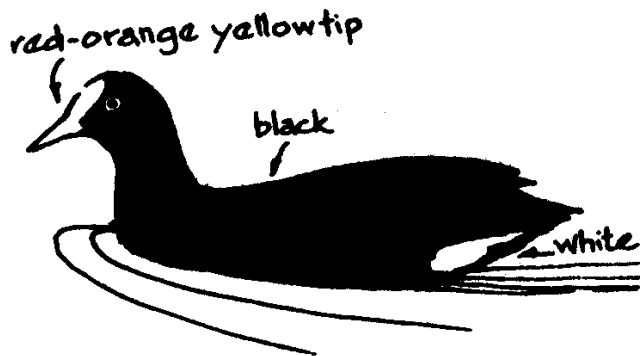
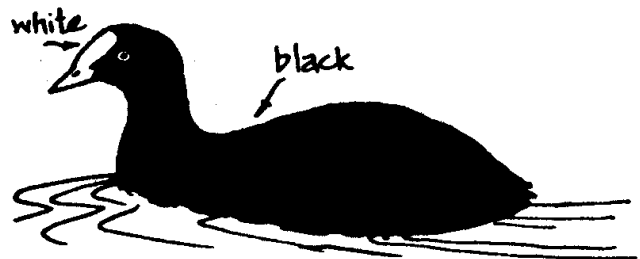
These duck species are protected for all except about 10 weeks, usually between March and May each year, when an open season is declared, during which time licensed shooters are allowed to take up to a certain “bag limit” per day. The exact timing and duration of the season, as well as the bag limits, may vary from year to year depending on the season and bird numbers. It should be noted that such an open season does not apply to National Parks and Nature Reserves, where the flora and fauna are protected all the time.



8. WATERHENS

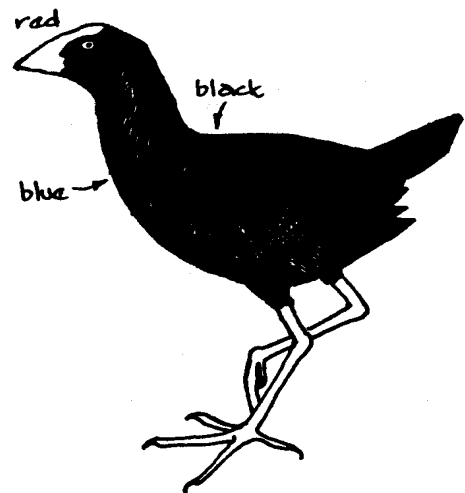
Both species of “redbills” – the Swampen (*Porphyrio porphyrio*) and the Moorhen (*Gallinula tenebrosa*) are found at Awabakal, as well as the related Coot (*Fulica atra*), which has a white bill and frontal shield.

The Coot spends all its time swimming and is rarely seen on land.



The Moorhen may be seen either swimming or scratching about among rushes or grasses along the waters edge.

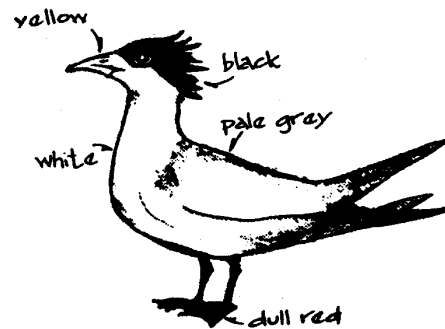
The Swampen finds most of its food among the rushes and grasses along the water's edge, not so often taking to the water. It is noted for its 'tail flicking' habit by which it exposes the white flash of its undertail coverts, as an alarm signal.



All three species are protected in N.S.W., except that it is acknowledged that the Swampen may cause damage to crops in certain areas and so it is unprotected for part of the year (from 1st December to 30th April) in particular areas (mainly the irrigation areas of the Riverina region). It remains a protected species all year round on the coast and the rest of the state.

9. CRESTED TERN (*Sterna bergii*)

Usually mixed in with a flock of Silver gulls, the Crested tern is common around the seashore at Dudley, diving into the sea to feed on fish.



10. KOOKABURRA (*Dacelo gigas*)

I think we all know a Kookaburra when we see one, but a couple of notes might be of interest:

a. All the Kookaburras we see in N.S.W. are this one species.

The Blue-winged species (*D. leachii*) is only found in the far north of Australia.

b. Male and female Kookaburras (*d. gigas*) look alike except that some males have a blue rump. This means that if you see a bird with a blue rump, it will be a male, but if you see one with the more common brown rump, it could be either male or female.



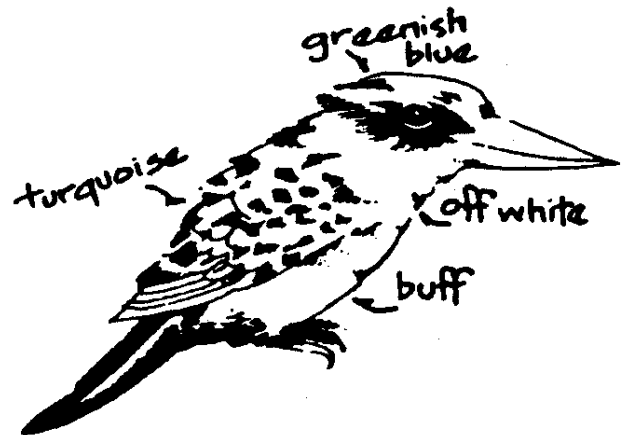
c. Kookaburras have a highly developed social system (Parry, 1970) and defend a territory throughout the year. Their dawn and dusk “laughing sprees” are in fact territory proclamations. Each territory is occupied by a breeding pair and a number of non-breeding “auxiliaries” who help defend the territory, incubate eggs and feed young. The size of the territory depends on, among other things, the number of auxiliaries available to help defend it. The social system plays an important role in regulating population and ensuring survival of the species.

d. Kookaburras nest in a hole or rotted limb in a tree, or in a termites’ nest and, like most hole-nesting species, lay white eggs.

11. SACRED KINGFISHER

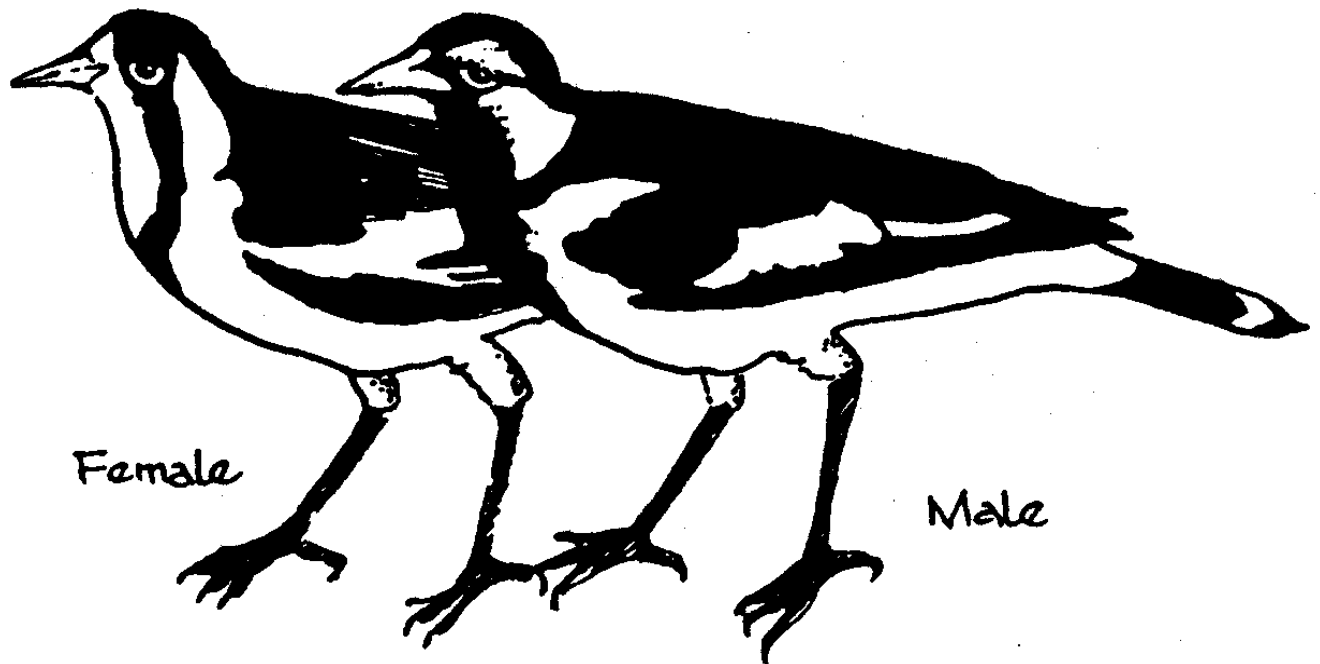
(*Halcyon sancta*)

These beautiful little birds, “distant cousins” of the Kookaburras, spend the Spring and Summer only at Awabakal. They arrive in August or September, breed, usually in holes they make in termites’ nests, and fly off northwards again around March.



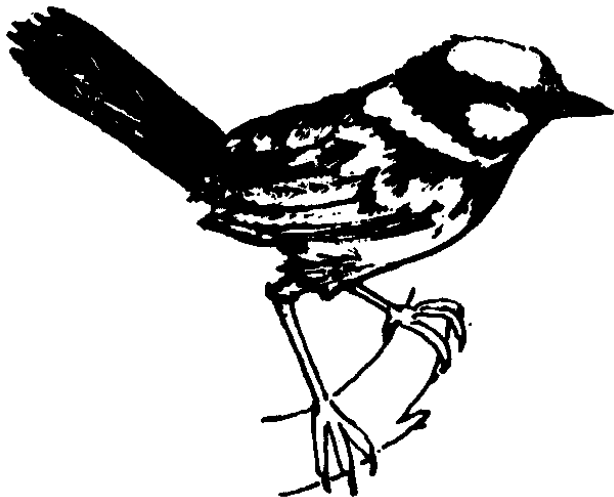
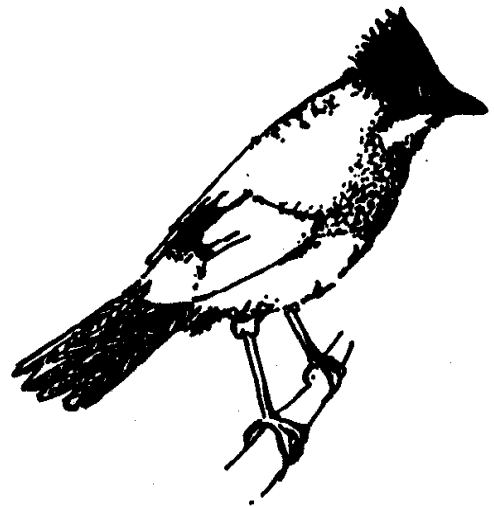
12. MAGPIE-LARK (*Grallina cyanoleuca*)

If you look closely you may be able to distinguish between male and female. If you see a bird, which does not fit either of the descriptions below, it is most likely to be a juvenile.



13. WHIPBIRD (*Psophodes olivaceus*)

The noisy chap with the unmistakable call who will greet you around the Environmental Education Centre building is usually heard but not seen. He spends the day on or close to the ground, scratching around amongst the leaf litter for insects. Malcolm McNaughton (1975) reports that at least some of the time, two birds combine singing talents with one making the first part of the famous call, and the second one completing it.



14. BLUE WREN

(*Malurus cyaneus*)

Well known to everyone, but don't forget it is only the male which is bright blue, the female being a plainer brown colour. Together they build a dome shaped nest in dense undergrowth and lay white eggs.

15. FANTAILS

These are Flycatchers, close relatives of the well-known Willie Wagtail (*Rhipidura Leucophrys*). The commoner species at Awabakal is the Grey fantail (*R. fuliginosa*) but the Rufous fantail (*R. rufifrons*) is also recorded. Both feed on flying insects. The Grey Fantail certainly nests here and the Rufous fantails are especially restless birds performing aerial antics often quite close to people walking quietly through forest areas. At such times the fan shaped tail is unmistakable.



16. WHISTLERS

Both the Golden Whistler (*Pachycephala pectoralis*) and the Rufous Whistler (*P. rufiventris*) are often seen by the quiet observer in the forest areas at Awabakal. They are small birds (15 cm long), the males of both species being brightly coloured while the females are less spectacular. They lay spotted eggs in an open nest in Spring or Summer.



Note that the bright colours of the males are all on the breast and underbelly. The more subdued colours on the back represent good camouflage protection from predators flying overhead.

The Rufous Whistler is most likely to be seen in the dry sclerophyll forest while the Golden Whistler is more common in wet sclerophyll gullies. Both species migrate northwards in winter.

17. HONEYEATERS

Ten species have so far been recorded in the Reserve, including:

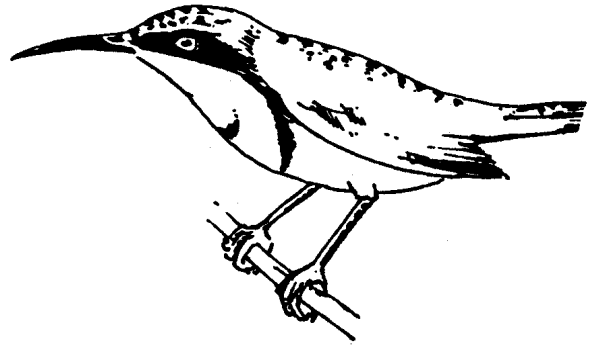
a) The two most common species in the heath at Dudley Bluff are the White-cheeked (*Phylidonyris niger*) and the Yellow-winged (*P. novaehollandiae*). They look alike and are most often glimpsed as a flash of colour flying from one dense shrub to another. The Yellow-winged or New Holland Honeyeater has a distinctive white eye, but this is difficult to see under normal conditions on the heath.



b) Eastern spinebill

(Acanthorhynchus tenuirostris)

Common around the dry heath on Dudley Bluff where it feeds on nectar, pollen and insects. Frequently visits suburban gardens around Newcastle.



c) Little Wattle-bird

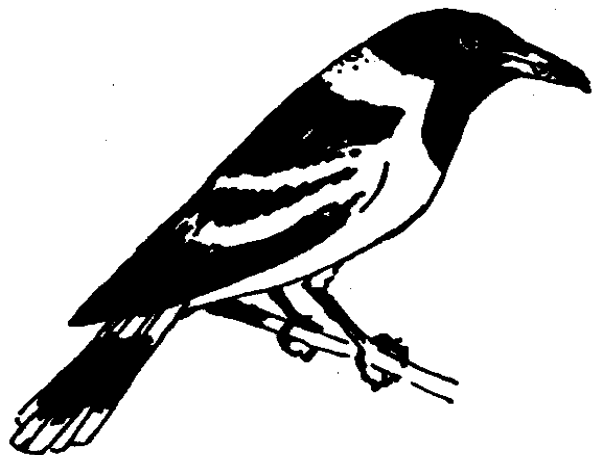
(Anthochaera chrysoptera)

A noisy bird found in both the forest and coastal heath areas. It feeds mainly on banksias flowers. While larger than most of the other honeyeaters, it is smaller than the Red Wattle-bird (*A. carunculata*), which although less common, might also be seen in the forest at Awabakal. The Little Wattle-bird measures 25-30 cm long.



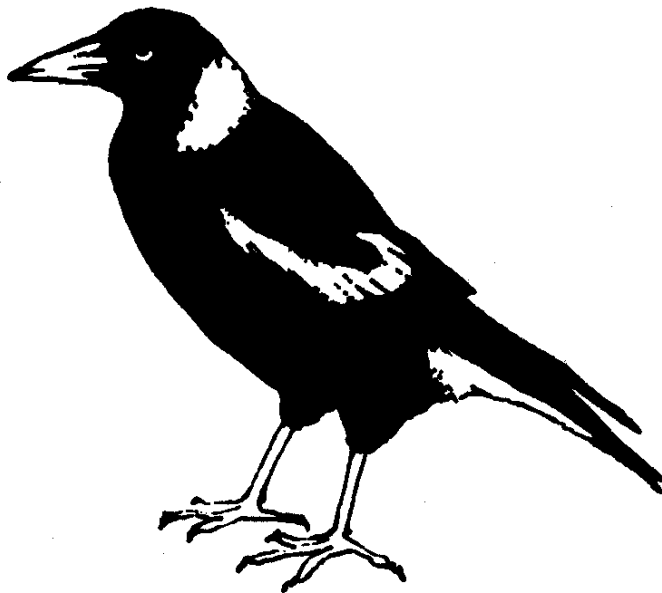
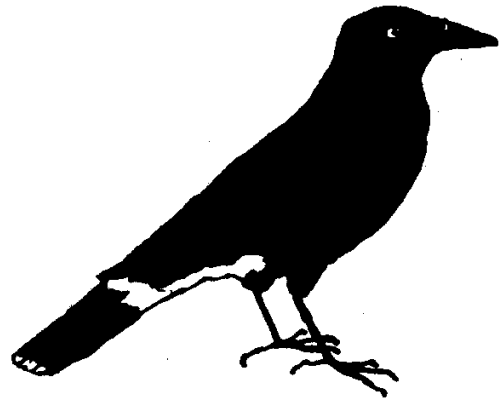
18. PIED BUTCHER BIRD (*Cracticus nigragularis*)

Famous for its beautiful song (especially in Autumn), and not so welcome attacks on caged birds. Food consists of lizards, insects, mice and small birds, which may be temporarily stored impaled on thorns or sharp spikes.



19. PIED CURRAWONG (*Strepera graculina*)

Common on the coast during Winter.
Usually either seen or heard in forest
or cleared areas.



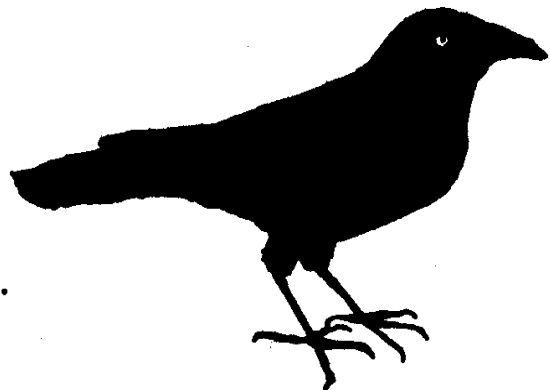
20. BLACK-EYED MAGPIE

Mainly in open forest and cleared
areas. Male and female look
alike except that the male is more
stark black and white, while the
female may have some grey
streaks.

21. AUSTRALIAN RAVEN

(*Corvus coronoides*)

The bird most people will call a
Crow. Technically speaking there
are no crows frequenting the
Newcastle Region. The bird in
question will be either the
Australian Raven or the Little
Raven (*C. mellori*). It is difficult to
distinguish between them.



NOTE:

Bird Calls: Often a bird is heard rather than seen and an experienced observer needs nothing more to positively identify the species. However, most calls lose a lot in translation to words and, for this reason, I have not attempted to express them in writing in the foregoing notes.

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REPTILES OF THE AWABAKAL RESERVE – A CHECKLIST

Listed by Stephen Parks and Theo Tasoulis.

FAMILY: CHELIDAE

Long-necked Tortoise

Cheladina longicollis

FAMILY: AGAMIDAE

Common Bearded Dragon

Amphibolurus barbatus

Jackey Lizard

Amphibolurus muricatus

Eastern Water Dragon

Physignathus lesueurii

FAMILY: PYGOPODIDAE

Burton's Legless Lizard

Lialis burtonis

Common Scaly Foot

Pygopus lepidopodus

FAMILY: SCINCIDAE

Striped Skink

Cryptoblepharus boutonii

Copper-tailed Skink

Ctenotus robustus

Land Mullet

Ctenotus taeniolatus

Garden Skink

Egernia major

Weasel Skink

Leiolopisma delicata

Leiolopisma mustelina

Leiolopisma guichenoti

Three-toed Skink

Siaphos equalis

Eastern Water Skink

Sphenomorphus quoyii

Yellow-bellied Skink

Sphenomorphus tenuis

She-oak Skink

Tiliqua casuarinae

Common Bluetongue

Tiliqua scincoides

FAMILY: TYPHLOPIDAE

Typhlina migrescens

FAMILY: BOIDAE

Diamond Python

Morelia s. spilotes

FAMILY: COLUBRIDAE

Green Tree Snake

Dendrelaphis punctulatus

FAMILY: ELAPIDAE

Dwarf Crowned Snake

Cacophis krefftii

Golden Crowned Snake

Cacophis squamulosus

Yellow-faced Whip Snake

Demansia psammophis

Marsh Snake

Hemiaspis signata

Red-bellied Black Snake

Pseudechis porphyriacus

Eastern Brown Snake

Pseudonaja textiles

FAMILY: HYDROPHIIDAE

Yellow-bellied Sea Snake

Pelamis platurus

THE DUDLEY MINE DISASTER AND ITS COMMUNITY

By Ken Leslight

It was a general rule that the air pumps had to be working for at least an hour before the men were allowed to enter the mine. Unfortunately, on 21st March, 1898, the men did go down before the gas, which had built up over the weekend, had cleared. The naked light in one of the lamps the miners used at the time ignited a pocket of gas in the mine causing the fatal explosion. Fifteen men were killed; of these, ten were buried at Whitebridge Cemetery and their tombstones are a reminder of the hazards and risks faced by the miners in the 18th and 19th century.

The conditions the miners worked in were very hazardous. They had to work in the narrow shafts in virtual darkness with the constant danger of fall-ins and explosions. It was usual for the men to work eight hours a day but if a “special job” was on, they were expected to continue until it was finished. With the lack of mechanization the men worked very hard, having only pit ponies to assist them in drawing the coal trucks through the shafts.

At the time of the explosion 250 men were employed at the Dudley mine, most being locals, though some traveled by train from Newcastle. The township itself had a population of between five and six hundred and centred around the three grocery shops, butcher, baker and two hotels. A school and a Methodist Church were also present.

The homes the miners lived in were rather small when compared to some of the homes in Dudley now. They only had two or four rooms with a wide verandah and were made of timber and had iron roofs.





THOMAS GREEN

A single man, aged 28 years, was born in Durham, England. He came to the colony 4 years ago, and lived with his parents at North Lambton. He was a member of the Hand of Freedom Lodge of Druids, and was a man of very fine physique. His remains were interred in the Wallsend General Cemetery on Thursday, 24th March, the same day as that on which the funeral of Mr W. Humphreys, another of the victims, took place. The funeral service at Green's grave was conducted by the Rev. B. Kenyon of the Primitive Methodist Communion.



CYPRUS PRICE

Leaves a widow and two children inadequately provided for. The family was found to be in need of prompt assistance. The body has not yet been recovered

SOURCE: Newcastle Morning Herald & Miners'
Advocate 2nd April, 1898.

A MEMBER OF THE
ADMINISTRATIVE COMMITTEE

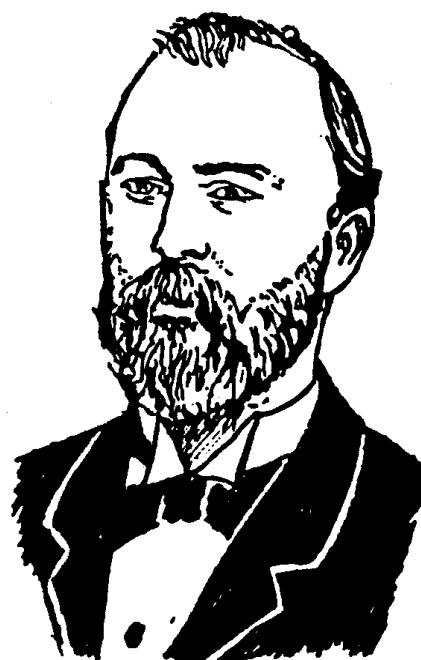
A VETERAN COLLIERY MANAGER



MR WILLIAM TURNBULL

No colliery manager in the district has had more practical experience in pit work than Mr W. Turnbull, who has been the colliery manager for the A.A Company for over 25 years. Before coming to the country he had been the manager of some of the largest collieries in Durham, and it was in view of his wide experience in dealing with explosions that the Hon. Alex Brown, M.L.J selected him as one of the administrative committee, which controlled the operations at the recent Dudley disaster.

THE DUDLEY
COLLIERY MANAGER



MR HUGH HUMPHREYS

Mr Hugh Humphreys, who is now 39 years of age, has been the colliery manager at Dudley almost from the inception of the pit. He was appointed to the position on January 21st, 1890, some few months after the three sinkers had lost their lives by being precipitated from the poppet heads to the pit bottom. He has since had the entire supervision of the working of the plant and machinery; also of the sinking of the lan-shaft and of the development of the mine, which, at the outset, was a matter of some difficulty. All the work has, however, been carried out without accident of any kind. Coal was first won from this colliery for marketable purposes on July, 1881.

The roads were bad and for transport most people relied on trains or horse drawn double-decker buses known as “Yankee Doodle Buses”, but some of the locals thought nothing of walking to Newcastle to go to see a concert or attend a dance.

Similarly, the housewives were undaunted by doing their washing out of doors, boiling the clothes in an old kerosene tin, scrubbing the floorboards and sewing the clothes worn. They assisted each other during illness; in fact, Dudley did not have a doctor, only a midwife, affectionately known as Granny Bromley (still remembered well by some of the now elderly residents she helped bring into the world).

The mine closed in 1938 and the site of the pit head was filled in and is now a sports field. Mullock heaps and remnants of railway lines are among the few reminders of the mining community.

